CS & IT ENGINEERING

Operating System

Memory Management

DPP 05 (Discussion Notes)

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TOPICS TO BE COVERED

01 Question

02 Discussion

Consider a paging system with a 256MB logical address space. How many bits of logical address will be required corresponding to given LAS?

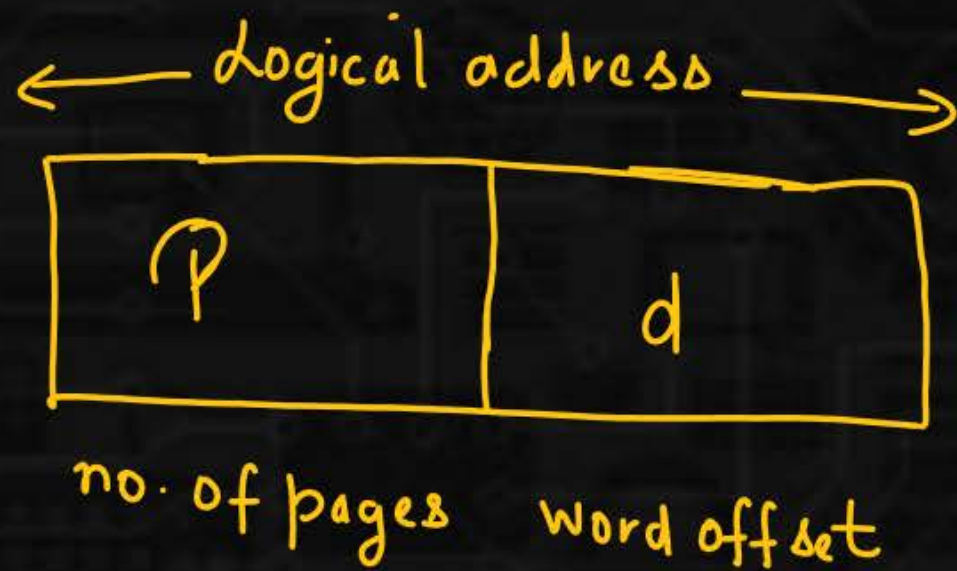[NAT]

$$256 \, MB \Rightarrow 2^8 * 2^{20} \text{ Bytes}$$

$$\Rightarrow 2^{28} \text{ Bytes.}$$

$$\Rightarrow \log_2 2^{28} = \underline{28 \, bits}$$

Consider a paging with 12 bits of logical address and each page is of size 2KB. Calculate the number of pages in this system? [NAT]

$$\xleftarrow{\hspace{2cm}} \text{Logical address} \xrightarrow{\hspace{2cm}}$$

P	d
no. of pages	word offset

$L \cdot A = 12 \text{ bits}$

word offset $(d) = 2KB$

$\Rightarrow 2^{11} B$

$\Rightarrow \log_2 2^{11} \Rightarrow \underline{11 \text{ bits}}$
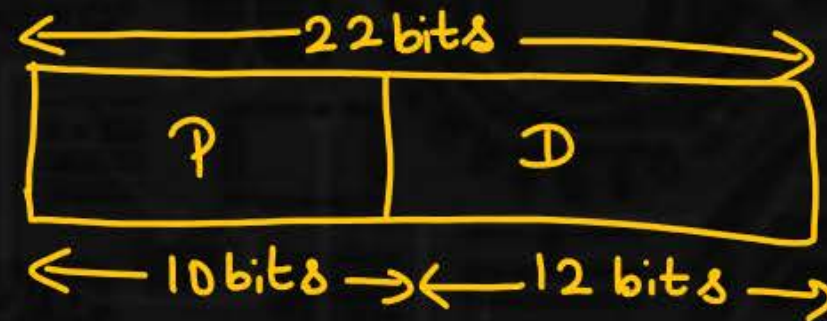
$$\frac{2^{12}}{2^{11}} \Rightarrow \text{No. of pages}$$

$$\Rightarrow 2^1 \Rightarrow \underline{2 \text{ pages}}$$

Q.3 Consider a system with 22 bits of logical address and 12 bits of page offset. Calculate logical address space, the number of pages, and page size respectively. Which of the following is correct?

[MSQ]

A. 4MB, 1K, 4KB

B. 8MB, 2K, 2KB

C. 4096KB, 1K, 4KB

D. 4096MB, 2K, 4MB

$$4 * 2^{20} B$$

$$\Rightarrow 4 * 2^{10} * 2^{10} B$$

$$\Rightarrow 4 * (1024) * 2^{10} B$$

$$\Rightarrow 4096 KB$$

$$2^{22} \text{ Bytes}$$

$$\Rightarrow 4 * 2^{20} \text{ Bytes}$$

$$\Rightarrow 4MB$$

$$2^{10} \Rightarrow 1K (1024)$$

$$2^{12} \Rightarrow 4 * 2^{10} B$$

$$\Rightarrow 4KB$$

22 bits — P | D

10 bits, 12 bits

Q.4 Which among the following is not an operation of paging hardware?

[MCQ]

A. Page fault repair

B. Memory protection

C. Address translation

D. none

Q.5 Consider the following statements:

S_1: In paging, logical address space is divided into [MCQ]
fixed partitions called "pages".

P	D

S_2: In paging, physical address space is divided into
fixed partition called "frames"

F	D

Which of the following is correct?

A. Only S_1 is true

B. Only S_2 is true

C. Both S_1 and S_2 are true

D. Both S_1 and S_2 are false

Q.6

Consider a system with 32-bit logical address, page size of 32KB and page table entry (PTE) size is 8 Bytes. How many pages are there in logical address space?
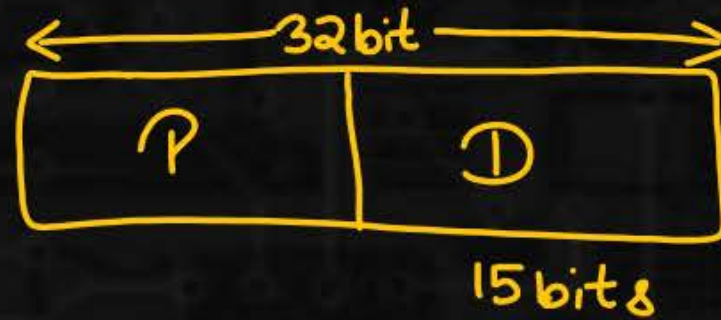
(P)(W)

[MCQ]

(A.) 2^{17}

(B.) 2^{19}

(C.) 2^{20}

(D.) none

$$\leftarrow 32\,bit \rightarrow$$

| P | ① |

15 bits

$32 - 15 \Rightarrow 17$

$32kB \Rightarrow 2^5 * 2^{10} B$

$\Rightarrow 2^{15} B$

17 bits to represent a page

The no. of pages $\Rightarrow 2^{17}$

128K pages

Q.7 Which of the memory allocation scheme suffers from external fragmentation?

[MCQ]

(A.) Paging ✗

(B.) Swapping ✗

(C.) Segmentation

(D.) none

Q.8 There are half as many holes as processes, the S be the average size of process and xS be the average size of holes. Then the total memory M is estimated using _____ if there are total n process in the system.

[MCQ]

(A.) $nS\left(\dfrac{x}{2}-1\right)$ ✗

(B.) $nS\left(\dfrac{x}{2}+1\right)$

(C.) $xS+\dfrac{n}{2}$

(D.) $\dfrac{nS}{2}+x$

n = Processes

(H) Holes = $\dfrac{n}{2}$

Size of the process (S)

Size of hole (H) = xS

$M = n^{*}S + \dfrac{n}{2}^{*} \times S$

$$M \Rightarrow nS\left(1+\dfrac{x}{2}\right)$$