Operating Systems & C – Fall 2021 - SWU

Exam Hand-in

This is the hand-in for the exam for the OS and C, fall 2021, 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 IsPower2(x)
B. How would you change your implementation of copyLSB(x) to set all bits of result to the most significant bit of x?

Question 2 (25%):

Attack Lab	**Perf Lab**
A. Would your solution to Phase 1 in attack lab be different if the stack was 8 bytes aligned? Explain your answer. B. What happens when a gadget uses a popq instruction? Illustrate your anwer with an example from attack lab.	A. Do the benefits of loop unrolling keep on increasing as the number of unrolled operations increases? Explain your answer and give examples based on your assignment. B. Give an example illustrating how SIMD processing increases performance. Explain how SIMD impacts performance.

Question 3 (25%): Malloc Lab

A. Describe the design of your solution to malloc lab.
B. Explain in details your implementation of the free function.

Question 4 (25%): Topics from the class

A. Describe what happens when executing the following instruction movl (%ebx), %eax.
B. Are footers necessary when implementing segregated free list for dynamic memory management? Explain your answer.
C. What is an inode?
D. What is a stack frame?
E. What is a mutex?