CSCI 8530: Computer Science
Advanced Operating Systems
Spring 2020
Homework 2

Due on February 18, 2020

Please keep answers short. You may either type your answers or write them by hand, but you must bring a hard copy to the class. Note that a "good effort" on the homework includes that all answers are in your own words (short sentences). DO NOT SHARE YOUR ANSWERS WITH OTHER STUDENTS OR ATTEMPT TO OBTAIN ANSWERS FROM OTHERS.

Questions

1. In what sense is the queue structure described here an implicit data structure?
2. Implement functions to manipulate lists using pointers instead of indices into an array of structures. What is the difference in memory space and processor time?
3. What are the advantages and disadvantages of interrupt-driven I/O over polled I/O? Which of these do you expect the MS-DOS operating system used? Which would be used during early stages of system startup to display messages?
4. When interrupts are used to announce significant events, there are two major techniques used to transfer multi-byte “chunks” of data between memory and I/O devices (like network adapters and disk controllers). Please briefly describe these and indicate which is likely to be more complex and efficient.
5. Please list the steps involved at the hardware level when a function is invoked and returns.
6. Describe the basic layout of memory for a C program. Indicate the basic characteristics you’d expect to be associated with “part” of the memory associated with a process during its execution.
7. We’ve seen that Xinu has a particularly efficient implementation for queues and lists of processes. What are two things in the implementation that make the implementation efficient (both in memory utilization and in execution time)?
8. Provide short definitions for the traditional interpretations of the terms thread and heavyweight process.
9. Where is it likely that the majority of user-accessible register contents will be saved when a process is moved from the running/current state to the ready state? Where else might some other register contents be saved? Use Xinu on the Galileo 2 as a specific case.
10. Xinu provides a mechanism to defer rescheduling decisions. Give an example of a case where this deferring of scheduling is appropriate.