Problem Set 22

CS 411

Due at the beginning of class on the first class day of the following week.
Sections 12.1–7

1. In most multiprogrammed systems, user programs access memory through virtual addresses, while the operating system uses raw physical addresses to access memory. What are the implications of this design for the initiation of I/O operations by the user program and their execution by the operating system?

2. Consider the following I/O scenarios on a workstation:

   (a) A mouse used with a graphical user interface

   (b) A tape-drive on a multitasking operating system (with no device preallocation available)

   (c) A disk drive containing user files

   (d) A graphics card with direct bus connection, accessible through memory-mapped I/O

   For each of these scenarios, would you design the operating system to use buffering, spooling, caching, or a combination? Would you use polled I/O or interrupt-driven I/O? Give reasons for your choices.

3. UNIX coordinates the activities of the kernel I/O components by manipulating shared in-kernel data structures, whereas Windows uses object-oriented message passing between kernel I/O components. Discuss two pros and two cons of each approach.