

B

Which of the following hardware components in a computer do not interact with the operating system? *

- ☐ Virtual memory
- ☐ Physical memory
- ☒ Cache memory
- ☐ Physical storage

Suppose your virtual address consists of only 16 bits, of which 10 bits are reserved for the offset and 6 bits are reserved for the page number. What is the maximum size of a single page frame, assuming that the memory is byte-addressable? *

- ☐ 64 KB
- ☐ 4 KB
- ☒ 1 KB
- ☐ 256 bytes

How can Belady's anomaly be avoided? *

- ☐ Increasing the number of physical frames
- ☒ Altering the page replacement algorithm
- ☐ Improving the speed of handling of page fault
- ☐ None of the other options

Which of the following requests do not go through the Virtual File System (VFS) in Linux? *

- ☐ Reading/writing to a Windows partition from Linux

- ☐ Reading the input of a keyboard
- ☐ Sending output to a monitor
- ☒ All of the above go through VFS

Suppose you are observing too many page faults of a single process. What is the cheapest way to resolve this problem? *

- ☐ Increase the number of page frames for the process
- ☒ Increase the amount of RAM
- ☐ Increase the amount of virtual memory assigned to a process
- ☐ None of the above options can help

The following is true about mandatory and advisory locks on files: *

- ☒ Mandatory locks work with both shared memory as well as regular files while advisory locks only work for regular files.
- ☐ Mandatory locks work for both regular as well as memory mapped files, while advisory locks only work for regular files.
- ☐ Mandatory locks work for both regular files and devices, while advisory locks do not.
- ☐ None of the above

Intel x86-64 / amd64 architecture does not support segmentation because of the following reasons (in long or 64-bit mode): *

- ☐ Most modern OSes do not use both segmentation and paging simultaneously as it is redundant and eventually slows down memory access.
- ☐ Segmentation works only with 32-bit addresses and not with 64-bit addresses.
- ☒ Modern OSes are written in high level languages like C, which treat addresses as linear addresses. The Intel x86 32-bit segmentation scheme first requires translation to a linear address before being accessible as linear addresses to programs written in C language.

- ☒ Most modern OSes like Windows simulate segmentation -- e.g. a process has code, stack, data, heap, bss and rodata segments. Thus, there is no need for additional segmentation hardware.
- ☐ None of the above.

Which of the following is true about shared libraries (in *NIX systems). (i) Shared libraries involve redundant frames that are visible to all processes. These frames store the binary of the library functions. (ii) Library functions have their own stacks that they use for computation and storing local variables. (iii) Libraries functions do not need to care about synchronization as these functions use the calling process' stack, heap and global data sections. (iv) Libraries need to take care of synchronization as these functions make use of their own stack, heap and global data. *

- ☒ Only (iii)
- ☐ (i) and (ii).
- ☐ (ii) and (iii)
- ☐ Only (iv)

Suppose you have a counting semaphore, but you have a total of 10 resources among three processes. How many instances of the semaphore are needed to maintain synchronized access, if each process requires a single resource? *

- ☒ 1
- ☐ 3
- ☐ 5
- ☐ 10

Suppose you have a binary semaphore, but you have a total of 10 resources among three processes. How many instances of the semaphore are needed to maintain synchronized access, if each process requires a single resource? *

- ☐ 1

- ☒ 10
- ☐ 30
- ☐ Not possible

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