CSci 402 - Operating Systems

Quiz 3

Fall 2023

Friay, Sep 15

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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

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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) Which of the following statements are correct about the **readers-writers problem** (assuming that the data being shared is in a database)?

(1) in the solution to the readers-writers problem, a reader thread must access the shared data in the database using critical section code
(2) in the solution to the readers-writers problem, a writer thread must access the shared data in the database using critical section code
(3) in the solution to the readers-writers problem, to wait for a guard to become true, reader threads would sleep in one mutex queue while writer threads would sleep in a different mutex queue
(4) in the solution to the readers-writers problem, to wait for a guard to become true, reader threads and writer threads must sleep in the same CV queue
(5) none of the above is a correct answer

Answer (just give numbers): ______________________________

(Q2) (2 points) Which of the following statements are correct about **Unix/Linux signals**?

(1) when a signal is generated by a user space program and if the kernel is blocking it, it becomes pending
(2) when a signal is generated in the kernel and if it's supposed to be delivered to a user space program, if every thread in the corresponding user space program is blocking it, it becomes pending
(3) when you are typing into a command shell and if you press <Ctrl+z> on your keyboard, the kernel will generate a SIGCONT signal
(4) when your user space program executes a divide-by-zero instruction, it will trap into the kernel and the kernel will generate a SIGILL signal
(5) none of the above is a correct answer

Answer (just give numbers): ______________________________

(Q3) (2 points) Which of the following statements are correct about **Unix/Linux signal masks**?

(1) a signal mask is stored inside a process control block because signals are delivered to processes and not threads
(2) if a bit in the signal mask has a value of 0, it means that the corresponding signal is blocked
(3) when you create a child thread, the child thread gets a copy of the signal mask from the parent thread
(4) when you call sigprocmask() to change signal mask, you can get the value of the signal mask right before sigprocmask() is called
(5) none of the above is a correct answer

Answer (just give numbers): ______________________________

(Q4) (2 points) Which of the following statements are correct about **pthread cancellation**?

(1) when thread X calls pthread_cancel(Y) to cancel thread Y, thread Y can ignore such a cancellation request if it doesn't want to be cancelled
(2) if the cancellation state of thread X is PTHREAD_CANCEL_DEFERRED, thread X will ignore canellation requests from another thread
(3) if the cancellation type of thread X is PTHREAD_CANCEL_ASYNCHRONOUS, thread X will ignore synchronous canellation requests from another thread
(4) when thread X "acts on cancel", it will call the exit() system call
(5) none of the above is a correct answer

Answer (just give numbers): ____________________

(Q5) (2 points) Which of the following statements are correct about **warmup2**?

(1) the guarded command used by a server thread to access the token bucket filter data structure has an "empty guard"
(2) the recommended way to catch the SIGINT signal is to catch the signal asynchronously by calling sigwait()
(3) if the SIGINT-catching thread returns from sigwait(), it must use pthread cancellation to cancel the packet thread, the token thread, and the server threads
(4) the guarded command used by the packet thread to access the token bucket filter data structure has an "empty guard"
(5) none of the above is a correct answer

Answer (just give numbers): ____________________