

Operating System Concepts

Midterm Exam

Instructor: Farn Wang

Class hours: 9:10-12:00 Tuesday

Room: BL 103

Course Nr. 901 49000

Fall 2013

Student name:

Student ID:

1. Please define what operating system is. (5pts/5)

2. Please explain the storage hierarchy in computer systems ? Please explain why it works ?
(10pts/15)

3. Please explain the activities in process management in operating systems. (5pts/20)

4. Please explain the importance of UNIX in the development of operating systems. (5pts/25)

5. What is system call in operating systems ? How is it implemented ? Why programmers use API instead of system calls ? (10pts/35)

6. What is the function of the SYSGEN process while installing an operating system ? (5pts/40)

7. What information are recorded in a process control block for process management of operating systems ? (5pts/45)

8. How does an operating system use queues to manage processes ? (5pts/50)

9. Please explain delayed termination of child threads ? (5pts/55)

10. In creating child processes, in UNIX environments, programmers can call `fork()` and `join()`.
What are the function of the two procedures ? (10pts/65)

11. Consider a system running ten I/O-bound tasks and two CPU-bound tasks. Assume that the I/O-bound tasks issue an I/O operation once for every two milliseconds of CPU computing and that each I/O operation takes 15 milliseconds to complete. Also assume that the context-switching overhead is 0.1 millisecond and that all processes are long-running tasks.

Describe the CPU utilization for a round-robin scheduler when:

- a. The time quantum is 4 milliseconds. (5pts/70)
- b. The time quantum is 10 milliseconds. (5pts/75)

12. Please explain the motivation of thread programming over process programming ? (5pts/80)

13. Please explain kernel threads and user-level threads ? (5pts/85)

14. Suppose we have the following processes. Please draw the schedules (Gantt Chart) respectively for the FCFS, preemptive SJF, and RR (time-quantum=4ms) scheduling policies.

<u>Process</u>	<u>Arrival time</u>	<u>Burst time</u>
P0	0	4 ms
P1	3	10 ms
P2	4	6 ms
P3	7	6 ms

14a. FCFS(2pts/87)

14b. preemptive SJF(2pts/89)

14c. RR (Quantum = 4ms) (2pts/91)

15. According to the workload in question 14, please calculate the following performance number for each scheduling policy: throughput, average turnaround time, average waiting time, average response time.

15a. FCFS

throughput (1pt/92)

average turnaround time (1pt/93)

average waiting time (1pt/94)

15b. preemptive SJF

throughput (1pt/95)

average turnaround time (1pt/96)

average response time (1pt/97)

15c. RR (Quantum = 4ms)

average turnaround time (1pt/98)

average waiting time (1pt/99)

average response time (1pt/100)