Final Exam

Operating System (1)

Computer and Syst. Dept.
Time Allowed: 3 hrs.
2nd Year Students.
Total Marks: 100
Code: CSE 3124

Solve the following:

- الامتحان في ورقتين (استخدم اقل عدد من الكلمات لإجابة الأجزاء النظرية).
- الرجاء وضوح الرسم قدر المستطاع (ليس شرطا استخدام المسطرة).
- يسمح باستخدام القلم الرصاص (شرط وضوح الخط).

Question 1: True or False (and why?) — 14 marks

(a) The number of the cylinders is greater than the number of tracks in any surface ( )
(b) All programs can be programmed in a multi-threaded manner. ( )
(c) Each process must have a process control block (PCB) in memory. ( )
(d) Data reliability is to keep data safe from human attacks. ( )
(e) FCFS is suitable for real time OS. ( )
(f) RR is suitable for time sharing systems. ( )
(g) Contiguous file allocation method suffers from external fragmentations. ( )

Question 2: Explain why? (Use the minimum words) — 10 Marks

(a) SJF CPU scheduling may suffer from starvation.
(b) The performance of RR depends heavily on the value of quantum time.
(c) RR is a preemptive circular FCFS.
(d) The minimum unit of data transfer is a block, while the smallest storage unit is a sector.
(e) It is difficult to map from block address to sector address.

Question 3: Explain how? — 6 Marks

(a) To map from logical block address to physical sector address.
(b) I/O devices connected to memory and CPU (use figures to explain your answer).
(c) To Accelerating Disk Access.

Question 4: Explain what? — 6 Marks

(a) Is meant by interrupt.
(b) Is meant by instruction cycle (Give your answer as a figure showing the details of the instruction cycle).

Question 5: Explain when? — 10 Marks

(a) Kernel runs the short term scheduler.
(b) Priority scheduling becomes identical to FCFS.
(c) SSTF disk scheduling suffers from starvation.
(d) A program becomes a process.
(e) The TAT of a process equals process execution time.

Question 6: — 10 Marks

Consider the following set of processes (burst time given in milliseconds) assuming a **system call takes place at time t=22.**

Process	Burst Time	Arrival time	Need I/O at
P_1	10	0	7
P_2	5	3	2
P_3	7	4	4
P_4	18	10	---

(a) Draw the Gant chart illustrates the execution of these processes.
(b) Calculate TAT and WT for each process, then calculate AWT for all processes.
(c) Calculate the number of context switches.

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Question 7: Draw the general structure of the memory unit, then:

(a) Specify the size of AR and DR.
(f) Explain the different memory operations.
(g) Draw the general structure of 128*5 memory.

10 Marks

Question 8: Explain the main difference between multi-threading and multi-programming, then:

(a) Explain how multi-threading adds flexibility when executing a process with long sub-tasks assuming a process with three sub-tasks(25 ms, 3 ms, and 2 ms) assuming the scheduling algorithm is RR and the process gain 6 ms in each CPU cycle.
(b) Write the code for the clock thread shown in figure 1.

10 Marks

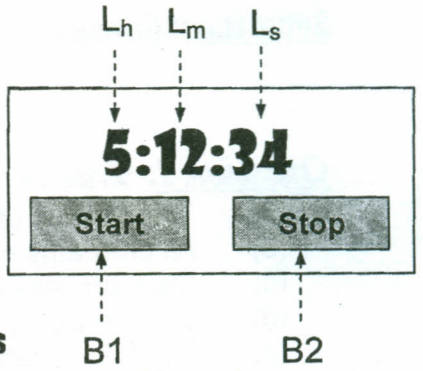

Figure 1

Question 9: Use figures only to:

16 Marks

(a) Explain how a file stored in blocks (141,452,378, 675) using FAT.
(b) Show the internal structure of 4*3 RAM, show how binary cells are connected together.
(c) Ready queue and input queue.
(d) The internal structure of the disk sector.
(e) How to use ACL to protect your data.
(f) Different process states.
(g) A block diagram showing the internal structure of the disk, then show how to choose the best scheduling technique.

Question 10: In multi-level queuing scheduling with feedback using the shown 3 queues (**Note**: Q3 uses **SJF** as a scheduling algorithm). Show how to schedule the shown processes in figure 2.

8 Marks

Process	Burst Time	Arrival Time
P_1	12	0
P_2	25	11
P_3	45	21
P_4	4	30
P_5	2	37
P_6	31	41

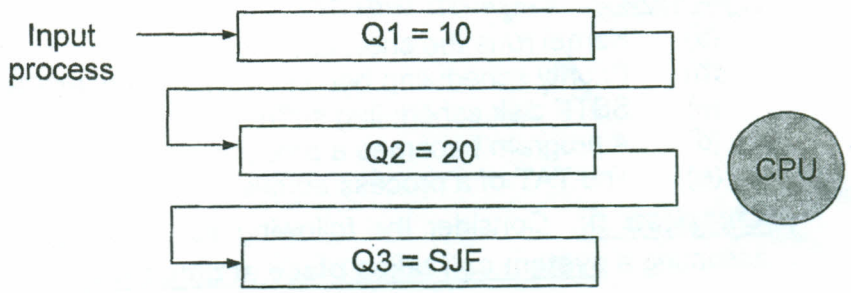

Figure 2

---------- End of Questions ----------

With Best Wishes ... ☺ ... Dr: Ahmed Saleh

PLZ, send your comments about the exam to: aisaleh@yahoo.com