Branch : CSE & IT Batch:Hinglish

Subject : Operating System

Topic : Memory Management

DPP-02

[MCQ]

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

(a) Page fault repair
(b) Memory protection
(c) Address translation
(d) none

[MCQ]

2. Consider the following statements:

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

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

Which of the following is correct?

(a) Only S_1 is true
(b) Only S_2 is true
(c) Both S_1 as S_2 are true
(d) Both S_1 and S_2 are false

[MCQ]

3. 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?

(a) 2^{17} (b) 2^{19}
(c) 2^{20} (d) none

[MCQ]

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

(a) Paging (b) Swapping
(c) Segmentation (d) none

[NAT]

5. In a virtual memory, size of virtual address is given as 64 bit, size of physical address is given 30 bit, size of page is given as 8KB and each page table entry is of 64bit.

Considering main memory is byte addressable. How many bits can be used to store protection and other information in each page table entry?

[MCQ]

6. In the paged memory. Page hit ratio is given as 0.4 and the time required to access the page from secondary memory and primary memory are given as 140ns and 18ns respectively.

Calculate the average time to needed to access a page?

(a) 90.8 (b) 91.2
(c) 80.8 (d) 81.2

[NAT]

7. In paging it requires 120ns to access the main memory and it needs 30ns to search translation look – a – side Buffer. If TLB hit ratio is 60%, then find the effective memory access time.

Answer Key

1. **(a)**
2. **(c)**
3. **(a)**
4. **(c)**
5. **(47)**
6. **(b)**
7. **(198)**

Hints and Solutions

1. (a)

Page fault repair: Page fault repair is not an operation of paging hardware, It's an error which is occurred when operating system is unable to find the particular file in memory.

Hence a is correct option.

Memory protection: It's an operation of paging hardware where, memory protection prevents a process from accessing unallocated memory in operating system.

Address translation: The addresses generated by the machine while executing in user mode are logical addresses. The paging hardware translates logical addresses to physical addresses.

2. (c)

- In paging, logical address space is divided into fixed partitions called **pages**.
- In paging, physical address space is divided into fixed partitions called 'frames'.

3. (a)

Given

Logical address (LA) = 32 bits

Page size (PS) = 32KB

Page table entry size(PTES) = 8 Bytes

No. of pages in logical address space

$$= \frac{2^{32}}{2^5 \times 2^{10}}$$

$$= \frac{2^{32}}{2^{15}}$$

$$= 2^{17}$$

4. (c)

Segmentation does not Suffer from internal fragmentation but suffers from external fragmentation.

5. (47)

Virtual memory = 2^{64} bytes

Physical memory = 2^{30} bytes

Page size = frame size

$= 8 * 10^3$ bytes

$= 2^3 * 2^{10}$ bytes

$= 2^{13}$ bytes

$$\text{Number of frames} = \frac{\text{Physical memory}}{\text{frame size}}$$

$$= \frac{2^{30}}{2^{13}} = 2^{17}$$

Number of bits for frame = 17 bits.

Each page table's entry size = Number of bits for frame + other information.

So, other information = Page table entry size – No. of bits for frame.

= 64 – 17

= 47 bits.

6. (b)

Average access time = Hit ratio × primary memory access time + (1 – hit ratio) × secondary memory access time

= 0.4 × 18 + (1 – 0.4) × 140

= 7.2 + 84

= 91.2

7. (198)

Effective access time = H(T + M) + (1 – H) (T + 2M)

0.6 × (30 + 120)

= (0.4) * (30+ 2(120))

= 0.6 * 150 + 0.4 × 270

= 90 + 108

= 198.

For more questions, kindly visit the library section: Link for app: https://physicswallah.live/tabs/tabs/library-tab

For more questions, kindly visit the library section: Link for web: https://links.physicswallah.live/vyJw

Any issue with DPP, please report by clicking here- https://forms.gle/t2SzQVvQcs638c4r5

PW Mobile APP: https://play.google.com/store/apps/details?id=xyz.penpencil.physicswala

For PW Website: https://www.physicswallah.live/contact-us