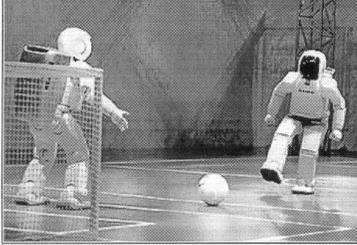


Robots play Soccer



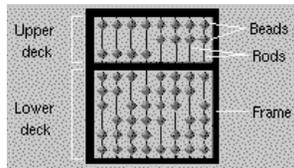
"By 2050 our aim is to beat the winners of the World Cup..."-Shu Ishiguro, head of Robot Lab in Osaka, Japan

1 Computer Science 107

A Brief History of the Development of Computers

Origins of Digital Computers

- earliest computing devices designed to aid numeric computation
- abacus, first developed in Babylonia over 5,000 years ago



1.3

Slide Rule of 1622

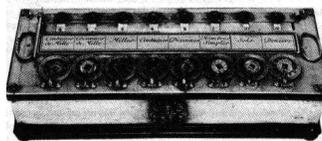
- 1614 John Napier discovered Logarithms.
- 1622 Edmond Gunter put scales on two pieces of wood.
- Multiply, divide, squares, cubes, logarithms, trig



1.4

Early Calculating Machines

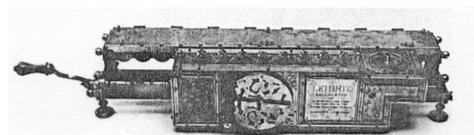
- Blaise Pascal (1623-1662), addition and subtraction using on 8 sprocket gear for each digit.
- Sold 10-15 machines.



1.5

Leibniz Machine-late 1600's

- G. W. F. Leibniz (1646-1716), "Stepped Reckoner," full-featured calculator, Add, Subt. Mult, Div 5-12 digits
- Long time to set up for each operation



1.6

Charles Babbage (1791-1871)

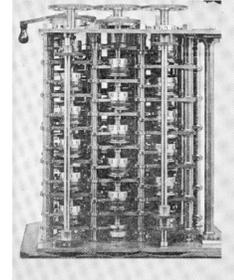


- Mathematics Prof at Cambridge University
- first true pioneer of modern digital computing machines
- built two prototype calculating machines
- Difference Engine
- Analytical Engine

1.7

Difference Engine- 1812

- Add, Subtract, Multiply & Divide
- Created math tables containing up to 26 digits
- designed a larger model, but hardware technology insufficient to build the machine
- 1990 London Museum of Science built it from original design



1.8

Analytical Engine - 1840

- Used punched cards
- Calculations to 20 digits of accuracy
- Ada Lovlace, daughter of Lord Byron. Assisted Babbage as his "Programmer", for free



1.9

Jacquard Loom-early 1800's

- Used series of wooden cards with holes
- Rods entered holes-moved appropriate strings for bobbin to pass through
- Method seen by Babbage and applied to his machines

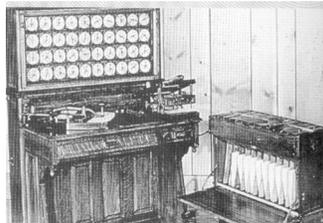


Jacquard loom

1.10

Card Tabulator - 1890

- Data coded into punched cards.
- Cards and Tabulator used in the census of 1890
- as cards were "read", dials kept count.



1.11

Herman Hollerith Tabulating Machine Company

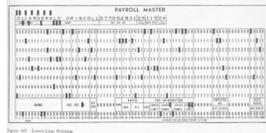
PAYROLL MASTER									
NAME	DOB	SSN	EMP ID	DEPT	RATE	START	END	TOTAL	STATUS
0114562810	0114562810	0114562810	0114562810	0114562810	0114562810	0114562810	0114562810	0114562810	0114562810
1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111	1111111111
2222222222	2222222222	2222222222	2222222222	2222222222	2222222222	2222222222	2222222222	2222222222	2222222222
3333333333	3333333333	3333333333	3333333333	3333333333	3333333333	3333333333	3333333333	3333333333	3333333333
4444444444	4444444444	4444444444	4444444444	4444444444	4444444444	4444444444	4444444444	4444444444	4444444444
5555555555	5555555555	5555555555	5555555555	5555555555	5555555555	5555555555	5555555555	5555555555	5555555555
6666666666	6666666666	6666666666	6666666666	6666666666	6666666666	6666666666	6666666666	6666666666	6666666666
7777777777	7777777777	7777777777	7777777777	7777777777	7777777777	7777777777	7777777777	7777777777	7777777777
8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888	8888888888
9999999999	9999999999	9999999999	9999999999	9999999999	9999999999	9999999999	9999999999	9999999999	9999999999
0000000000	0000000000	0000000000	0000000000	0000000000	0000000000	0000000000	0000000000	0000000000	0000000000

Figure 143. Lower-Line Printing

1.12

Herman Hollerith International Business Machine

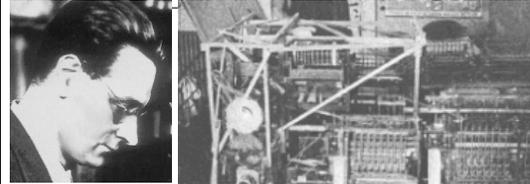
- 1924 renamed IBM by new President Thomas Watson
- By 1952 world was using 16 Billion cards/year



1.13

Konrad Zuse

Germany, 1939



"I was too lazy to calculate and so I invented the computer."

First General Purpose, programmable digital computer built with electric relays and eventually vacuum tubes. Developed first programming language "PlanKalkul"

1.14

John Atanasoff

USA, 1939

First electronic digital computer

Built at Iowa State University with his student Clifford Berry

called ABC Computer

•special-purpose: only to solve simultaneous equations



1.15

Bill Hewlett and Dave Packard USA, 1939

Began HP company in Garage in Palo Alto, CA

40 years later in a Garage in same town, Apple computer was begun

Did not work with computers until years later



1.16

Howard Aiken -Mark I USA, 1944

At Harvard, the Mark I was the largest electromechanical calculator ever built.

- 5 Tons, 55ft long
- Used electromechanical relays
- Instructions were punched in paper tape.
- Took 3-5 sec/calculation
- Data stored in 3000 mechanical wheels



1.17

He said WHAT?

- Howard Aiken was quoted in 1947 as saying
- "Only six electronic digital computers would be required to satisfy the computing needs of the entire United States"

1.18

Grace Murray Hopper (1906-1992) USA, 1944

Retired at 79 as a Rear Admiral in the Navy

Worked on Mark I, II, III and UNIVAC

Primary designer of COBOL




1.19

John Mauchly and Presper Eckert 1945 ENIAC - Electronic Numerical Integrator and Computer



- First general purpose electronic computer
- operational in 1946
- 18,000 vacuum tubes
- weighed 30 tons
- 140,000 watts of power
- 3000 blinking lights
- 5000 additions/sec

Compiled a trajectory table in two days.

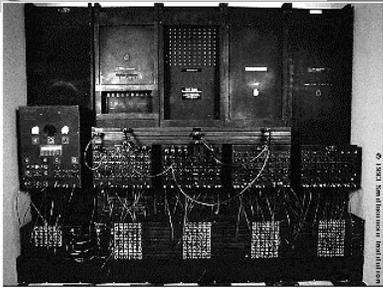
1.20

ENIAC Programmed by setting 6000 Switches



1.21

ENIAC Transferred data with connecting wires

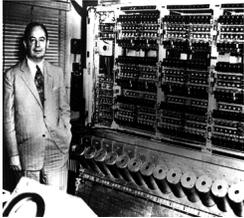


Took two days to set up a program that might run a few seconds

1.22

Von Neumann Architecture

- Early 1950's Developed the "stored program" concept
- basic computer architecture of today's computers
- binary encoding
- I/O, CPU-Memory organization
- "fetch-decode-execute" instruction cycle



1.23

Alan M. Turing (1912-1954)

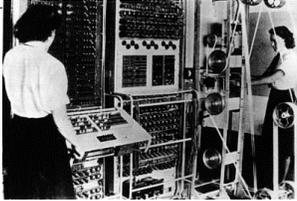


- led the WWII research group that designed a machine similar to ENIAC called Colossus.
- proposed a simple abstract universal machine model for defining computability

[More Info](#)

1.24

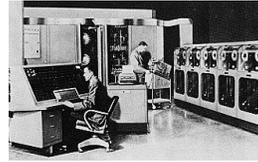
Colossus vs Enigma



- In England in 1943, Colossus was used to break the German's coded messages created by their Enigma machine

1.25

UNIVAC I



- first commercial general-purpose computer system
- successor to Mauchly-Eckert BINAC
- delivered in 1951
- used to forecast the 1952 presidential election (Eisenhower)

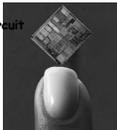
1.26

Evolution and Acceleration

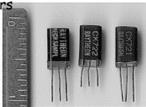
First Generation
1930's-1940's
Vacuum tubes



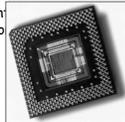
Third Generation
Late 60's
Integrated circuit



Second Generation
1950's- mid 1960
Transistors



Fourth Generation
70's to present
Microprocessors



1.27

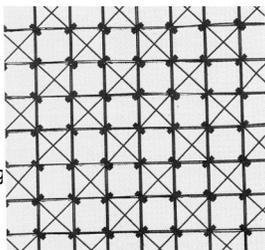
Integrated Circuits

- More reliable
- Smaller
 - Millions on one silicon chip)
- Faster
- More Efficient
 - less power needed, less heat
- Cost less
 - Mass produced

1.28

CORE MEMORY

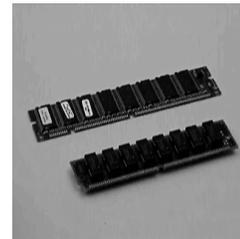
- Small donut shaped magnets
- Oriented in one of two directions
- Some wires used for determining location
- Others for specifying magnetic orientation
- Nonvolatile



1.29

Today's MEMORY

- SIMM: Single In-line Memory Module
- DIMM: Dual In-line Memory Module
- EDO, SRAM, VRAM, WRAM, SDRAM, RDRAM
- Access Speeds: 60, 45, 12, 6, 2 Nanoseconds



1.30

First Microcomputer were Kits for Hobbyists



The MITS Altair, the first personal computer, came with no keyboard or monitor. It could only be programmed by using a bank of binary switches for input; binary patterns of lights provided the output.

1.31

First Microcomputer

- Alan Kay
- Developed one of the first Microcomputers in the late 1960's
- Coined the term "Personal Computer"
- His Alta computer was not a commercial success



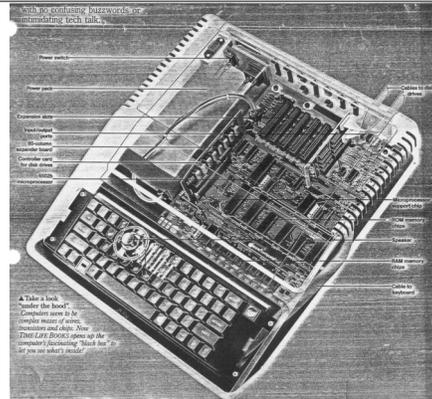
1.32

First Commercial Desktop computer

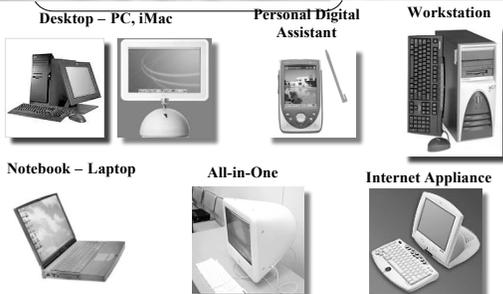
- Steve Jobs and Steven Wozniak
- Jobs sold VW Van to Form Apple Computer in 1976
- HP did not think it was a worthwhile project



1.33



Types of Computers Computers for Individuals



1.35

Types of Computers Computers for Organizations

- **Servers** are not designed for individuals. They make programs available for network users
- **Minicomputers** handle the computing for small corporations



- **Mainframes** handle gigantic processing jobs for large corporations or agencies
- **Supercomputers** are ultra-fast and handle huge amounts of scientific data using hundreds of microprocessor chips running in parallel

1.36

Special-Purpose Computers

- Special-Purpose
 - often attached to sensors to measure and/or control the environment
 - programs etched in silicon so they can't be altered (firmware)
- Embedded
 - enhance consumer goods
 - control a variety of hardware devices, including robots



1.37

Software

Software

- A 16 year old Bill Gates in partnership with his friend Paul Allen Created a DOS (Disk operating system) that would eventually dominate the world's operating system markets.



1.38

Bill Gates/Microsoft Corp.

- In 2004 his Windows Operating Systems were on more than 96% of the worlds desktop computers.
- Apple OS on 2.8%
- Linux OS on 1%



What's he worth today?

1.39

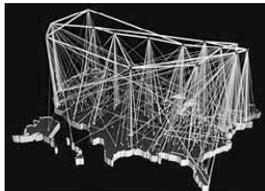
Software Applications

- Word processing and desktop publishing
- Spreadsheets and databases
- Computer graphics, multimedia
- Telecommunication and networking
- Artificial intelligence
- General problem-solving
- Programming languages

1.40

The Internet Explosion

- A network of networks
- World Wide Web for usability
- Electronic mail
- Multimedia content
- Self-publishing
- On-line transactions
- Intranets
- Network computers



1.41

That's all folks!