Device Drivers Part 2

MCIT 595

Kinds of Devices

- OS-related devices
  - Clock interrupt, etc,
- User related devices:
  - Keyboard, mouse
- Shared by many processes:
  - Disks, network interfaces, etc.
  - Requires demultiplexing, i.e. relaying data between device and the appropriate process
- Block vs character devices:
  - Block devices (e.g. disks, file systems)
  - Character devices (keyboards, printers)

Naming Devices

- Even with memory mapped I/O, it is difficult for processes to track the addresses used for communicating with the various devices installed on a system
- Instead, many operating systems have a notion of a device namespace that processes use to refer to devices
  - Manipulate these devices by opening, reading/writing to file abstractions
  - For example, the first printer might be named /dev/printer1

User Process Control of Devices

- User level processes typically do not interfere with operations in device drivers or interrupt handlers
- However, sometimes, it is useful to expose some configuration APIs to user applications:
  - For example, setting the bit rate on a serial interface
- Perform these functions through standardized system calls
  - Unix-based systems use the `ioctl` system call for this
  - Device driver provides interface between control system call and actual physical device

Sharing Devices Among Processes

- Some devices might be used by more than one process at a time
  - For example, multiple processes writing to same disk
- Solutions: Have all access go through a subsystem that translates requests, schedules I/O and enforces order
  - Might be in OS kernel or in a user process
  - For example, file system manages access to disks