Operating Systems & C – Fall 2022 - SWU

Exam Hand-in

This is the hand-in for the exam for the OS and C, fall 2022, for SWU students. You will get your grade based on your written answers to the questions below.

This hand-in exam is composed of four questions, with equal weight. Each question contains several sub-questions. The first three questions concern the assignments. Note that there are two versions of Question 2, one for Attack Lab, the other for Perf Lab. You should only answer one version of Question 2, not both. The fourth question concerns concepts and techniques introduced in class.

Question 1 (25%): Data Lab

A. Describe your implementation of *howManyBits(x)*
B. Describe your implementation of *tmin(void)*

Question 2 (25%):

Attack Lab	**Perf Lab**
A. What happens when the *c3* (*ret*) assembly instruction is executed? Does anything in the stack change? B. What is a gadget farm? Describe an example of how you use one in your code.	A. What is the difference between spatial and temporal locality? Give an example of situations where each is important and explain how caching plays a role. B. What is SIMD processing? Explain whether and how your solution benefits from SIMD (and if not, why not)?

Question 3 (25%): Malloc Lab

A. Explain in detail your implementation of the mm_malloc function.
B. What is pointer arithmetic? Describe how you use it in your version of mm.c

Question 4 (25%): Topics from the class

A. What is the difference between traps, faults and aborts in the context of interrupts?
B. What is the difference between an ephemeral and a well-known port? Give examples of when either is used.
C. What is a memory leak? When does it occur? What can you do to avoid it?
D. What is a race-condition? Why is a race-condition hard to debug? Which instructions can you use to avoid race-conditions? Why are these instructions expensive?