

Examination – VI

Answer *all* from Section-A and *any eight* from Section-B

SECTION-A

[1 x 10 = 10]

1. CPU fetches the *instruction* from memory according to the value of:
 1. Program Counter
 2. Status Register
 3. Instruction Register
 4. Program Status Word
2. Memory management technique in which system stores and retrieves data from secondary storage for use in Main Memory is called?
 1. Fragmentation
 2. Paging
 3. Mapping
 4. None of these
3. The page table contains:
 1. Base address of each page in physical memory
 2. Page Offset
 3. Page Size
 4. None of these
4. Virtual Memory is:
 1. an extremely large main memory
 2. an extremely large secondary memory
 3. an illusion of an extremely large memory
 4. a type of memory used in super computers
5. A multilevel page table is preferred in comparison to a single level page table for translating virtual address to physical address because:
 1. It reduces the memory access time to read or write a memory location.
 2. It helps to reduce the size of the page table needed to implement the virtual address space of a process.
 3. It is required by the Translation Look Aside Buffer (TLB).
 4. It helps to reduce the number of page faults in page replacement algorithms.
6. If there are 32 segments, each of size 1 Kbytes, then the logical address space should have:
 1. 13 bits
 2. 14 bits
 3. 15 bits
 4. 16 bits
7. Dirty Bit for a page in a page table:
 1. Helps avoid unnecessary writes on a paging device.
 2. Helps maintain LRU information.
 3. Allows only read on a page.
 4. None of these
8. In a partitioned memory allocation scheme, the:
 1. Best Fit algorithm is always better than the First Fit algorithm.
 2. First Fit algorithm is always better than the Best Fit algorithm.
 3. Superiority of the First Fit and Best Fit algorithms depend on the sequence of memory requests.
 4. None of these

9. The address of a page table in memory is pointed by:
 1. Stack Pointer (SP)
 2. Page Table Base Register (PTBR)
 3. Page Register (PR)
 4. Program Counter (PC)
10. When the memory allocated to a process is slightly larger than the process, then:
 1. Internal Fragmentation occurs.
 2. External Fragmentation occurs.
 3. Both internal and external fragmentation occurs.
 4. Neither internal nor external fragmentation occurs.

SECTION-B

[5 x 8 = 40]

1. A computer system supports 32-bit virtual addresses as well as 32-bit physical addresses. Since the virtual address space is of the same size as the physical address space, the operating system designers decide to get rid of the virtual memory entirely. Which one of the following is True?
 1. Efficient implementation of multi-user support is no longer possible.
 2. The processor cache organization can be made more efficient now.
 3. Hardware support for memory management is no longer needed.
 4. CPU scheduling can be performed more efficiently.
2. Consider the virtual page reference string 1, 2, 3, 2, 4, 1, 3, 2, 4, 1. On a demand paged virtual memory system running on a computer system that main memory size of 3 pages frames which are initially empty. Let LRU, FIFO, OPTIMAL denote the number of page faults under the corresponding page replacements policy. Then:
 1. OPTIMAL < LRU < FIFO
 2. OPTIMAL < FIFO < LRU
 3. OPTIMAL = LRU
 4. OPTIMAL = FIFO
3. A virtual memory system uses First-In-First-Out (FIFO) page replacement policy and allocates a fixed number of frames to a process. Consider the following statement: (P) Increasing the number of page frames allocated to a process sometimes increases the page-fault rate. (Q) Some programs do not exhibit locality of reference. Which one of the following is True?
 1. Both P and Q are true, and Q is the reason for P.
 2. Both P and Q are true, but Q is not the reason for P.
 3. P is false, but Q is true.
 4. Both P and Q are false.
4. In a system with 32-bit virtual addresses and 1KB page size, use of one-level page tables for virtual to physical address translation is not practical because of:
 1. the large amount of internal fragmentation
 2. the large amount of external fragmentation
 3. the large memory overhead in maintaining the page tables
 4. the large computation overhead in the translation process
5. Consider a machine with 64MB physical memory and a 32-bit virtual address space. If the page size is 4KB, the approximate size of the page table is _____.
6. Consider six memory partitions of size 200KB, 400KB, 600KB, 500KB, 300KB and 250KB, where KB refers to Kilobyte. These partitions need to be allotted to four processes of sizes 357KB, 210KB, 468KB, and 491KB in that order. If the Best-Fit algorithm is used, which partitions are NOT allotted to any process?
 1. 200KB and 300KB
 2. 200KB and 250KB
 3. 250KB and 300KB
 4. 300KB and 400KB

7. A computer system implements 8 kilobyte pages and a 32-bit physical address space. Each page table entry contains a valid bit, a dirty bit and three permissions bits and the translation. If the maximum size of the page table of a process is 24MB, the length of the virtual address supported by the system is _____ bits.
1. 36
 2. 32
 3. 28
 4. 40
8. Consider a computer system with 40-bit virtual addressing and page size of sixteen kilobytes. If the computer system has a one-level page table per process and each page table entry requires 48 bits, then the size of the per-process page table is _____ megabytes.
1. 324
 2. 48
 3. 192
 4. 96
9. What is the size of the physical address space in a paging system which has a page table containing 64 entries of 11 bit each (including valid and invalid bit) and a page size of 512 bytes?
1. 2^{11}
 2. 2^{15}
 3. 2^{19}
 4. 2^{20}
10. Consider a logical address space of 8 pages of 1024 words mapped into memory of 32 frames. How many bits are there in the logical address?
1. 13 bits
 2. 15 bits
 3. 14 bits
 4. 12 bits