CSci 402 - Operating Systems

Quiz 4

Fall 2023

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(This exam is open book and open notes.
Remember what you have promised when you signed your
Academic Integrity Honor Code Pledge.)

Time: (N/A) minutes

_____-
Name (please print)

Total: 10 points

_____-
Signature

Instructions

1. This is the first page of your exam. The previous page is a title page and does not have a page number. Since this is a take-home exam, no need to sign above since you won't submit this file.
2. Read problem descriptions carefully. You may not receive any credit if you answer the wrong question. Furthermore, if a problem says *"in N words or less"*, use that as a hint that N words or less are expected in the answer (your answer can be longer if you want). Please note that points may get *deducted* if you put in wrong stuff in your answer.
3. If a question doesn't say `weenix`, please do not give `weenix`-specific answers.
4. Write answers to all problems in the **answers text file**.
5. For non-multiple-choice and non-fill-in-the blank questions, please show all work (if applicable and appropriate). If you cannot finish a problem, your written work may help us to give you partial credit. We may not give full credit for answers only (i.e., for answers that do not show any work). Grading can only be based on what you wrote and cannot be based on what's on your mind when you wrote your answers.
6. Please do *not* just draw pictures to answer questions (unless you are specifically asked to draw pictures). Pictures will not be considered for grading unless they are clearly explained with words, equations, and/or formulas. It's very difficult to draw pictures in a text file and you are not permitted to submit additional files other than the answers text file.
7. For problems that have multiple parts, please clearly *label* which part you are providing answers for.
8. Please ignore minor spelling and grammatical errors. They do not make an answer invalid or incorrect.
9. During the exam, please only ask questions to *clarify* problems. Questions such as "would it be okay if I answer it this way" will not be answered (unless it can be answered to the whole class). Also, you are suppose to know the definitions and abbreviations/acronyms of *all technical terms*. We cannot "clarify" them for you. We also will **not** answer any clarification-type question for multiple choice problems since that would often give answers away.
10. Unless otherwise specified and stated explicitly, multiple choice questions have one or more correct answers. You will get points for selecting correct ones and you will lose points for selecting wrong ones.
11. When we grade your exam, we must assume that you wrote what you meant and you meant what you wrote. So, please write your answers accordingly.

(Q1) (2 points) Assuming that you have an x86 CPU, which of the following statements are correct about **function/procedure calls**?

(1) stack frames are linked together in a doubly linked circular list
(2) the EBP register is a "base register" because it contains the base address of an array
(3) when you are executing code in a function, the EBP register must be pointing somewhere within the stack frame set up for that function
(4) when you make a function call, the return address is stored inside the EAX register
(5) none of the above is a correct answer

Answer (just give numbers): _____

(Q2) (2 points) Assuming that you have an x86 CPU, which of the following statements are correct about **context switching**?

(1) when a user thread makes a system call, the user thread context is saved in the user space stack
(2) when thread X calls switch(Y) to give the CPU to thread Y, the ESP and EBP registers for thread X are both saved inside thread X's thread control block
(3) when thread X calls switch(Y) to give the CPU to thread Y, the ESP and EBP registers for thread X are both saved inside thread X's stack
(4) when kernel is servicing a hardware interrupt, if another interrupt is generated, it can only be delievered when the current interrupt service routine has returned
(5) none of the above is a correct answer

Answer (just give numbers): _____

(Q3) (2 points) Which of the following statements are correct about **hardware interrupt context switching**?

(1) if the system is running user thread X when a hardware interrupt is delivered, thread X's context will be saved in thread X's user space stack
(2) if the system is running kernel thread X when a hardware interrupt is delivered, thread X's context will be saved in thread X's kernel stack
(3) if the system is running a interrupt service routine at IPL 6 when a hardware interrupt at IPL 5 is delivered, the interrupt context for IPL 6 will be saved in an interrupt stack
(4) if the system is running a interrupt service routine at IPL 6 when a hardware interrupt at IPL 12 is delivered, the interrupt context for IPL 6 will be saved in an interrupt stack
(5) none of the above is a correct answer

Answer (just give numbers): _____

(Q4) (2 points) Which of the following statements are correct about **a bus I/O architecture**?

(1) PIO devices and DMA devices are addressed over the bus using memory-mapped I/O
(2) a disk controller is usually considered to be a PIO device
(3) memory is usually considered to be a DMA device
(4) device driver code is typically written by device manufacturers
(5) none of the above is a correct answer

Answer (just give numbers): _____

(Q5) (2 points) Which of the following statements are correct about **memory allocators**?

(1) for any sequence of memory allocation requests, the first-fit memory allocator always performs better than the best-fit memory allocator
(1) for any sequence of memory allocation requests, the best-fit memory allocator always performs better than the first-fit memory allocator
(3) one problem with the first-fit memory allocator is external fragmentation
(4) one problem with the first-fit memory allocator is internal fragmentation
(5) none of the above is a correct answer

Answer (just give numbers): _____