Final Exam

Operating System

Solve the following Questions:

(1) Explain why?

   a. Deadlock can not be prevented by denying mutual exclusion.
   b. Paging may have internal fragmentations but it has no external fragmentations.
   c. Paging alone can not be used to implement virtual memory.
   d. Distributed system is a robust one.
   e. The virus does not start its destruction stage immediately after its arrival.
   f. Absolute loader cannot be used to load user processes.
   g. Load module may be greater or equal the object module.
   h. It is preferred to use the MAC address rather than IP address.
   i. Virtual memory may decrease the system performance.
   j. Sometimes it is preferred to ignore the deadlock problem.
   k. Although the resource allocation graph may have a cycle, the system may not be in a deadlock state (give an example).
   l. Memory should be managed carefully.
   m. Bootstrap loader is an absolute one.
   n. Dynamic linking minimizes the size of the load module.
   o. Static linking usually used to link to the language library.

(20 marks)

(2) Explain how? (briefly باختصار)

   a. Logical address is converted to physical address in contiguous memory allocation.
   b. To recover from deadlock.
   c. Can OS protect process from one another in contiguous memory allocation?
   d. To protect your network using NAT and PAT, give an example showing the used translation table.

(10 marks)

(3) Explain when?

   a. Page fault happened.
   b. Page replacement happened.
   c. Dirty bit=1.

(6 marks)

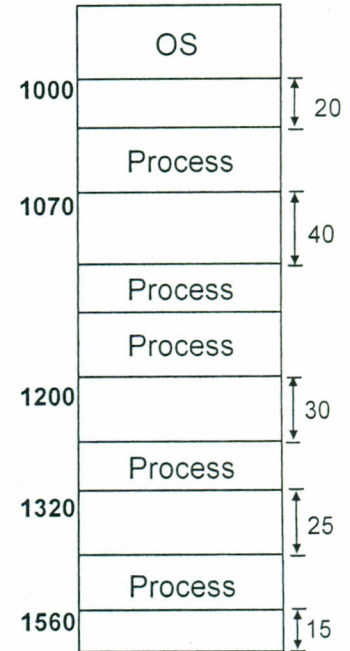(4) **Draw the segmentation hardware**, then:

Consider a process of size 55 words and consists of three segments as shown in table below. The segments are allocated in the sequence S_0, S_1 S_2. The current memory state is shown in the figure. Show how OS allocate those segments in a **first fit, then best fit**, then:

   • Show the contents of your segment table for each case.
   • Show how OS converts the logical to physical address.
   • According to your segment tables, what are the physical addresses corresponding to the logical addresses 15 and 37 (for each technique).

Memory state figure:

Address	Block	Size
	OS	
1000		20
1070	Process	40
	Process	
1200	Process	30
1320	Process	25
1560	Process	15

Segment	Size
S_0	10
S_1	25
S_2	20

(14 marks)

اقلب الورقة

(5) A memory of size of 30 words, the size of page (and frame also) = 5 words. Show how OS stores a process of 11 instructions using the paging technique, then:
Show the contents of your paging table.
- Show how OS converts the logical to physical address.
- According to your page table, what are the physical addresses corresponding to the logical addresses 2 and 7.
- Based on your answer, what are the paging drawbacks? In your opinion, can OS overcome such drawback? Why?

(10 marks)

(6) Use figures only to show the different steps for executing the user program.

(3 marks)

(7) Compare between: (briefly باختصار)
- a. Internal and external fragmentations.
- b. Services of Network and distributed operating systems (اذكر فقط).
- c. Web and Internet.
- d. Different methods to break the password.
- e. Different firewall techniques, then write some firewall security rules. **(10 marks)**

(8) What is meant by:
- a. Swapping, then mention the swapping disadvantages.
- b. Overlaying, then show to execute a process which is divided into six components C_1, C_2, C_3, C_4, C_5, C_6 in a total size of **100 KB**. The process components are shown below:

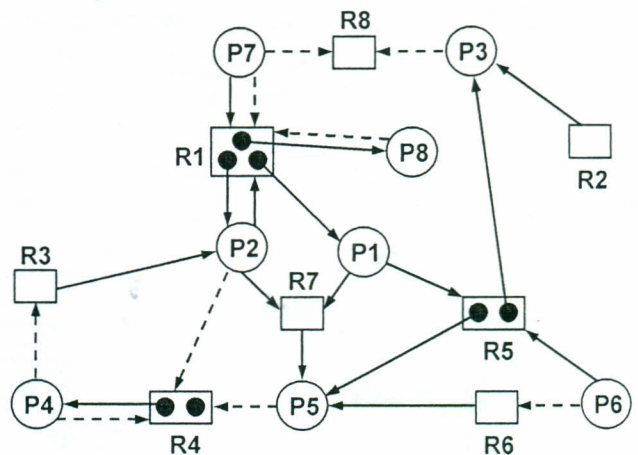| Component	Size	Description	Demands
C1	40 KB	Executable part	C2, C5
C2	30 KB	Driver	---------
C3	10 KB	Driver	Need to be kept in memory during the process execution
C4	20 KB	Executable part	C5
C5	20 KB	Driver	---------
C6	30 KB	Executable part	C2 ,C5

(8 marks)

(9) Determine the number of page fault using Optimal page replacement algorithm using **4** memory frames with the following reference string;

7,0,1,2,5,0,3,0,4,6,2,3,5,0,3,2,1,2,0,5,6,3,1,7,0,1

(5 marks)

(10) For the following resource allocation graph, is the system in the safe state? If yes, what is the safe sequence? If one instance of R4 is removed, is there will be a safe sequence for executing the processes.

(14 marks)