CS 350 Notes

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1 Devices and Device Controllers

- Examples
  - Network interface
  - graphics card
  - storage (disk, tape)
  - serial (mouse, keyboard)
  - sound
  - co-processors
- How does the kernel talk to these devices? It talks to it through a *device driver*.
- The driver talks to the device through a BUS.
  - there are many kinds of BUS's.
  - PCI, ISA
- A *controller* has registers tha tit uses to interact with the kernel:
  - command — how the kernel tells the device to do something
  - status — the device writes to these and the kernel reads from it so the device can tell the kernel what it's doing
  - data — data that the kernel can send to the device
- A device uses interrupts to tell the kernel that it's done a task, and the kernel handles the interrupt to find out what to do next.
- Kernel has to copy memory from the device back to memory and vice versa, which takes a lot of CPU

- Direct Memory Access (DMA) prevents the writing, and the controler is smart enough to write its data to kernel memory directly without CPU involvement.
- The advantage of DMA is that the CPU isnt' busy with every device acces. The disadvantage is that the hardware is now much more complex, since the hardware must write to memory.