

## Computer Basics

9-8-2003

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## Opening Discussion

- Do you have any questions that you have thought of since last class about the syllabus or how the class will be run? Make sure that you read the full syllabus as it has more details than what I was able to cover in class.
- I said last time that the computer is the tool of a computer scientist, but what exactly is a computer. What are the features off the computers we use?
- Answer to the last minute essay. Most of you had something close.

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## What is a Computer?

- The term implies something that does computations. Before we had machines that were good at it humans were employed with the title "Computer".
- We use what are called general purpose computers that have the ability to perform any computable computation. There are also special purpose machines.
- In CS we have theoretical models of what a computer is as well.

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## Hardware vs. Software

- Two terms that you often hear when talking about computers are hardware and software. The typical definitions are that hardware is the physical machine that you can touch while software is what gets run on that machine.
- The distinction though gets murky in some areas. Flashable BIOSes and ROMs are borderline.
- Also almost any functionality can be moved between the two. Special hardware can replace some software or the other way around. (Winmodems or software DVD decoders)

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## Parts of a Computer

- The standard theoretical model of a computer has two pieces, something to do processing and something to store data.
- Real machines have a bit more.
  - Output devices
  - Input devices
  - Primary Memory
  - Secondary Storage
  - Central Processing Unit (CPU)

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## Information on Computers

- Computers represent everything on them as a series of bits. Each bit can be either on or off. We typically denote that as a 1 or a 0.
- Just looking at memory on a computer you can't tell if what is there is a program or data. Context is very important and must be stored in other ways.
- During two upcoming classes we will look more at this.

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## How the Computer Works

- The computers you use are general, multi-purpose computers. They store their programs in memory right next to data. The way the computer runs is to repeatedly fetch instructions from memory, decode them, and execute them.
- The instructions can do things like read from memory, write to memory, or perform operations on values.

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## Modern Considerations

- The description I just gave was reasonably accurate for the earliest computers. However, its not all that fast.
- Modern processors have taken this basic model and thrown in a large number of complexities to help the machines to be able to get more done in each clock cycle and also allow for more clock cycles to execute in a second.

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## Networking

- 10 years ago you could talk about computers just fine without mentioning networking. It's still something that exists beyond our simple model of what a computer is. Today though the value of a computer often hinges strongly on the network connection that it has.
- In our model, networking basically just lets one computer communicate with another.

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## More Modern Nuances

- Most of the fastest computers on the planet today aren't single computers. Instead, they are many computers tied together with high speed networking.
- These "machines" work on a single problem by sending data back and forth.
- You will also be seeing more and more single computers with more "processors". Some of these will be multiple processors on a board, others have many on a single chip.

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## Minute Essay

- What did we talk about today?
- For those of you who are ahead of the curve and want something extra to play with our ACM programming team will meet at 4:30 on Wednesdays.
- Thursday 2:30-4:30+ open lab in 340.
- After handing in your essay go to the board and write your name where it is visible above your head for a picture.

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