178 330 Operating Systems

Final Examination

28 February 2008 13.00 - 16.00

Instructions:

- 1. NO books, sheets, calculators are allowed.
- 2. There are 1 questions, 100 marks total, attempts ALL questions.
- 3. Do NOT cheat.
- 1. Explain the following terms: (10 marks) 1.1 Race condition

1.2 Semaphore

1.3 Mutex

1.4 Monitor

1.5 Dining Philosopher Problem

2. Draw the resource-allocation graph following allocations:

Process	Allocated Resources	Requesting Resources
PO	А	В
P1	D	E
P2	В	D
P3	-	А
P4	С	B, D
P5	E	С

Is there any deadlock ? If there is, which processes do involve ? (10 marks)

3. From the system snapshot at t_n , is it a safe state if total resource is 12 ? Explain

Process	Max Need	Need at <i>t_n</i>
PO	9	4
P1	7	3
P2	5	3
P3	2	1

(10 marks)

4. What are relationships between pages and frames in the paging system ? (5 marks)

5. What are swapping and demand paging ? Which one is better ? Why ? (5 marks)

6. A 64-bit CPU uses 36-bit addressing with 16kB-page size. How many level of paging should we use ? How many bits are used for each page level ? Explain. (10 marks)

7. TLB access time is 20 times less than those of the main memory. Given a hit rate of 0.95, what is the speed-up of systems with TLB compare to those without TLB? (10 marks)

8. Given a system with 3 frames, and the following sequence of page accesses:

0, 4, 4, 4, 6, 4, 5, 1, 2, 4, 1, 3

determine the number of page faults among FIFO, Optimal, and LRU page replacement algorithms (15 marks)

9. Why do we need files, directories, file systems, and virtual file systems ? (10 marks)

10. A disk has the geometry of 255 heads, 63 sectors, and 1,024 cylinders. Given the following sequence of cylinders to be accessed:

56, 426, 47, 598, 471, 927, 141, 710, 546, 264, 67, 51

and the current head position of the cylinder 13, determine the number of cylinders that the disk head must be moved for the SSTF, SCAN, and C-LOOK. (15 marks)