

1. Which of the following page replacement algorithms is considered the most efficient but is typically not implementable in practice?
  - a. FIFO (First-In-First-Out)
  - b. LRU (Least Recently Used)
  - c. **Optimal Page Replacement**
  - d. Clock Replacement
2. What is a "swap" in the context of virtual memory?
  - a. The process of copying data from physical memory to a secondary storage device
  - b. **The process of replacing one page of memory with another from the disk**
  - c. The process of defragmenting memory
  - d. The operation of increasing the physical memory of the computer
3. What is the typical consequence of a "thrashing" condition in virtual memory systems?
  - a. The system runs out of disk space
  - b. **There is a significant decrease in CPU performance due to constant paging**
  - c. The system starts allocating more physical memory to processes
  - d. The operating system stops executing processes entirely
4. A system uses paging with a page size of 8 KB. If a process has a 128 MB virtual address space, how many page table entries are required to map the entire address space?
  - a. 16384 entries
  - b. **32768 entries**
  - c. 65536 entries
  - d. 8192 entries
5. A paging scheme uses a Translation Lookaside buffer (TLB). A TLB access takes 10 ns and a main memory access takes 50 ns. What is the effective access time (in ns) if the TLB hit ratio is 90% and there is no page fault?
  - a. 54
  - b. 60
  - c. **65**
  - d. 75
6. What is Belady's Anomaly
  - a. For a particular reference string, the number of page faults decreases with increase in number of page frames
  - b. For a particular reference string, the number of page faults increases with decrease in number of page frames
  - c. **For a particular reference string, the number of page faults increases with increase in number of page frames**
  - d. For a particular reference string, the number of page faults decreases with decrease in number of page frames
7. Which of the following is the main cause of internal fragmentation?
  - a. Using variable-sized partitions for memory allocation

- b. Using fixed-sized blocks for memory allocation, where the allocated block is larger than the required memory
  - c. Allocating memory without tracking usage
  - d. Continuous loading and unloading of processes in memory
- 8. What is a STUB
  - a. A piece of code that is used to assign addresses to a process
  - b. A piece of code that is used to start execution of a process
  - c. A piece of code that is used to locate library routines
  - d. A piece of code that is used to load a process
- 9. A 100 MB process is swapped into main memory, while a 200 MB process is swapped out. The transfer rate for secondary memory (both reading and writing) is 50 MB/sec. Calculate the context switch time with swapping, assuming main memory access time is negligible and sufficient space is available to load the 200 MB process after swapping out the 100 MB process.
  - a. 4 seconds
  - b. 6 seconds
  - c. 8 seconds
  - d. 10 seconds
- 10. What is the purpose of dirty bit in a page table
  - a. It helps to reduce the number of page faults
  - b. It helps to reduce the page data corruption
  - c. It helps to reduce the illegal access to a page
  - d. It helps to reduce the page fault time
- 11. A page fault
  - a. Is an exception that is triggered when a program accesses an page in memory
  - b. Is an exception that is triggered when there is an error in an instruction execution
  - c. Is an exception that is triggered when a reference to page belonging to another process is made
  - d. Is an exception that is triggered when a program accesses a page not currently in memory
- 12. In a system with 64-bit virtual addresses and 1 KB page size, use of one-level page tables for virtual to physical address translation is not practical because of
  - a. Large computation overhead in translation process
  - b. Large memory overhead in maintaining page tables
  - c. Large amount of internal fragmentation
  - d. Large amount of external fragmentation
- 13. A system uses contiguous memory allocation with variable partition sizes. The main memory has a list of free holes: H1:300 KB, H2:200 KB, H3:400 KB, and H4:250 KB. The processes that need to be allocated are: P1:220 KB, P2:180KB and P3:350 KB. Using the Best-fit and First strategies which hole is allocated to which process
  - a. Best Fit: (P1,B), (P2,D), (P3,C)                      First Fit: (P1,B), (P2,D), (P3,C)
  - b. Best Fit: (P1,D), (P2,B), (P3,C)                      First Fit: (P1,A), (P2,B), (P3,C)
  - c. Best Fit: (P1,D), (P2,B), (P3,C)                      First Fit: (P1,B), (P2,D), (P3,C)
  - d. Best Fit: (P1,B), (P2,D), (P3,C)                      First Fit: (P1,A), (P2,B), (P3,C)
- 14. There are 200 tracks on a disc platter and the pending requests have come in the order - 36, 69, 167, 76, 42, 51, 126, 12 and 199. Assume the arm is located at the 100th track and moving towards track 199. If the sequence of disc access is 126, 167, 199, 12, 36, 42, 51, 69 and 76 then which disc access scheduling policy is used?
  - a. Elevator

- b. SSTF
  - c. FCFS
  - d. C - SCAN
15. Which of the following disk scheduling algorithms perform better for systems that place a heavy load on the disk
- a. LOOK and C-LOOK
  - b. SCAN and C -LOOK
  - c. SCAN and FCFS
  - d. SCAN and C-SCAN
16. Which type of bus is most commonly used in modern PCs and servers for high-speed connections?
- a. ISA bus
  - b. PCI bus
  - c. AGP bus
  - d. USB bus
17. If the disk head is located at 32, find the number of disk moves required with FCFS with following disk requests: 98,37,14, 124, 65, 100.
- a. 354
  - b. 352
  - c. 312
  - d. 314
18. The DMA transfer is initiated by \_\_\_\_\_
- a. CPU
  - b. I/O Devices
  - c. Operating System
  - d. Process executing
19. The seek time of the disk to a random location is given as 10 ms. Rotational speed of disk is 6000 RPM. What is Avg disk access time?
- a. 10 msec
  - b. 12 msec
  - c. 15 msec
  - d. 18 msec
20. The time taken to move the disk arm to the desired cylinder is called the \_\_\_\_\_
- a. Rotational Latency
  - b. Seek Time
  - c. Disk Access Time
  - d. Positioning Time