CS241 Section: Week 10

Topics

- LMP2 changes
- Problem solving session: Memory

LMP2 Changes

- In .c and .h file, change the return type of my_mwrite to int, instead of void
- In the tester programs, change the following line:
  - sprintf(filename[i], "file%d", i+1);

  to
  - sprintf(filename[i], "tester/file%d", i+1);
- File map table: initialization and maintenance may be done in the encrypt and decrypt function

Memory: Problem Solving Session

Problem 1

Consider a system in which the memory has the following hole sizes in the following memory order:

1KB, 4 KB, 15 KB, 20 KB, 4 KB, 7 KB, 18 KB, 12 KB, 15 KB, 9 KB

You are given successive requests for program segments in the following order:

10 KB, 5 KB, 3 KB, 2 KB, 19 KB, 9 KB, 24 KB, 10 KB.

For each of the following algorithms, show how the holes get filled for each of the above requests. If a particular request cannot be satisfied, you can skip it (but do mention which ones cannot be satisfied):

- First fit
- Best fit
- Worst fit
- Next fit

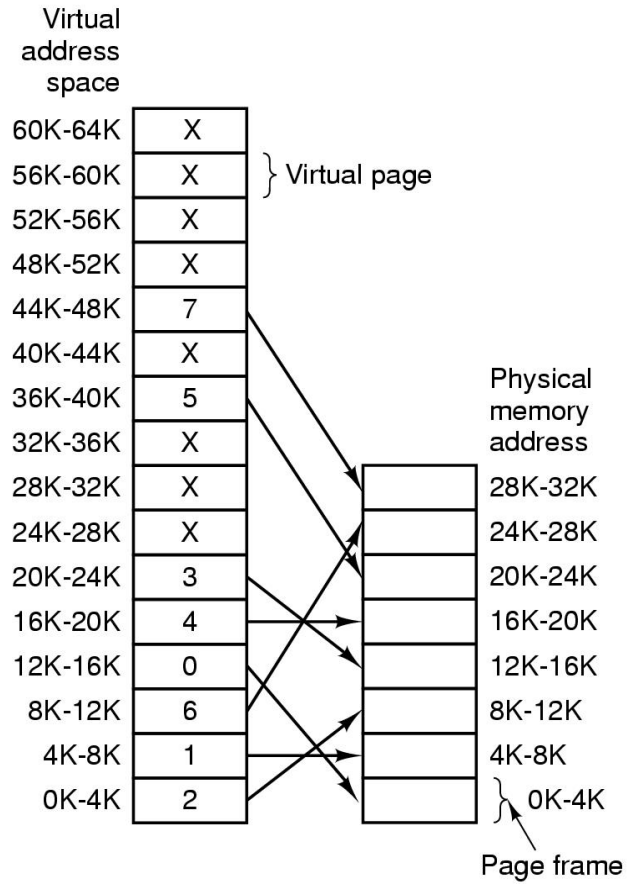
Problem 2

For each of the following decimal virtual addresses, compute the virtual page number and offset for a 4 KB page and for and 8 KB page: 20000, 32768, 60000.

Problem 3

Consider the page table of the figure. Give the physical address corresponding to each of the following virtual addresses:

- 29
- 4100
- 8300



Problem 4

A machine has 48 bit virtual addresses and 32 bit physical addresses. Pages are 8 KB. How many entries are needed for the page table?

Problem 5

Consider a machine such as the DEC Alpha 21064 which has 64 bit registers and manipulates 64-bit addresses.

If the page size is 8KB, how many bits of virtual page number are there?

If the page table used for translation from virtual to physical addresses were 8 bytes per entry, how much memory is required for the page table and is this amount of memory feasible?

Problem 6

A computer with a 32-bit address uses a two-level page table. Virtual addresses are split into 9-bit top-level page table field, an 11 bit second-level page table field, and an offset.

How large are the pages and how many are there in the address space?

Problem 7

Fill in the following table:

Virtual Address (bits)	Page Size	# of Page Frames	# of Virtual Pages	Offset Length (bits)	Addressable Physical Memory
16	256 B	2^2			
32	1 MB	2^4			
32	1 KB	2^8			
64	16 KB	2^20			
64	8 MB	2^16			

Problem 8

Fill in this table with the correct page evictions.
Physical memory contains 4 pages.

Page Accesses	0	1	2	3	4	1	3	4	4	5	3	1	2	0	4	5	4
Optimal	-	-	-	-	0	-	-	-	-	4	-	-	-	3	2	-	-
FIFO	-	-	-	-													
LRU	-	-	-	-													
LFU	-	-	-	-													
MRU	-	-	-	-													