Branch : CSE & IT Batch:Hinglish

Subject : OPERATING SYSTEMS

Topic : Inverted Paging, Shared pages & Monitors

DPP 01

[MCQ]

1. Consider a processor with 128MB of physical memory and 32 bit of virtual address space. If the page size is 8KB, then approximate size of conventional and inverted page table will be?

(a) Conventional Page Table Size = 1MB
Inverted Page Table Size = 48KB

(b) Conventional Page Table Size = 2MB
Inverted Page Table Size = 96KB

(c) Conventional Page Table Size = 4MB
Inverted Page Table Size = 192KB

(d) Conventional Page Table Size = 8MB
Inverted Page Table Size = 48KB

[MCQ]

2. Most virtual memory schemes make use of special high-speed cache for page table entries, usually called _____.

(a) Translation lookaside buffer (TLB)
(b) Memory Management Unit
(c) Page table of segment table
(d) Page table

[MCQ]

3. choose the correct statements from the following.

S_1: For a given size of TLB, as the memory size of process grows and as locality decreases, the hit ratio on TLB accesses declines.

S_2: One way to improve TLB performance is to use a larger TLB with more entries.

(a) Only S_1 is true.
(b) Only S_2 is true.
(c) Both S_1 & S_2 are true.
(d) Both S_1 & S_2 are false.

[MCQ]

4. Choose the correct statements from the following:

S_1: Monitor is collection of variables, conditional variables and procedures combined together in a special kind of module or package.

S_2: Monitors have an important property that many processes can be active inside the monitor at any point of time.

(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.

[MCQ]

5. A monitor is specified by _____

(a) An identifier.
(b) Numbers of variables in it.
(c) A set of programmers defined.
(d) None of the above.

[MSQ]

6. Choose the false statements from the following

(a) In segmentation, each segment has a name and segments can be variable size.
(b) In paging page are fixed.
(c) Segmentation may suffer from external fragmentation.
(d) Paging technique suffer from external fragmentation.

[MCQ]

7. Select the correct statements from the following:

S_1: Shared pages are used to improve the performance of the paging system.

S_2: To avoid duplication of the same pages in the same memory, it is preferable to share the pages. Shared pages are used to avoid having two copies of a page in memory at once.

(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.

[MCQ]

8. Choose the correct statements from the following about shared pages:

S_1: A shared page is shared memory page that can be used by multiple processes at the same time.

S_2: The most advantage of shared pages is that only one copy of a shared file exists in memory, reducing the overhead of pages and allowing most efficient use of RAM.

(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.

Answer Key

1. **(a)**
2. **(a)**
3. **(c)**
4. **(a)**
5. **(c)**
6. **(d)**
7. **(c)**
8. **(c)**

Hints & Solutions

1. (a)

For Conventional Page Table,

$$\text{Number of pages} = \frac{\text{virtual memory size}}{\text{page size}}$$

$$= \frac{2^{32}\text{B}}{2^{13}\text{B}}$$

$= 2^{19}$

Page table size = Number of pages * PTE size

$= 2^{19}*2\text{B}$ [frame number bits = 14 bits ≈ 2 bytes]

= 1MB

For Inverted Page Table,

$$\text{Number of frames} = \frac{\text{physical memory size}}{\text{page size}}$$

$$= \frac{2^{27}\text{B}}{2^{13}\text{B}}$$

$= 2^{14}$ frames

Page table size = Number of frames * PTE size

$= 2^{14}*3\text{B}$ (Page number bits = 19 bits ≈ 3 bytes)

$= 2^4*2^{10}*3$ bytes

$= 16 * 2^{10} * 3$ bytes

$= 48 * 2^{10}$ bytes

= 48 KB

2. (a)

Every virtual memory reference can cause two physical memory accesses, one to fetch the appropriate page table entry and one to fetch the desired data. Thus, a straight-forward virtual memory scheme would have the effect of doubling the memory access time to overcome this problem. Most virtual memory schemes make use of a special high-speed cache for page table entries usually called a translation look aside buffer (TLB).

3. (c)

- for a given size of TLB, as the memory size of process grows and as locality decreases, the hit ratio on TLB access declines.
- One way to improve TLB performance is to use a larger TLB with more entries. Hence, both the statements S_1 and S_2 are true.

4. (a)

Monitors have an important property that "only one" process can be active inside the monitor at any point of time.

5. (c)

A monitor is specified by a set of programmers defined operators.

6. (d)

paging technique suffers from internal fragmentation. Maximum internal fragmentation in paging will be p/2 where p is the page size.

7. (c)

- Shared pages are used to improve the performance of the paging system.
- To avoid duplication of the same pages in the same memory, it is preferrable to share the pages. shared pages are used to avoid having two copies of a page in memory at once.

8. (c)

- A shared page is shared memory page that can be used by multiple processes at the same time.
- The most advantage of shared pages are that, only one copy of a shared file exists in memory, reducing the overhead of pages and allowing more efficient use of RAM.