Interfacing and Conclusions

4-25-2003

Opening Discussion

- What did we talk about last class?
- Have you seen anything interesting in the news?

Interfacing

- So we looked at the buses that carry information around inside a computer. There are still questions about the communication actually happens though.
  - How does a request get communicated to a device?
  - How does data get into memory?
  - What is the role of the OS?

Role of the OS

- The OS is vital for I/O.
  - Oversees interaction of different programs.
  - Abstracts the low level nature of I/O interrupts.
  - Tries to improve fairness and increase throughput.
- It commands the devices, gets notification from devices. Doesn't play a direct role in getting data into memory.

Commanding I/O Devices

- Memory-mapped I/O: sections of memory are used only for I/O devices. Writes to those addresses don't go to memory, but instead instruct the device. Reads ask for info from devices. The OS controls this memory to prevent direct access.
- Special I/O instructions: an architecture can also be made with special instructions that communicate with I/O devices.

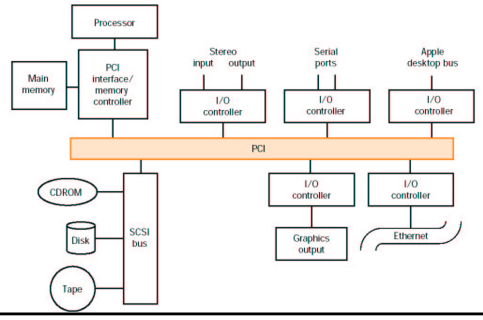
Communication with Processor

- The simplest form of an I/O device communicating back to a processor is polling. The device sets a bit or register that the processor occasionally checks. This wastes processor time.
- Alternately we can use I/O interrupts. These work like exceptions and send control to OS code that can handle it before going back to the normal program.

Moving Data between Device and Memory

- Both polling and interrupts work best with low bandwidth devices. For high bandwidth we like to use Direct Memory Access (DMA).
- The Processor initiates the process. A special controller moves the data to memory as the device supplies it. When the transfer is done an interrupt is sent so the processor can check the transfer and do any required processing on it.

Typical Desktop I/O



Conclusions

- We discussed the growing gap between processor performance and memory performance in the last chapter. The same thing is happening with I/O and for that reason, this might be the most outdated chapter in the book. That is simply because the standard buses and needs of peripherals has changed dramatically. Perhaps the biggest change has been in graphics so far, but many more changes are likely to come in the near future.

Minute Essay

- What do you foresee as the future of I/O? What buses do you explicitly look for when buying a computer?
- Remember that assignment #7 is due today. You should start reading chapter 9 before next class. I'll have assignment #8 posted sometime this weekend.