

Chapter 8 – Virtual MemoryTrue / False Questions:

1. In a system employing a memory management strategy that doesn't require an entire process to be in main memory at one time, the portion of a process that is actually in main memory at any given time is defined to be the resident set of the process.
2. The condition known as thrashing occurs when the majority of the processes in main memory require repetitive blocking on a single shared I/O device in the system.
3. The modify (M) bit is a control bit in a page table entry that indicates whether the contents of the corresponding page have been altered since the page was last loaded into memory.
4. A Page Fault occurs when the desired page table entry is not found in the Translation Lookaside Buffer (TLB).
5. One of the advantages to the programmer of virtual memory using segmentation is that it simplifies the handling of growing data structures by allowing the segment to grow or shrink as necessary.
6. In a combined paging/segmentation system, a user's address space is broken up into a number of fixed-size pages, which in turn are broken up into a number of segments.
7. To achieve sharing in a segmentation system, it is possible for a segment to be referenced in the segment tables of more than one process.
8. Linux is an example of an operating system that does not provide virtual memory.
9. The fetch policy determines when a page should be brought into main memory.
10. The Least Recently Used (LRU) replacement policy replaces the page in memory that has been referenced most recently.
11. A global replacement policy considers all unlocked pages in main memory as candidates for replacement, regardless of which process owns a particular page.
12. In a precleaning policy, modified pages are written to secondary memory once they have been selected for replacement.
13. SVR4 and Solaris systems use two separate schemes for memory management, one for user processes and disk I/O, and another for kernel memory allocation.
14. Linux makes use of a two-level page table structure, consisting of a page directory and a page table.
15. Every W2K user process sees a separate 32-bit address space, allowing 4 GB of memory per process.

Multiple Choice Questions:

1. The type of memory that allows for very effective multiprogramming and relieves the user of memory size constraints is referred to as:
 - a. Real memory
 - b. Virtual memory
 - c. Main memory
 - d. All of the above

2. The situation where the processor spends most of its time swapping process pieces rather than executing instructions is called:
 - a. Paging
 - b. The Principle of Locality
 - c. Thrashing
 - d. None of the above
3. The situation that occurs when the desired page table entry is not found in the Translation Lookaside Buffer (TLB) is called a:
 - a. TLB miss
 - b. TLB hit
 - c. Page fault
 - d. None of the above
4. The real address of a word in memory is translated from the following portions of a virtual address:
 - a. Page number and frame number
 - b. Page number and offset
 - c. Frame number and offset
 - d. None of the above
5. Segmentation has a number of advantages to the programmer over a non-segmented address space, including:
 - a. Simplifying the handling of growing data structures
 - b. Sharing among processes
 - c. Protection
 - d. All of the above
6. In a combined paging/segmentation system, a user's address space is broken up into a number of:
 - a. Segments or pages, at the discretion of the programmer
 - b. Fixed-size pages, which are in turn broken down into variable-sized segments
 - c. Variable-sized Segments, which are in turn broken down into fixed-size pages
 - d. All of the above
7. Sharing is achieved in a segmentation system by:
 - a. Referencing a segment in the segment tables of more than one process
 - b. Each process segment table having a reference to the dispatcher main memory area
 - c. Having a common data area that all processes can share
 - d. All of the above
8. A fundamental choice in the design of the memory-management portion of an O/S is:
 - a. Whether or not to use virtual memory techniques
 - b. Whether to use paging, segmentation or a combination of the two
 - c. The algorithms employed for various aspects of memory management
 - d. All of the above
9. The fetch policy that exploits the characteristics of most secondary memory devices, such as disks, which have seek time and rotational latency is called:

- a. Demand paging
 - b. Prepaging
 - c. Swapping
 - d. None of the above
10. The replacement policy that is impossible to implement because it would require the O/S to have perfect knowledge of future events is called the:
- a. Optimal policy
 - b. Least recently used (LRU) policy
 - c. Clock policy
 - d. None of the above
11. The replacement policy that chooses only among the resident pages of the process that generated the page fault in selecting a page to replace is referred to as a:
- a. Global replacement policy
 - b. Local replacement policy
 - c. Variable replacement policy
 - d. None of the above
12. The concept associated with determining the number of processes that will be resident in main memory is referred to as:
- a. A cleaning policy
 - b. The page fault frequency
 - c. Load Control
 - d. None of the above
13. In SVR4 and Solaris systems, the memory management scheme that manages user processes and disk I/O is called the:
- a. Paging system
 - b. Virtual memory manager
 - c. Kernel memory allocator
 - d. None of the above
14. The multi-level memory management scheme implemented in Linux was designed to minimize large page tables and directories in which of the following line of processors:
- a. 16-bit X86 architecture
 - b. 32-bit Pentium/X86 architecture
 - c. 64-bit Alpha architecture
 - d. None of the above
15. The Windows 2000 virtual memory manager can use page sizes ranging from:
- a. 4 KB to 64 KB
 - b. 64 KB to 4 GB
 - c. 4 GB to 4 TB
 - d. None of the above

Fill-In-The-Blank Questions:

1. In a system employing a memory management strategy that doesn't require an entire process to be in main memory at one time, the portion of a process that is

actually in main memory at any given time is defined to be the _____ of the process.

2. The situation where the processor spends most of its time swapping process pieces rather than executing instructions is called _____.
3. Most virtual memory schemes make use of a special high-speed cache for page table entries, called a _____.
4. Each entry in a _____ contains control bits and the corresponding frame number if the page is resident in memory.
5. In a segmentation system, each entry in a _____ contains control bits and the starting address and the length of the segment.
6. _____, which is transparent to the programmer, eliminates external fragmentation, provides efficient use of main memory, and has pieces of fixed, equal size.
7. _____, which is visible to the programmer, has the ability to handle growing data structures, modularity, and support for sharing and protection.
8. An example of an O/S that doesn't provide virtual memory is _____.
9. The fetch policy where a page is brought into main memory only if a reference is made to a location on that page is called _____.
10. The replacement policy that treats the page frames allocated to a process as a circular buffer is called _____.
11. A _____ replacement policy chooses only among the resident pages of the process that generated the page fault in selecting a page to replace.
12. A _____ policy writes modified pages before their page frames are needed so that pages can be written out in batches.
13. In SVR4 and Solaris systems, the memory management scheme that manages memory allocation for the kernel is called the _____.
14. Linux systems use a _____-level page table structure in its memory management scheme to accommodate large addresses.
15. In a W2K system, although each user sees a 32-bit address space, allowing 4 GB of memory per process, a portion of this memory is reserved for O/S use, so a user process actually has access to _____ of virtual address space.