Summary in Graph

Exam Summary (GO Classes Test Series 2024 | Operating Systems | Test 3)

Qs. Attempted:	**14** 5 + 9	**Correct Marks:**	**12** 4 + 8
Correct Attempts:	**8** 4 + 4	**Penalty Marks:**	**0** 0 + 0
Incorrect Attempts:	**6** 1 + 5	**Resultant Marks:**	**12** 4 + 8

Total Questions:	**15** 5 + 10
Total Marks:	**25** 5 + 20
Exam Duration:	**45 Minutes**
Time Taken:	**45 Minutes**

EXAM RESPONSE   EXAM STATS   FEEDBACK

Technical

Q #1 Multiple Select Type   Award: 1   Penalty: 0   Operating System

Assume that the following table is the sequence of pages referenced by a program to be run in a 2-page memory. Assume demand paging is used.

Time	Page Referenced
1	1
2	2
3	1
4	3
5	4
6	stop

Which pages are in memory at time 6 if the program is run under the replacement rule LFU (the least frequently used page should be replaced)?

A. 1
B. 2
C. 3
D. 4

Your Answer: A;D | **Correct Answer: A;D** | Correct | Discuss

---

Q #2 | Multiple Select Type | Award: 1 | Penalty: 0 | Operating System

Which of the following statements describe(s) properties of a purely segmented memory system?

    A. It divides memory into units of equal size.
    B. It permits implementation of virtual memory.
    C. It suffers from internal fragmentation.
    D. It suffers from external fragmentation.

Your Answer: B;D | **Correct Answer: B;D** | Correct | Discuss

---

Q #3 | Multiple Choice Type | Award: 1 | Penalty: 0.33 | Operating System

Of the following page-replacement policies, which is guaranteed to incur the minimum number of page faults?

    A. Replace the page whose next reference will be the longest time in the future.
    B. Replace the page whose next reference will be the shortest time in the future.
    C. Replace the page whose most recent reference was the shortest time in the past.
    D. Replace the page whose most recent reference was the longest time in the past.

Your Answer: A | **Correct Answer: A** | Correct | Discuss

Q #4 | Numerical Type | Award: 1 | Penalty: 0 | Operating System

A computer has four frames that are currently filled with pages. The following table shows information about each page including the time the page was loaded into memory, the time the page was last referenced.

Page	Loaded	Last Reference
0	126	279
1	230	260
2	120	272
3	160	280

Assume different page replacement policies are considered to replace one of these pages. Which page will LRU replace?

Your Answer: 1 | **Correct Answer: 1** | Correct | Discuss

Q #5 | Multiple Select Type | Award: 1 | Penalty: 0 | Operating System

What is **demand paging?**

    A. A policy for determining when to bring a page into memory.
    B. A policy for determining which page to replace.
    C. Loading a page into memory only on a page-fault.
    D. Starting a process with all of its pages resident in physical memory.

| Your Answer: B;D | Correct Answer: A;C | Incorrect | Discuss |

Q #6 Multiple Choice Type   Award: 2   Penalty: 0.67   Operating System

Consider a system with N bytes of physical RAM, and M bytes of virtual address space per process. Pages and frames are K bytes in size. Every page table entry is P bytes in size, accounting for the extra flags required and such. What is the size of the page table of a process?

A. $N/K * P$
B. $M/N * P$
C. $M/K * P$
D. $N/P * K$

| Your Answer: C | Correct Answer: C | Correct | Discuss |

Q #7 Multiple Select Type   Award: 2   Penalty: 0   Operating System

Assume that you have a page reference string for a process. Let the page reference string have length p with n distinct page numbers occurring in it. Let m be the number of page frames that are allocated to the process (all the page frames are initially empty). Let $n > m$. Which of the following is correct?
(Your answer is independent of the page replacement scheme that you use.)

A. p is the lower bound on the number of page faults.
B. n is the lower bound on the number of page faults.
C. p is the upper bound on the number of page faults.
D. n is the upper bound on the number of page faults.

| Your Answer: | Correct Answer: B;C | Not Attempted | Discuss |

Q #8 Multiple Select Type   Award: 2   Penalty: 0   Operating System

Consider the page replacement policies of OPT(optimal page replacement), FIFO(first in first out), and LRU(least recently used). Which of the following statements are true? Be careful to notice when the phrase states **"better than or equal to"** versus **"strictly better than".**

A. OPT always performs better than or equal to LRU.
B. LRU always performs better than or equal to FIFO.
C. OPT with $n + 1$ pages(frames) of physical memory always performs better than or equal to OPT with n pages.
D. FIFO with $n + 1$ pages(frames) of physical memory always performs better than or equal to FIFO with n pages.

| Your Answer: B;D | Correct Answer: A;C | Incorrect | Discuss |

Q #9 Multiple Select Type   Award: 2   Penalty: 0   Operating System

Consider a virtual memory with M main memory page frames and a periodic page reference string

$$p_1, p_2, \ldots, p_N, p_1, p_2 \ldots, p_N, p_1, p_2 \ldots, p_N$$

of N distinct requests.

Assume that the string of N requests was constructed randomly, and assume that initially none of the pages are resident.

If the string of N requests is repeated many times, which of the following is (are) true?

A. The fewest page faults occur when $M \geq N$.

B. LRU and FIFO will always result in the same number of page faults.

C. LIFO will always result in the fewest possible page faults.

D. Assume that $N = 2M$ and FIFO is used. If the string $p_1, p_2, \ldots, p_N$ is repeated three times, then the number of page faults is $3N$.

Your Answer: A;B;C   **Correct Answer: A;B;D**   Incorrect   Discuss

---

Q #10   Multiple Select Type   Award: 2   Penalty: 0   Operating System

Belady's anomaly: Intuitively, it seems that the more frames the memory has, the fewer page faults a program will get. Surprisingly enough, this is not always true. Belady (1969) discovered an example in which FIFO page replacement causes more faults with four page frames than with three. This strange situation has become known as Belady's anomaly.

A program with five virtual pages numbered from 0 to 4 references its pages in the following orders given below. Using FIFO replacement, compute the number of page faults with 3 frames. Repeat for 4 frames.

I. 012301401234

II. 012301410234

Which of the following is true?

A. For I, The number of page faults is 9 with 3 frames.

B. For I, The number of page faults is 10 with 4 frames.

C. For II, The number of page faults is 6 with 3 frames.

D. For II, The number of page faults is 9 with 4 frames.

Your Answer: A   **Correct Answer: A;B**   Incorrect   Discuss

---

Q #11   Numerical Type   Award: 2   Penalty: 0   Operating System

Assume in a computer supporting paging, virtual addresses are 36 bits long. Page size is 16 KB. Assume a page table entry is 8 bytes long. The computer has 4 GB of RAM (physical memory).

We have three processes (A, B, C) in the system at the moment. The virtual memory VM layouts of the processes are like the following :

- A is using 64 MB from the start of its VM and 32 MB from the end. The rest of its VM is unused.
- B is using 128 MB from the start and 64 MB from the end. The rest of its VM is unused.
- C is using 32 MB from the start and 32 MB from the end. The rest of its VM is unused.

What will be the amount of physical memory required (in Mega Bytes) to hold the page table information for these three processes in total, if single-level page table is used?

Your Answer: 221   **Correct Answer: 96**   Incorrect   Discuss

---

Q #12   Numerical Type   Award: 2   Penalty: 0   Operating System

Assume in a computer supporting paging, virtual addresses are 36 bits long. Page size is 16 KB. Assume a page table entry is 8 bytes long. The computer has 4 GB of RAM (physical memory).
We have three processes (A, B, C) in the system at the moment. The virtual memory (VM) layouts of the processes are like the following :

- A is using 64 MB from the start of its VM and 32 MB from the end. The rest of its VM is unused.
- B is using 128 MB from the start and 64 MB from the end. The rest of its VM is unused.
- C is using 32 MB from the start and 32 MB from the end. The rest of its VM is unused.

What will be the amount of physical memory required (in K Bytes) to hold the page table information for these three processes in total, if two-level page table is used with address division scheme $(11, 11, 14)$?

Your Answer: 224   **Correct Answer: 224**   Correct   Discuss
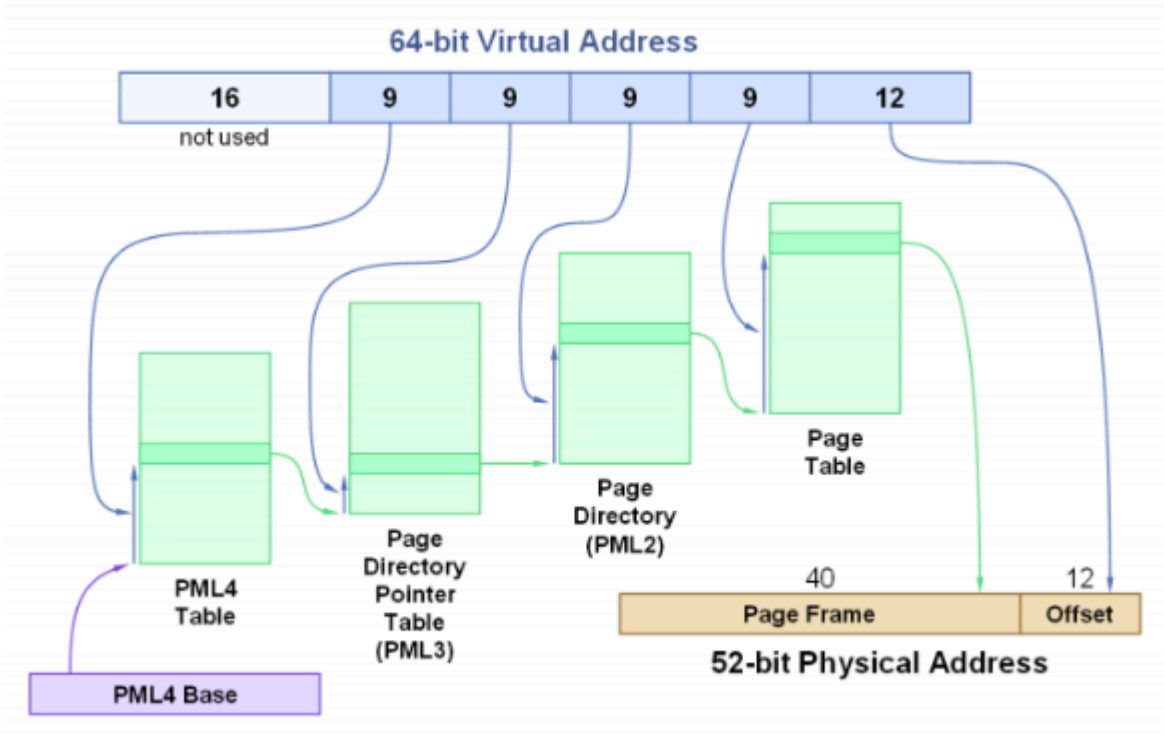

Q #13   Numerical Type   Award: 2   Penalty: 0   Operating System

The figure below shows the address translation mechanism used for 64-bit mode in Intel x86 processors. Starting with a 48-bit virtual addresses, it uses 4 levels of page table to translate the address to a 52-bit physical address. Each page table entry is 8 bytes long.

If the page size is increased, the number of levels of page table can be reduced. How large must pages be in order to translate 48-bit virtual addresses with only 2 levels of page table(Each page table at each level fits exactly into page)?
How large must pages be, in KB _____

Your Answer: 2048   **Correct Answer: 256**   Incorrect   Discuss

---

Q #14   Multiple Select Type   Award: 2   Penalty: 0   Operating System

Consider a system with a 6 bit virtual address space, and 16 byte pages/frames. The mapping from virtual page numbers to physical frame numbers of a process is $(0, 8), (1, 3), (2, 11)$, and $(3, 1)$. Note that all addresses are in decimal. Your answer must be in decimal.
Which of the following is/are true ?

A. The physical address to which virtual address 20 is mapped to is 52.
B. The physical address to which virtual address 40 is mapped to is 184.
C. The physical address to which virtual address 20 is mapped to is 53.
D. The physical address to which virtual address 40 is mapped to is 180.

Your Answer: A;B | **Correct Answer: A;B** | Correct | Discuss

---

Q #15 | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Operating System

A 10-unit heap of memory uses an allocation algorithm in which a block is allocated at the left end of the leftmost block in which it fits. Which of the following allocation/deallocation patterns CANNOT be satisfied?

A. $x := \mathrm{alloc}(10); \mathrm{free}(x); y := \mathrm{alloc}(3)$

B. $x := \mathrm{alloc}(5); y := \mathrm{alloc}(3); \mathrm{free}(x); z := \mathrm{alloc}(6)$

C. $x := \mathrm{alloc}(1); \mathrm{free}(x); x := \mathrm{alloc}(6); y; = \mathrm{alloc}(4)$

D. $x := \mathrm{alloc}(9); y := \mathrm{alloc}(1); \mathrm{free}(x); z := \mathrm{alloc}(8); w := \mathrm{alloc}(1)$

Your Answer: B | **Correct Answer: B** | Correct | Discuss

Copyright & Stuff