

CSCI 3753: Operating Systems
Fall 2016
Problem Set One

Please write your answers in the space provided.

Due date: Thursday, September 15 in class. No extensions will be given except at the instructor's discretion in documented cases of extreme hardship or emergencies. Please submit a hardcopy of your solutions.

Problem 1. [10 Points] What is the role of instructions such as *trap ()* in operating system design?

Problem 2. [10 Points] What role does the trap table play in executing a system call?

Problem 3. [30 Points] Provide a step-by-step description for adding a new device in Linux operating system without requiring recompiling the kernel.

Problem 4. [20 Points] Explain two ways that I/O can be overlapped with CPU execution and how they are each an improvement over not overlapping I/O with the CPU.

Problem 5. [30 Points] Draw and label a figure to show the sequence of steps (step 1, step 2, etc.) in a *write()* operation to disk, from the application first calling a *write()* through the OS processing the *write()* to the final return from the *write()* call upon completion of the disk operation. Assume DMA with interrupts. Further assume that the disk is not ready at first for the *write()* operation. Your answer should include components such as the device controller, interrupt handler, device handler, device driver, DMA controller and any other OS components you deem appropriate to add.