Assignment 8-1: Memory Management - Paging

Due Oct 14 at 11:59pm **Points** 26 **Questions** 11
Available until Oct 16 at 11:59pm **Time Limit** None **Allowed Attempts** 2

Instructions

Work through the questions for each of the sections. You may submit this exercise twice.

Objectives

- Apply the use of a **paging memory management** mechanism.
- Recognize the differences in memory addresses that are caused by different memory sizes.
- Recognize the differences in memory addresses that are caused by different page frame sizes.
- Practice the process of mapping a logical memory address to a physical memory address.
- Practice the process used to **calculate a physical memory address** in the context of **pure demand paging**.

Useful Resources

- How to convert binary to hexadecimal
  - http://www.wikihow.com/Convert-Binary-to-Hexadecimal (http://www.wikihow.com/Convert-Binary-to-Hexadecimal) (http://www.wikihow.com/Convert-Binary-to-Hexadecimal)
  - Base Conversions.pdf (https://drive.google.com/open?id=0B2pK0GpUEQ4hS2dCU3NTOHRHSHc) [URL: https://drive.google.com/open?id=0B2pK0GpUEQ4hS2dCU3NTOHRHSHc]

Take the Quiz Again

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	61 minutes	23 out of 26

Correct answers are no longer available.

Score for this attempt: **23** out of 26
Submitted Oct 13 at 3:22pm
This attempt took 61 minutes.

For the following questions, consider a paged memory system that has a physical main memory size of 64KB **(2^{16})** and a page frame size of 8KB **(2^{13})**. Consider a process P whose logical address space is 64KB **(2^{16})**.

Important Note: If an answer requires an exponent, use the ^ character. For example: **2^{16}** would **be entered as 2^16.**

Question 1

2 / 2 pts

How many physical page frames are there in the above paged memory system? *Your answer should be in exponential form.* 2^3

How many bits are needed to represent a physical page frame number in the system? 3

Answer 1:

2^3

Answer 2:

3

Question 2

2 / 2 pts

How many logical pages are there for P? *Your answer should be in exponential form.* 2^3

How many bits are needed to represent a logical page number for P?

3

Answer 1:

2^3

Answer 2:

3

Question 3

4 / 4 pts

Assume that the state of the page table for some process P is as shown below. Note that both the page and page frame number shown in the page table are in ***hexadecimal*** so you will need to do some conversion.

Page	Frame
0x 0	0x 1
0x 1	0x 6
0x 2	0x 3
0x 3	0x 5
0x 4	0x 2
0x 5	0x 4
0x 6	0x 7
0x 7	0x 0

Given the logical address 0x 969C, what will be the logical page number issued by a process P? 0x 4

What is the corresponding physical frame number? 0x 2

Note: Your responses should be given in **hexadecimal** format!

Answer 1:

0x 4

Answer 2:

0x 2

For the following questions, consider a paged memory system that has a physical main memory size of 1MB (2^{20}) and a page frame size (and hence page size) of 32KB (2^{15}). Consider a process P whose logical address space is 512KB (2^{19}).

Important Note: If an answer requires an exponent, use the ^ character. For example: 2^{15} would be entered as 2^15.

Question 4

2 / 2 pts

How many physical page frames are there in the above paged memory system? *Your answer should be in exponential form.* 2^5

How many bits are needed to represent a physical page frame number in the system? 5

Answer 1:

2^5

Answer 2:

5

Question 5

2 / 2 pts

How many logical pages are there for P? *Your answer should be in exponential form.* 2^4

How many bits are needed to represent a logical page number for P?

4

Answer 1:

2^4

Answer 2:

4

Translate the following logical addresses issued by P into a physical addresses, assuming the state of the page table for P is as follows:

Page	Frame
0x 0	0x 1
0x 1	0x C
0x 2	0x 9
0x 3	0x 16
0x 4	0x 2
0x 5	0x 1C
0x 6	0x 19
0x 7	0x 8
0x 8	0x D

0x 9	0x 1A
0x A	0x 1F
0x B	0x 6
0x C	0x 12
0x D	0x 15
0x E	0x 3
0x F	0x A

Note that both the page number and page frame number shown in the page table are in ***hexadecimal***.

Partial

Question 6

4 / 6 pts

Given the logical address 0x 69656, what will be the logical page number issued by a process P? 0x D

What is the corresponding physical frame number? 0x 15

What is the hexadecimal physical address? 79656

Note: Your responses should be given in **hexadecimal** format!

Answer 1:

0x D

Answer 2:

0x 15

Answer 3:

79656

For the following questions, consider a system that has a physical main memory size of 32KB (2^{15}) and a page frame size (and hence page size) of 4KB (2^{12}). Assume that the system uses **pure demand paging** and that the system supports up to 16-bit logical/virtual addresses. Assume that a process P2 with a logical address space of 64KB (2^{16}) executes on this system. Assume that the current state of the page table for P2 in as shown below. The index of each entry in the page table is given for your convenience. Note that both the page and page frame number are in ***decimal***. If a logical page is not currently in the physical main memory, no frame number is specified for that logical page.

Page	Frame
0	1
1	-
2	7
3	2
4	0
5	-
6	5
7	-
8	-
9	3
10	-
11	-
12	-
13	4
14	-
15	6

Question 7

2 / 2 pts

How many page frames are there in the above pure demand paging memory system? *Your answer should be in exponential form.*

2^3

How many bits are needed to represent a physical page frame number in the system? 3

Answer 1:

2^3

Answer 2:

3

Question 8

2 / 2 pts

How many logical pages are there in the process P2? *Your answer should be in exponential form.* 2^4

How many bits are needed to represent a valid logical page number in the logical address space of process P2? 4

Answer 1:

2^4

Answer 2:

4

Question 9

1 / 1 pts

At any given time, what is the maximum number of entries in the page table of P2 that can have valid physical frame numbers?

8

Incorrect

Question 10

0 / 1 pts

Assume that P2 issues the logical address 0xA87A.

What is the logical page number contained in the given logical address, in *hexadecimal*?

A

Question 11

2 / 2 pts

What is the logical page number, *in decimal*, that corresponds with the hexadecimal logical address of the page being requested in the previous question? 10

Is this page being requested currently in the physical main memory? (*yes or no*) no

Answer 1:

10

Answer 2:

no

Quiz Score: **23** out of 26