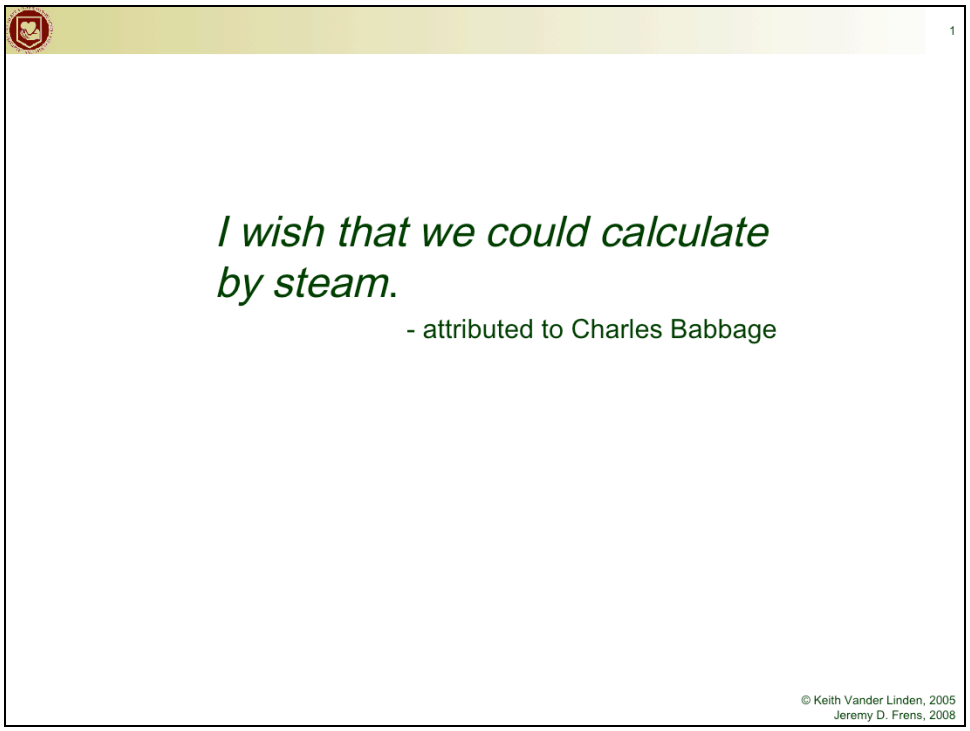
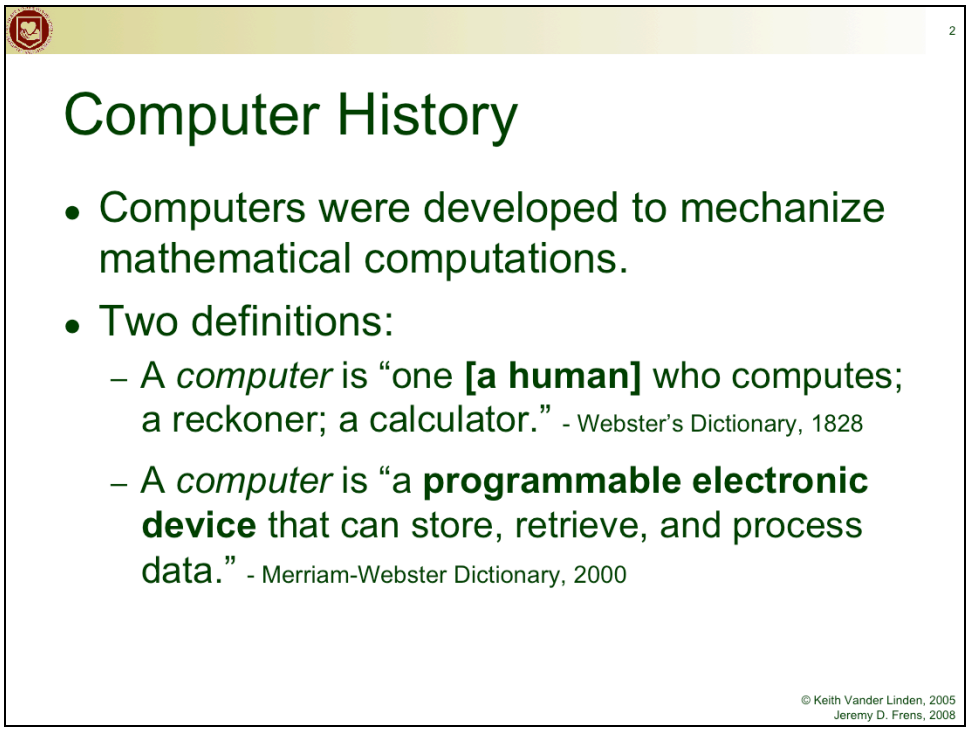


The computer is a universal machine.

It's a mind-set, not a skill-set. Brilliance helps, but is not required.

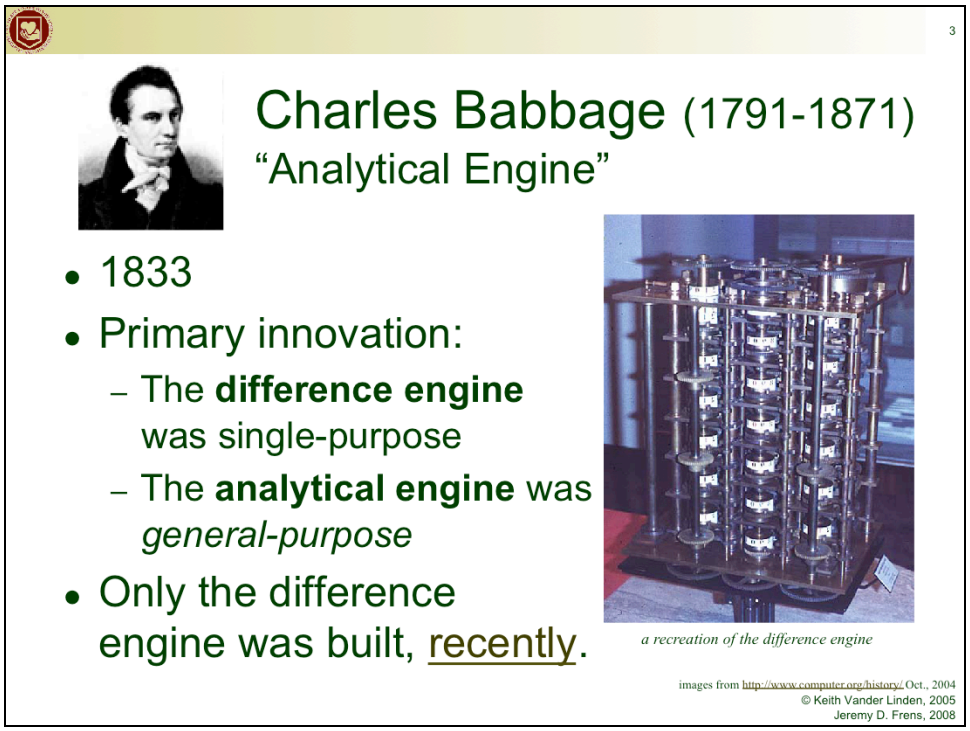
Instead, adopt these mantras: be stubborn, **bossy**, lazy, obsessive, cynical, plodding, and importunate. Why? So you can use IT as a tool to do cool stuff…



Manual computing was very important in the 1800's (industrial revolution) and into the 1900's (the world wars) because of the use of mathematical tables in navigation, engineering, etc. The tables were also very hard to produce and filled with errors.

A British mathematician named William Shanks spent 28 years of his life calculating Pi to 707 places, finishing in 1873. Soon after his calculations, another mathematician called De Morgan found that Shanks had made an error in the 528th place, after which all his digits were wrong!

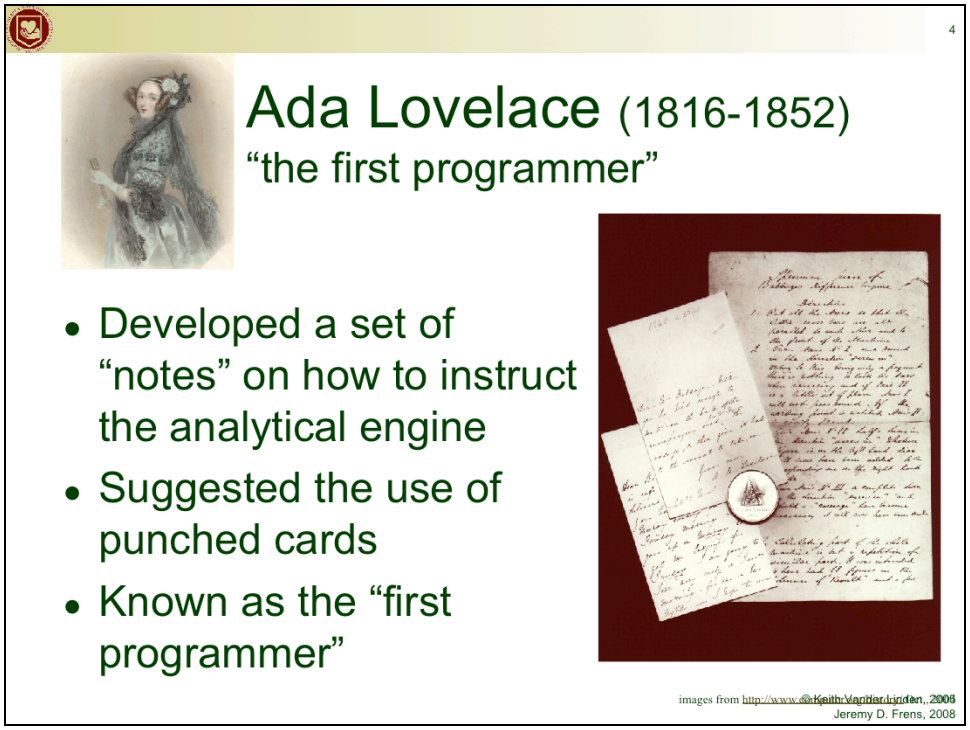
The 2 definitions show how the view of computing changed around 1940.



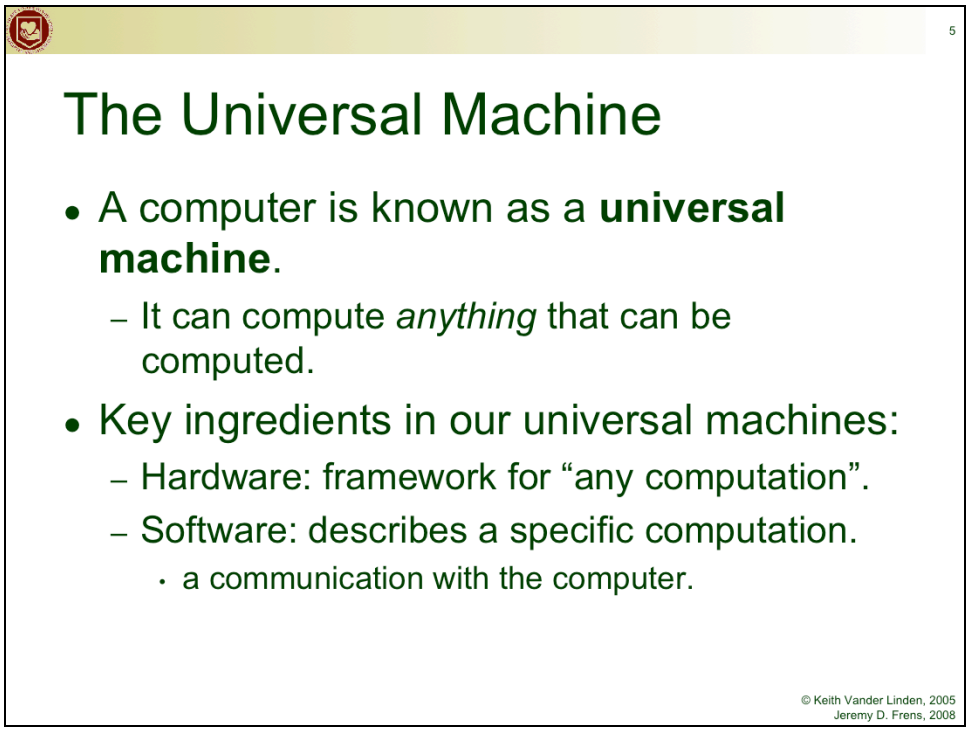
Babbage died an embittered man, having never convinced anyone of the value of his ideas (apart from Ada and a few others - see the next slide)

"recently" links to excellent 4 minute video of Difference Engine No. 2 built after 2000

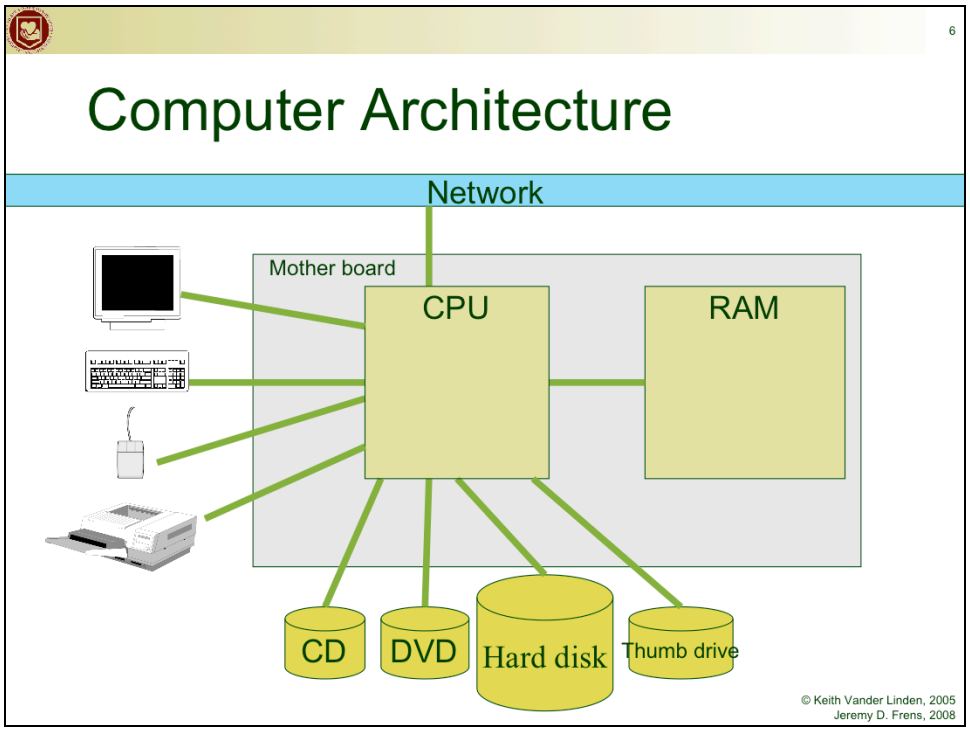
http://www.youtube.com/watch?v=0anIyVGeWOI



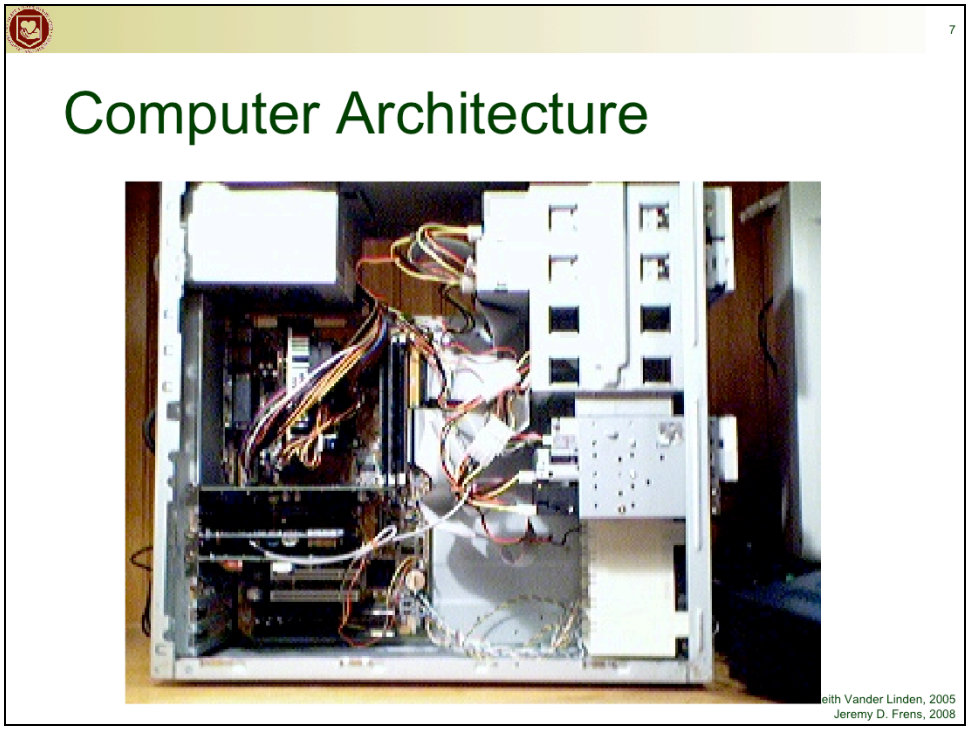
She was Countess of Lovelace and Lord Byron's daughter. She was a supporter and mentor of Babbage.



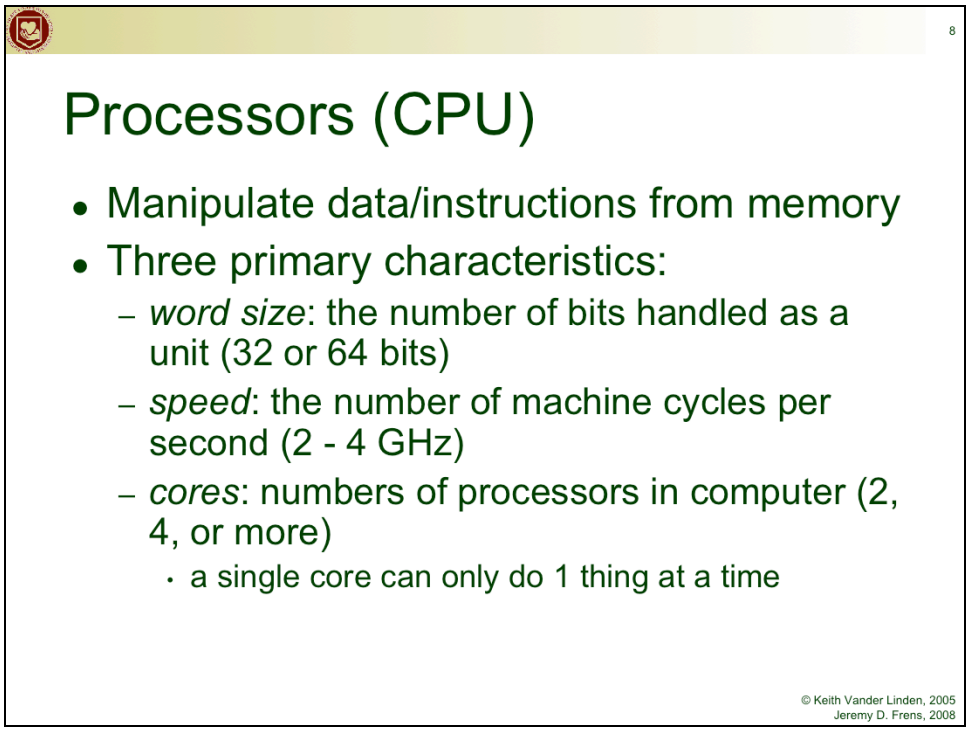
Computers are universal devices, unlike hammers and other artifacts that are designed to do one thing.



- **CPU/Main Memory**
- **System State**
- **Secondary Storage**
- **Peripheral devices**
- **Network**
- **Software**



Tear a computer open and show them all the parts, then talk about each part using the schematic diagram on the next slide as an outline.



The computer's speed/efficiency is based on these characteristics. To speed things up, increase the number of cores or the clock speed.

Least control over word size.

The Central Processing Unit (CPU) - You can find information on your MS Windows system processor in the system properties browser

AMD commercial http://www.youtube.com/embed/ocxDVl9lccE

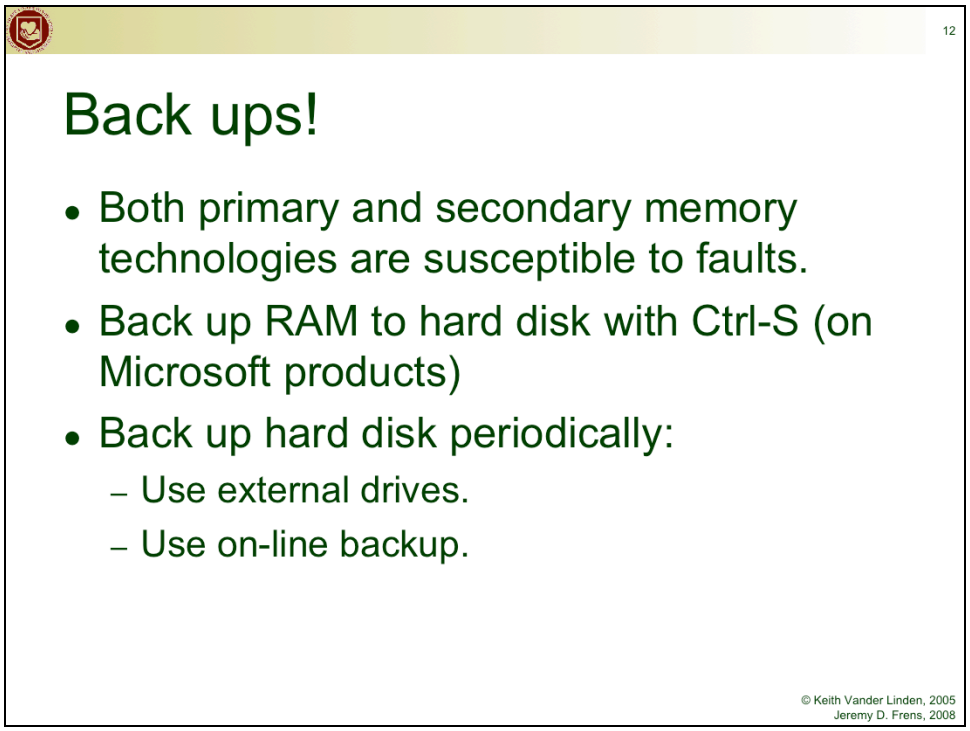
Main Memory

- The processor manipulates data/ instructions in Random Access Memory (RAM).
- Properties of main memory:
  - Random access
  - Relatively fast
  - Volatile: needs electricity to work
- Technology:
  - current computers have 1 - 4GB of RAM

"But I can't die yet, I have unsaved changes"

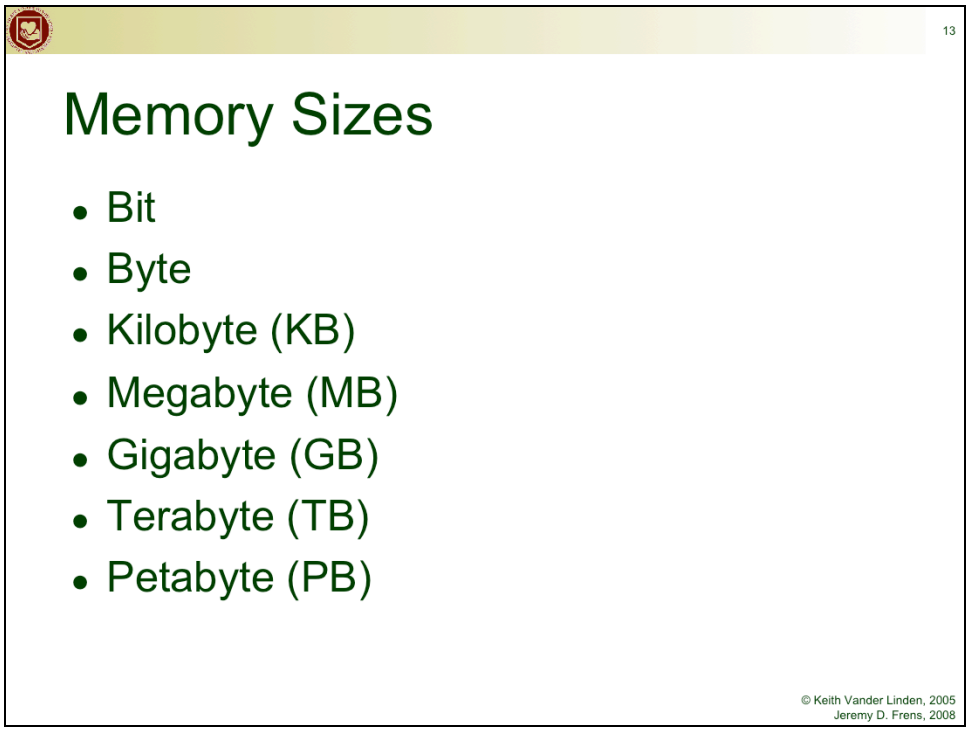
Secondary Storage

- Mass, long-term storage
- Properties of secondary storage:
  - Slow
  - Non-volatile: no power required
  - Less expensive
- Technologies:
  - *Magnetic*: hard disk, tape
  - *Optical*: CD, DVD
  - *Solid state*: USB stick



Impress upon them the importance of (psychotically) backing things up.

Your H: drive in the windows lab is a network drive that is backed up by CIT. So is the Knightvision/Moodle server.



Bit - A single 0 or 1

Byte - 8 bits: enough to store one character

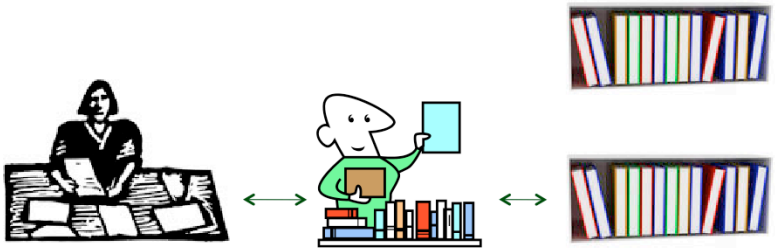
Kilobyte (KB) – 1024 (2^10) characters: a paragraph of text

Megabyte (MB) - ~1 million (2^20) bytes: a book or a minute of mp3 audio

Gigabyte (GB) - ~1 billion (2^30) bytes: 16 hours mp3 audio, 20 minutes of DVD video

Terabyte (TB) - ~1 trillion (2^40) bytes: all the text in Calvin's library, or 150 DVD movies

Memory Sizes, CPU Speeds



RAM: You can use information quickly on books open on your table.

Bigger table = more RAM = more apps/files open at once

CPU: gets books (applications) and files from the bookshelves

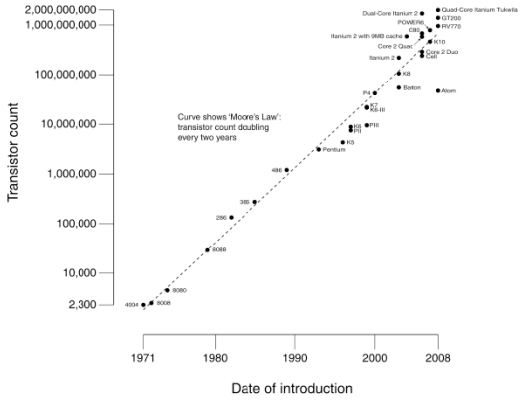
Faster CPU = getting apps/files is faster

Hard disk: holds files and applications.

Bigger hard disk = more apps/files can be stored

Moore's "Law"

CPU Transistor Counts 1971-2008 & Moore's Law



- Processing capacity for the price doubles every 18 months

image from wikipedia, January 2009

There is some question as to whether this trend will continue and if it will ever hit a "wall". See Kurzweil.

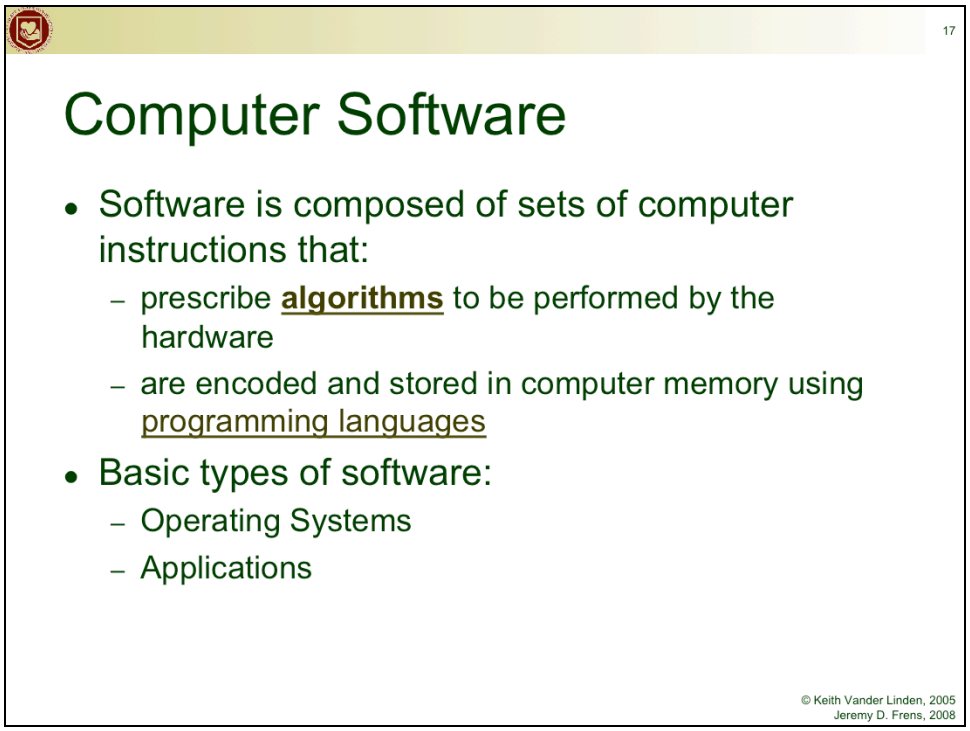
Moving to multi-core changes speed-up claim.

Note the log scale on the left!!!!! Exponential growth!!

Nova segment on making things smaller: http://www.pbs.org/wgbh/nova/tech/making-stuff-smaller.html 9:10-18:26

Input/Output Devices

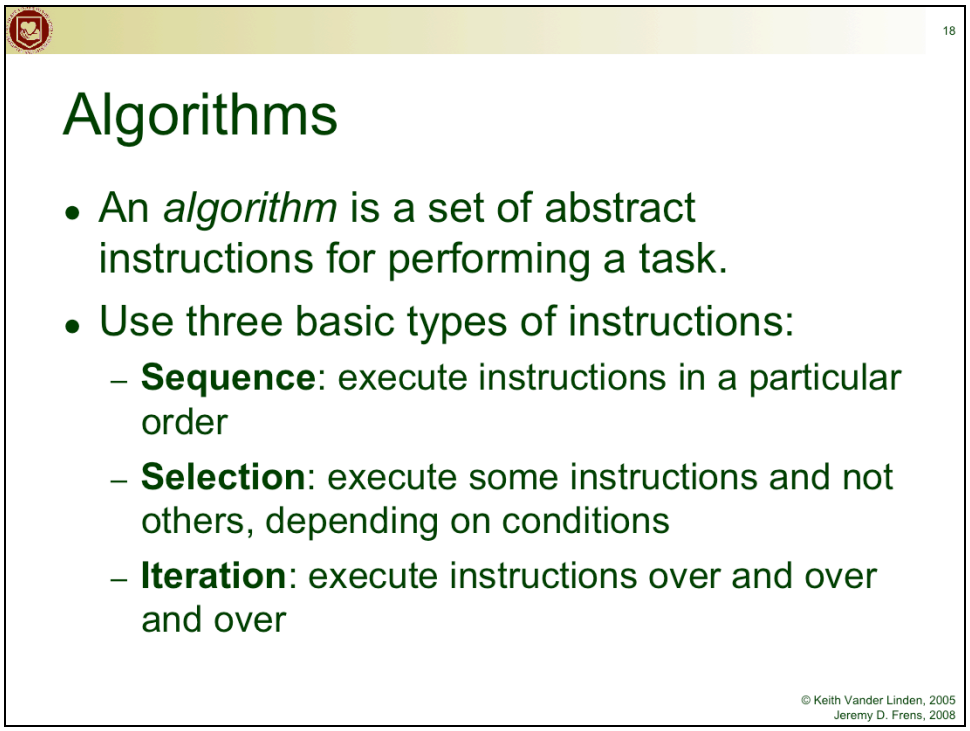
- To be useful, the computer must usually be expanded by additional devices:
  - e.g., monitor, keyboard, mouse, camera, printer, scanner, microphone, touchpad, etc., etc., etc.



Just summarize the basic types of software, without visiting the slides:

OS - manages the hardware/software of the computer, e.g., MacOS, Windows, Linux

Applications - support basic user tasks, e.g., Word, Excel, Dreamweaver, Powerpoint



Algorithms are like recipes.

We'll see them used in a programming language in this week's lab.

Programming Languages

- *Programming languages* are used to encode algorithms in a computer's language.
- Types of programming languages:
  - machine language
    (directly executed by the CPU)

```
00111011010001110010101 1...
```

Code for moving data Code for data source and so forth…

  - high-level languages
    (translated to ML with *compilers*)

```
Speech = txtSpeak.Text
If Speech = "count to 10" Then
   For i = 1 to 10
      Peedy.Speak Speech
   Next i
End If
```

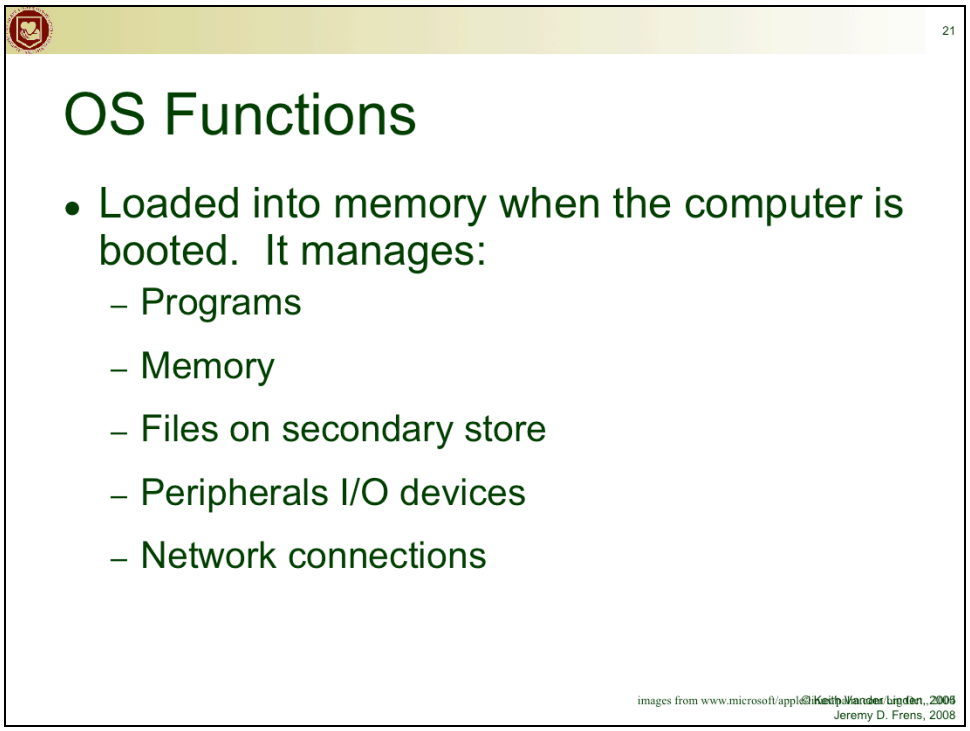

e.g., C++, Java, VB.net

Operating Systems

- Set of programs/utilities/libraries that manages the hardware and basic operations of the computer
- Common operating systems:
  - Microsoft Windows (e.g., XP, pocketPC)
  - Mac OS
  - Unix variants (e.g., Linux, Solaris)
  - PalmOS



images from www.microsoft/apple/linux.com, 2006



Programs

multi-tasking (show the processes and the applications in the task manager)

Memory

Loads files from disk when needed (show memory use in task manager)

Files on secondary store

keeps track of files on disk (discuss the A:, C: and H: drives in windows explorer)

Peripherals I/O devices

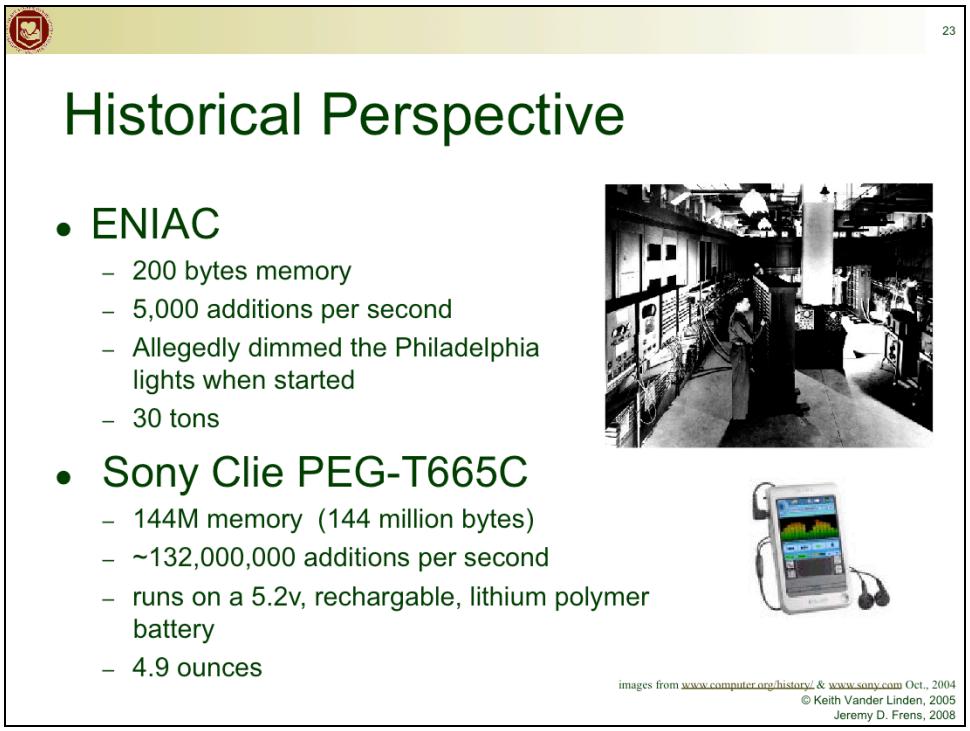
"talks" to all the external devices

Network connections

maintains the network connection (if any) (show network connection in task manager)

Software Applications

- Programs built on top of the OS that support basic user tasks
- Common Applications:
  - Word Processing
  - Spreadsheets
  - Databases
  - Electronic Mail
  - Presentation Software
  - Web Browsing / Development



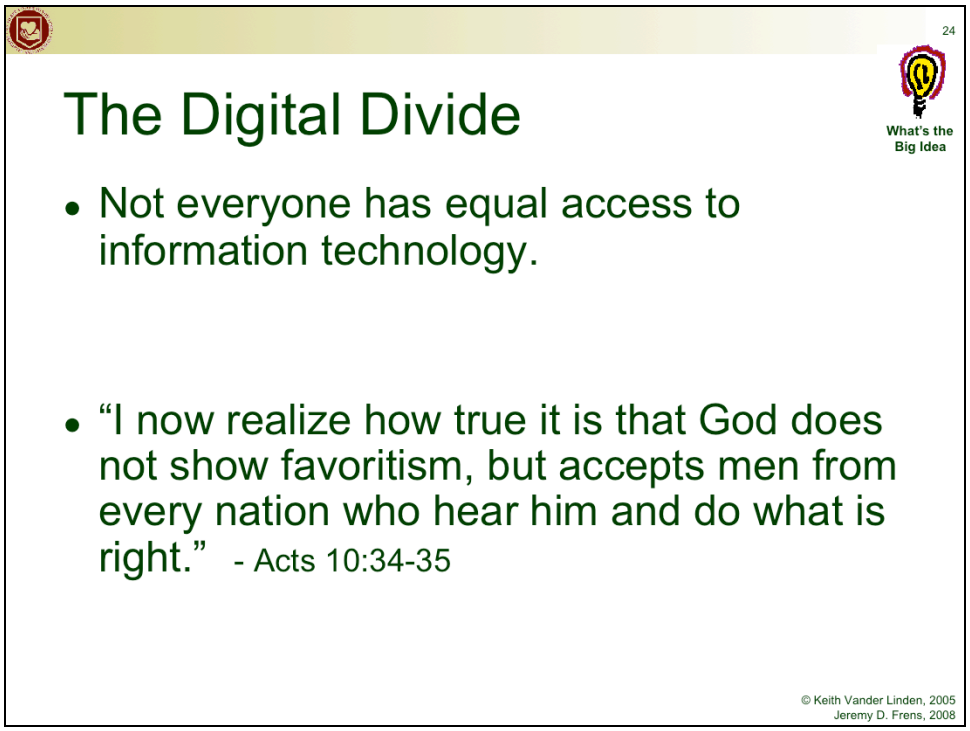
Palm VIIx has a 20MHz Motorola MC68EZ328 Dragonball processor, 8MB of RAM, 2MB of Flash memory, and can display 16 gray scales

The Clie T665C has a new DragonBall Super VZ Processor (66 MHz CPU)/16 MB (DRAM) Memory

The original DOS OS was limited to 640K - way too small!

Ipod touch: 64GB flash drive, Built-in rechargeable lithium-ion battery, 3.56 ounces

includes display, built-in speakers, light sensor, accelerometer, three-axis gyro



Key problems:

Computer technology costs money that people don't have.

Computer literacy costs money.

IT is decidedly western in structure and support (e.g., the world-wide-web is not really world-wide).