CS101 Lecture 2: 
Brief History of Computing

"There is no reason anyone would want a computer in their home."
-- Ken Olson, founder and CEO of Digital Equipment Corp., 1977

Aaron Stevens 
21 January 2011

Some images courtesy Wikimedia Commons, IBM

What You Will Learn Today

– Why should you care about the history of computing?
– How can computers learn new tricks?
– Who are the main actors in the history of personal computing?
– Why have computers become so much better, faster, and cheaper over time?
– AND: answers to some dumb questions
Why should we care?

“Predictions are that by 2013 a supercomputer will be built that exceeds the computation capability of the human brain.”

Did You Know
Globalization and The Information Age --
Created by Karl Fisch, and modified by Scott McLeod
http://www.youtube.com/watch?v=ljbl-363A2Q

Is this for real?

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Why should we care?

“Predictions are that by 2049 a $1000 computer will exceed the computational capabilities of the human race.”

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Is this for real?
Early History of Computing

**Abacus** (2400 BC)
Ancient device to record numeric values

Above: a reconstructed Roman abacus

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Early History of Computing

**Blaise Pascal** (1623-1662)
Mechanical device to add, subtract, divide & multiply
Early History of Computing

Joseph Jacquard (1801)
Jacquard’s Loom, the punched card

What tricks does your computer do?

– Web browsing, email, instant messenger
– Play games
– Watch movies, organize photos
– Word processing, spreadsheets, database

Programmability is the ability to give a general-purpose computer *instructions* so that it can perform new tasks.
Difference Engine

Charles Babages’ mechanical calculating machine, designed in 1820s.

[Image]

http://www.youtube.com/watch?v=KBuJqUfO4

Early Digital Computers

Harvard Mark I (1944)

[Image]
Early Digital Computers

**Harvard Mark I (1944)**
First fully automatic digital computer to be completed
- 51 feet wide, 8 feet high, 2 feet deep
- Built out of switches, relays, and rotating mechanical shafts/clutches
- Storage for 72 numbers, each 23 decimal digits in length
- Read instructions from paper tape, one at a time
First Computer Bug

Log of first computer bug, discovered by Grace Hopper, 1945

That 70’s Show…

Microsoft, 1978
Video: Triumph of the Nerds

PBS Series hosted by Bob Cringely

http://video.google.com/videoplay?docid=-2539790754467363791

00:00 - intro // 03:00
09:24 - Cringely explains digital computing, program,
10:00 - data, instructions in binary, flipping switches, etc.
Grace Hopper, programming COBOL, mainframe computers, punch cards,
Wozniak, Jobs on programming,
12:58 - microprocessor (vacuum tubes, transistors, chips), Intel
15:30 - Altair 8800
19:20 - Homebrew computer club
20:30 - Mellon/Garland @ computer club, binary addition by flipping
switches
22:30 - programming language/basic interpreter, Paul Allen, Bill Gates //
27:00

27:00 - Microsoft in Albuquerque, basic for the Altair
29:12 - Steve Jobs, Jim Warren, sixties counter culture
31:30 - Apple Computer, Apple I, II // 35:00
35:00 - venture capital for apple, apple II, manufacture
37:10 - computer fair
39:55 - Intro VisiCalc on an Apple II
44:38 - wall street use of PC
46:15 - wrap up characters
48:50 - closing remarks
Moore’s Law

Computing hardware will keep getting better, faster, cheaper for the rest of our lives.

Cheaper, Faster, Better

Computing hardware will keep getting better, faster, cheaper for the rest of our lives.

It’s about the software

- Hardware performs only a limited set of fundamental instructions ("tricks").
- Software harnesses this set of instructions.
- Computers do not think, and are not creative.
What You Learned Today

- Be afraid of Scary Stories
- Mechanical Computers
- Programmability
- Digital Computers
- Moore’s Law
Announcements & To Do List

– Readings this week:
  • Reed ch 4, pp 64-79 (today)
  • Reed ch Reed ch 2, pp 19-26 (next week)

– HW01 is posted, due Wednesday 1/26 @ midnight

Early Personal Computers

Computer Ads:

• Atari 400 (1980)
  http://www.youtube.com/watch?v=5sr28fygmOQ
• Commodore VIC-20 (1981)
  http://www.youtube.com/watch?v=gVX5cyMOGAg
• Compaq portable computer
  http://www.youtube.com/watch?v=YTMdXZ_QwTo
Additional Pictures:

Covered in videos (more or less)

First Generation Hardware
(1951-1959)

**Vacuum Tube**
Stored a single element of memory (on or off)
First Generation Hardware (1951-1959)

**Magnetic Drum**
Memory device that rotated under a read/write head

Punch Card
First Generation Hardware
(1951-1959)

**Magnetic Tape Drives**
Auxiliary storage devices.

Second Generation Hardware
(1959-1965)

**Transistor**
Replaced vacuum tube, fast, small, durable, cheap
Second Generation Hardware (1959-1965)

Circuit Boards
Transistors were soldered together

Magnetic Disks
Notice the hard disk platters!
Third Generation Hardware (1965-1971)

**Integrated Circuits**
Replaced circuit boards; transistor on a silicon wafer chip – smaller, cheaper, faster, more reliable

The Digital Equipment Corporation VT05, introduced 1970

**Terminal**
An input/output device with a keyboard and screen
Fourth Generation Hardware (1971-?)

Large-scale Integration
Thousands of transistors on a single chip

Die of an Intel 80486DX2 microprocessor (actual size: 12×6.75 mm) in its packaging. Released in 1992, it has 1.2 million (1.2 × 10^6) transistors.

Fifth Generation Hardware (1990-?)

PCs, the Commercial Market, Workstations
Personal Computers and Workstations emerge
New companies emerge: Apple, Sun, Dell …

Laptops, Cellphones, PalmPilot, iPod, etc.
Everyone has his/her own portable computer - or several of them.

Internetworking
Virtually all computing devices connected to the Internet. High-speed and wireless connections are common.