COMS 465:
Computer Mediated Communication

Plan

- Review
- Historical Context
- Preview

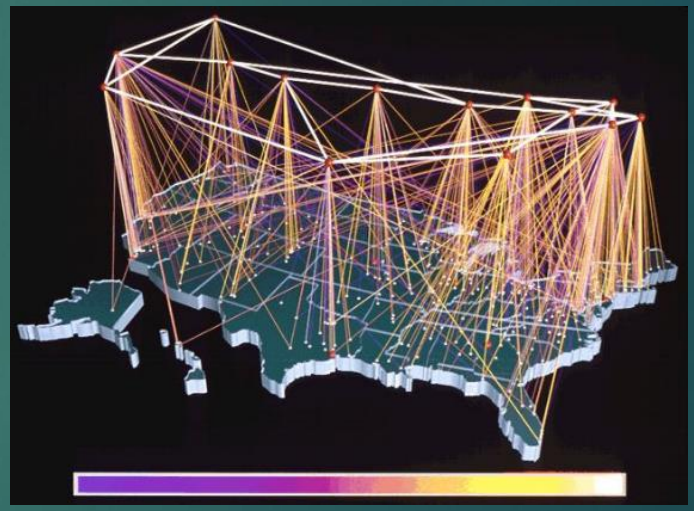
Review

http://gunkelweb.com/coms465

Introduction

- Computer Mediated Communication
  - Two technological components:

computers



networks

Introduction

- Demystify Technology
  - History
  - Basic Features

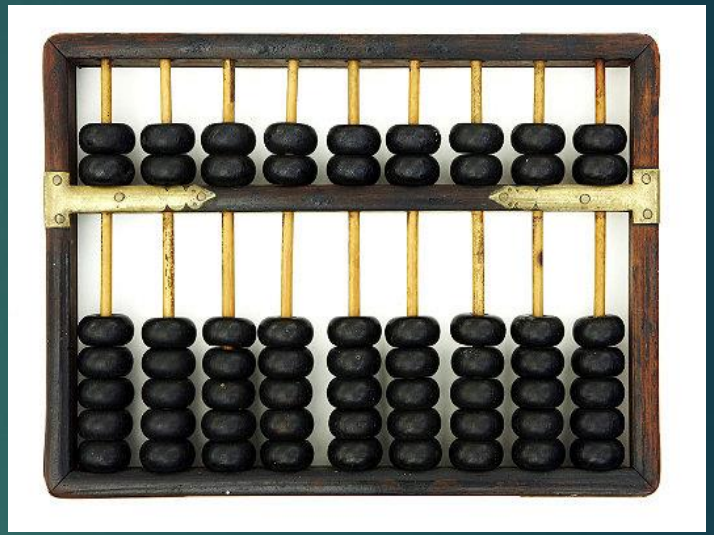
History of Computing

History of Computing

- Topics
  - Mechanical Computers
  - Electronic Computers
  - Computer Generations (1-4)
  - General Features

History of Computing

- Mechanical Computers
  - Abacus
    - Popular and accurate device
    - 4000+ years in service
    - Operation
      - Beads on wire = figures (data)
      - User follows a set of rules to perform addition & subtraction
      - Results of operations are read from the location and number of beads



History of Computing

- Mechanical Computers
  - Napier Bones (1617)
    - Invented in Persia
    - Table that reduces multiplication and division to a series of additions and subtractions
  - William Schickard (1623)
    - 4 Function mechanical calculator
    - Combined Napier's Bones, for multiplication and division, with a toothed-wheel system to add and subtract.

History of Computing

- Mechanical Computers
  - Pascal's Calculator (1642)
    - Adding machine
    - Accountancy/Taxes
  - Leibniz's Step Reckoner (1674)
    - Full Four Function Calculator

History of Computing

- Mechanical Computers
  - Joseph Marie Jacquard (1801)
    - Programmable weaving loom
    - Mechanical Memory – punch cards to control weaving pattern
    - *Luddites* - Ned Lud and followers; opposed the automation of weaving

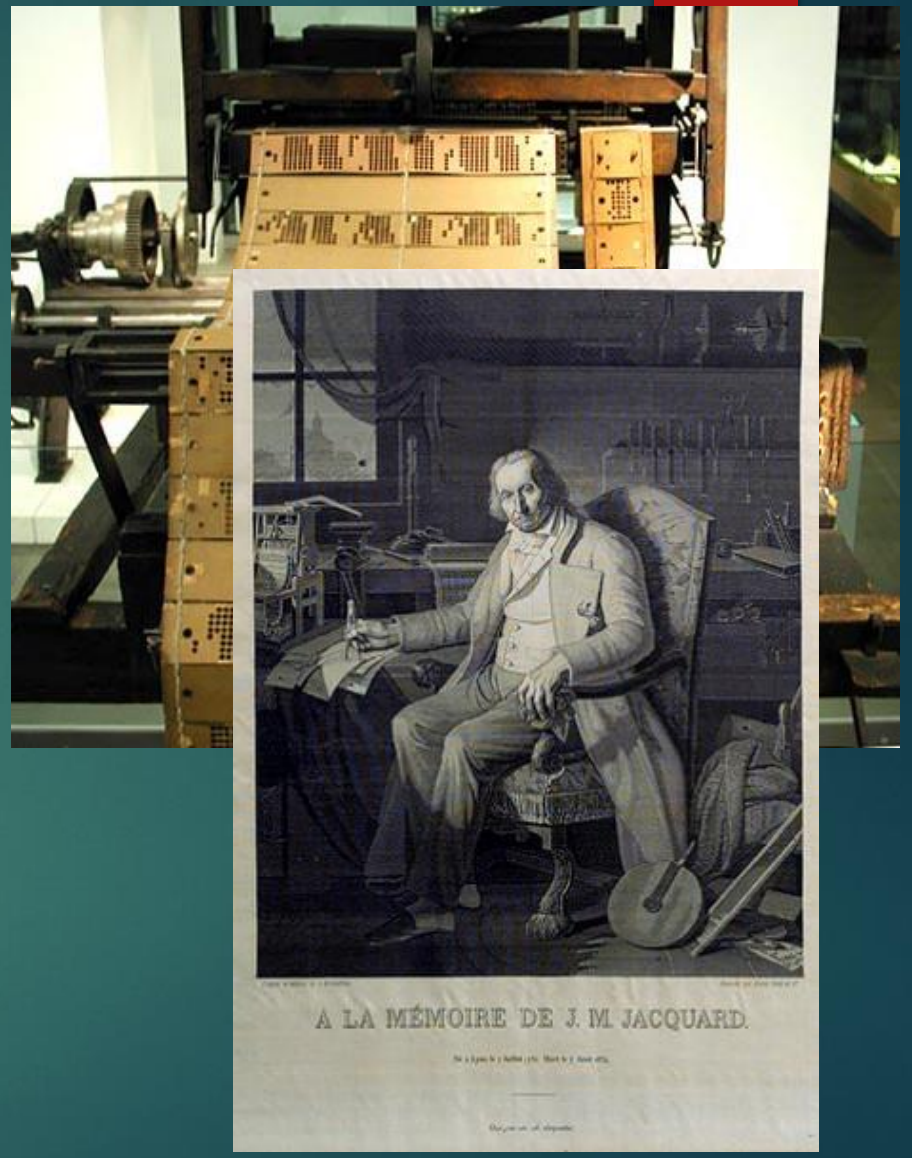
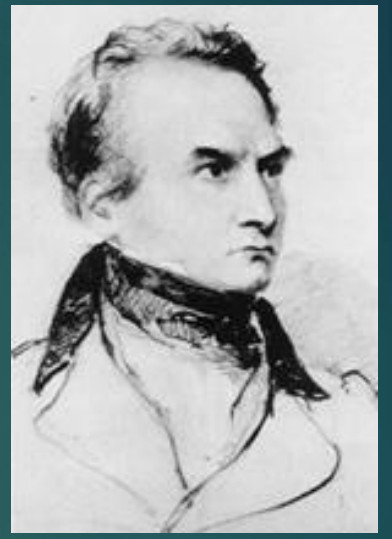


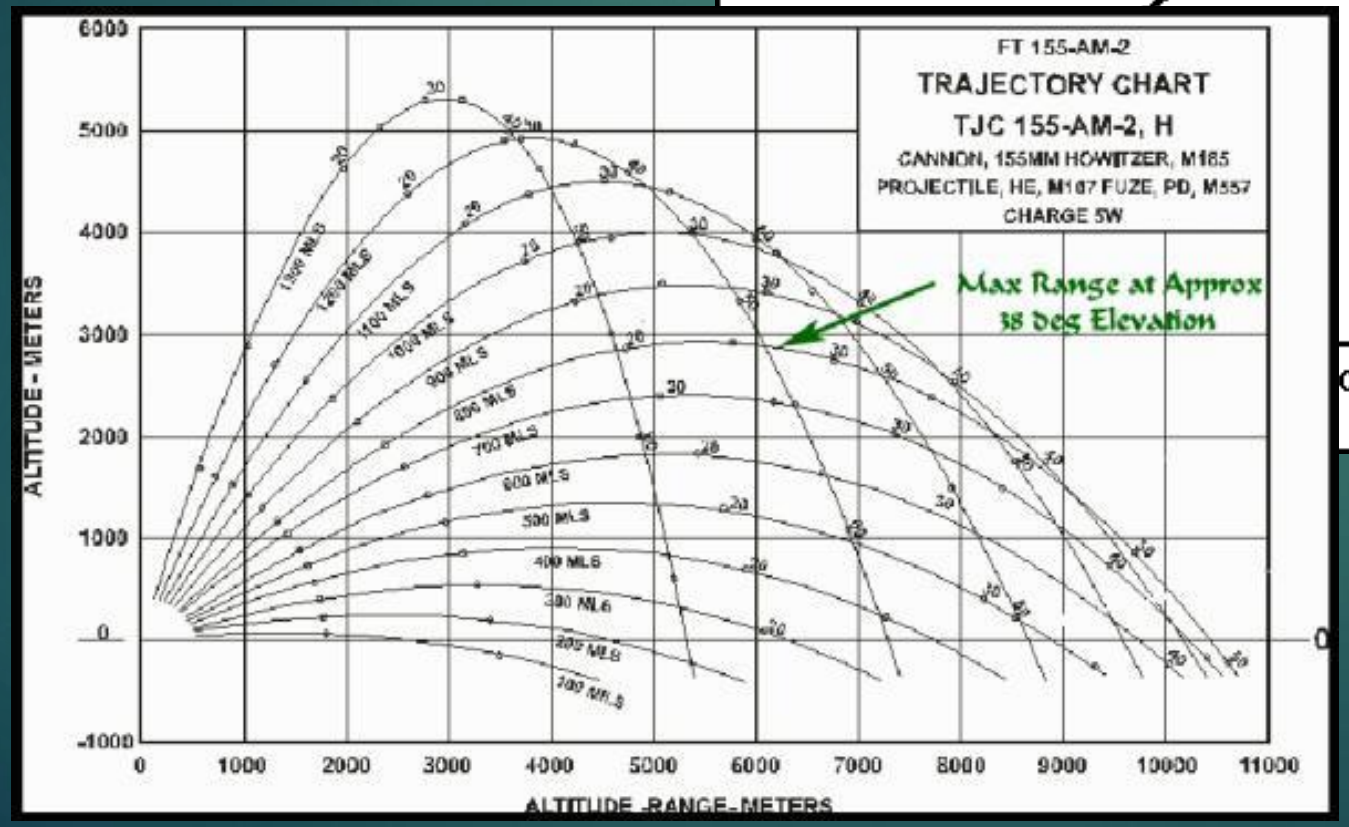
Image of Jacquard woven in silk with a Jacquard Loom; required 24,000 punch cards (1839)

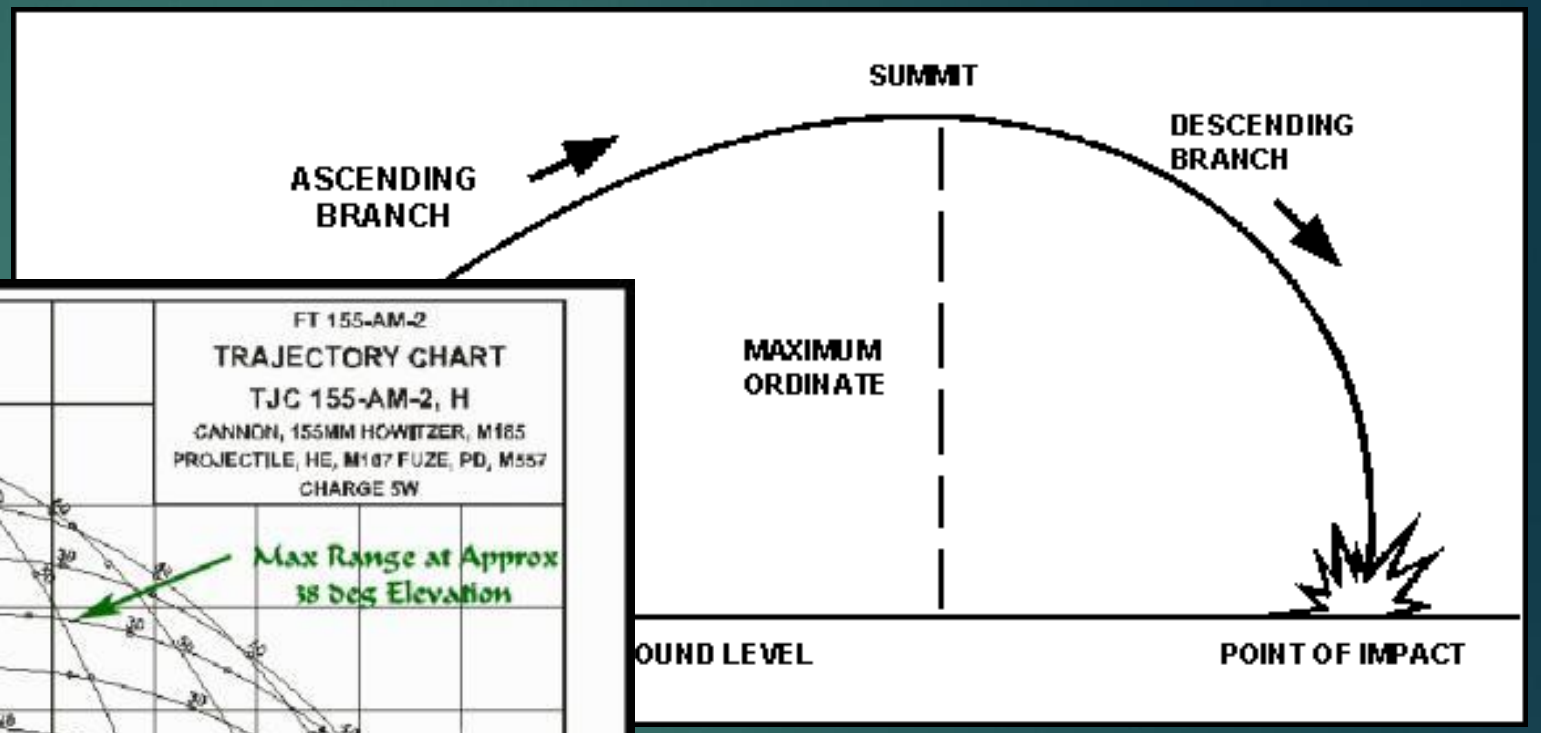
History of Computing

- Mechanical Computers
  - Charles Babbage (1792-1871)
    - Automate computation for the purpose of making more accurate mathematical tables for navigation and artillery
  - Two Projects
    - Difference Engine - Mechanical computer used to create mathematical tables
    - Analytical Engine - First programmable computer with separate memory and processing units and punched-card input



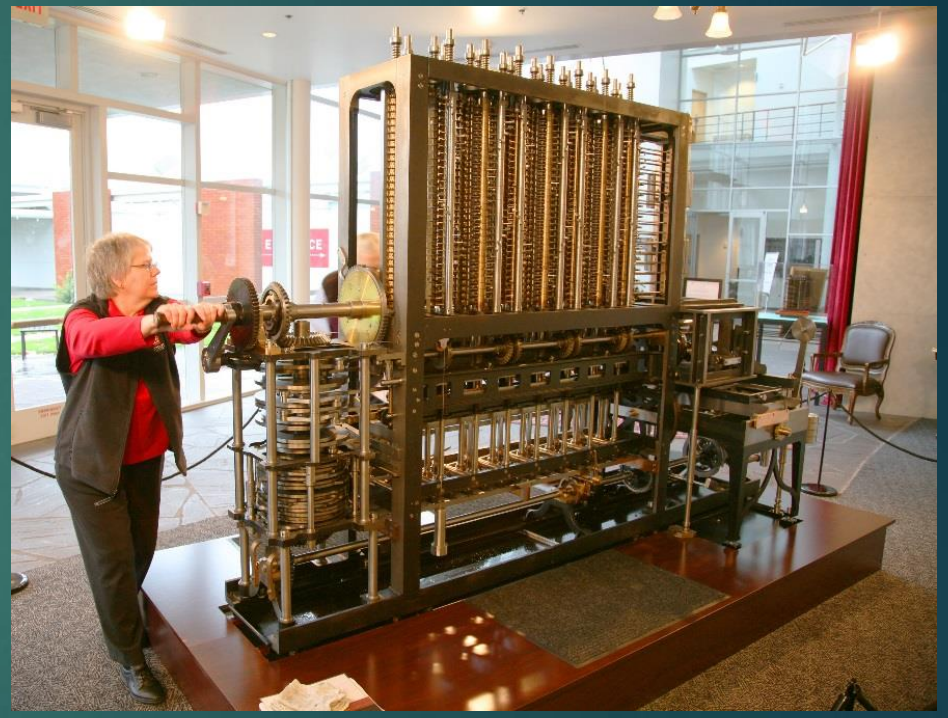
History of Computing





History of Computing

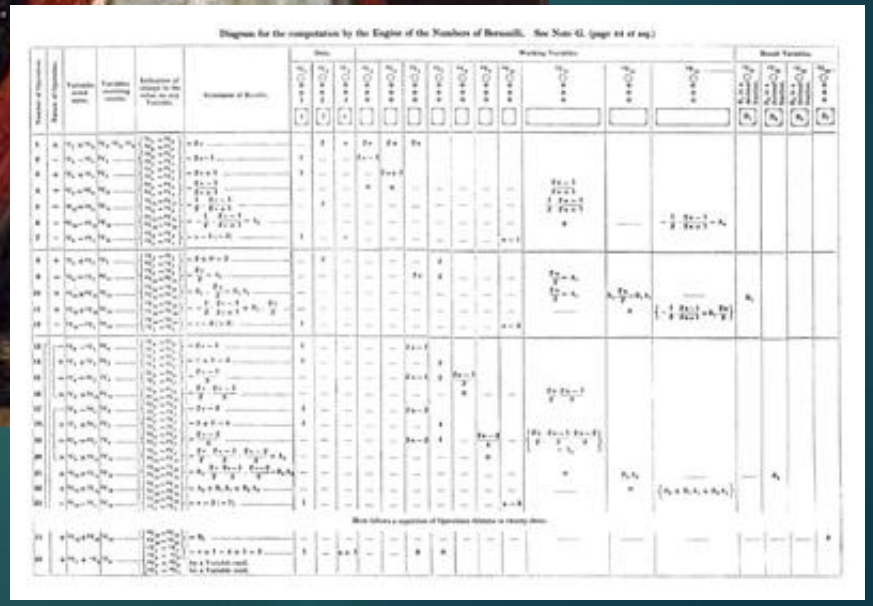
- Mechanical Computers
  - Charles Babbage (1792-1871)
    - Neither project was built in his lifetime
    - Difference Engine No. 2 was finally constructed in 1991 by London Science Museum; it worked perfectly.



Difference Engine demo

History of Computing

- Mechanical Computers
  - Augusta Ada Byron (1815-1842)
    - Mathematician
    - Developed programming for the Analytical Engine
    - First "Computer Scientist"



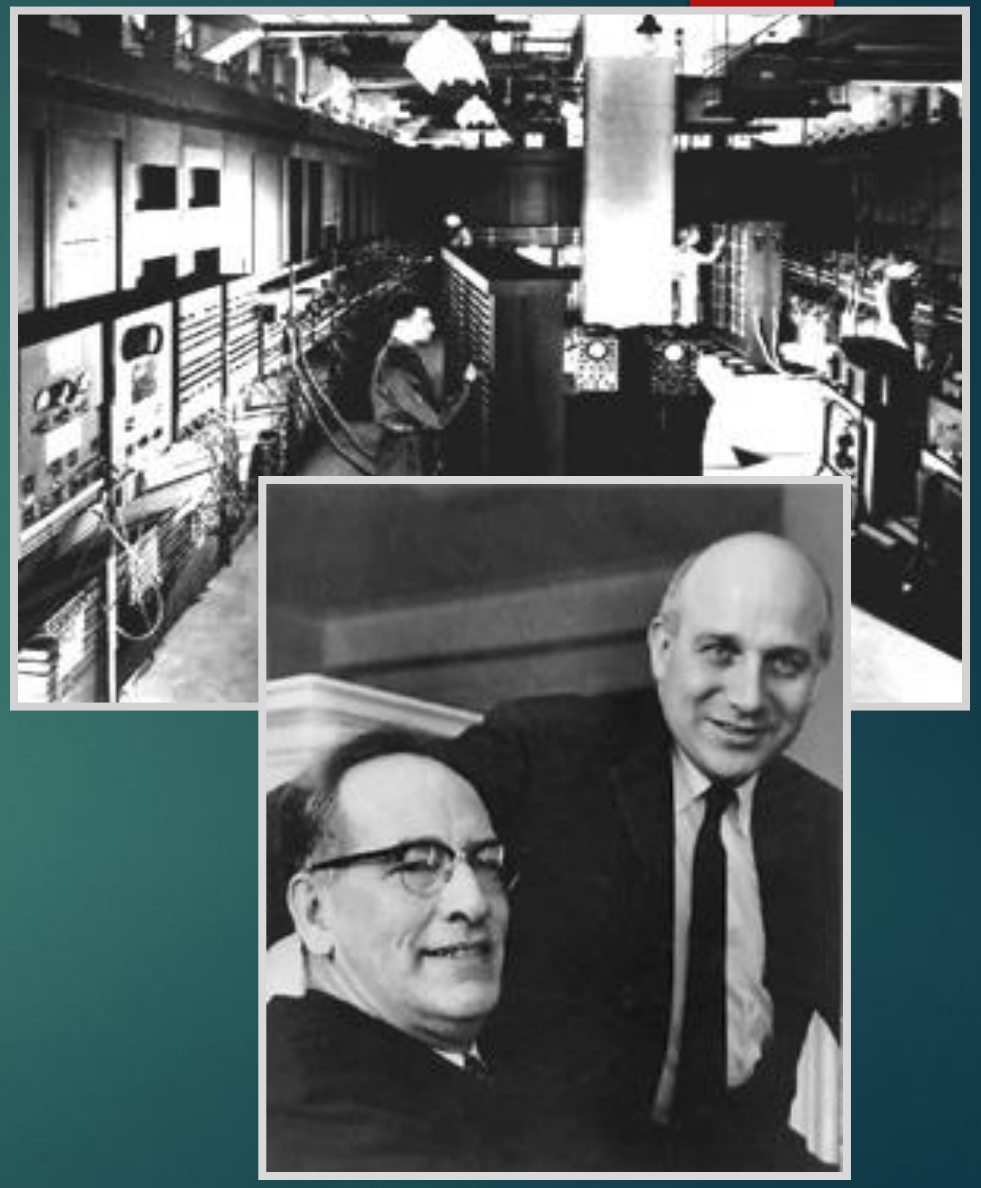
Bernoulli number algorithm
- Ada Lovelace (1843)

History of Computing

- Electro-Mechanical
  - Differential Analyzer (1931)
    - Vanevear Bush (1890-1974)
    - A room with a complicated array of gears and shafts driven by electric motors.
  - Z1 (1935) & Z2 (1939)
    - Konrad Zuse (1910-1995)
    - Binary electrically driven mechanical calculator with limited programmability, reading instructions from punched tape
    - Z2 used electro-mechanical relay switches

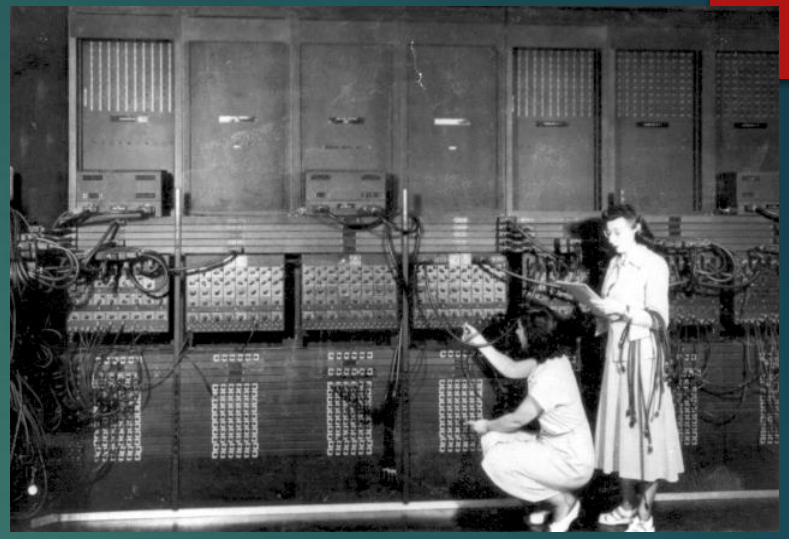
History of Computing

- Electronic Computers
  - ENIAC (1945)
    - Electronic Numerical Integrator and Computer
    - Giant vacuum-tube machine (18,000 tubes); weighed 30 tons
    - Developed by John Mauchly (1907-1980) and J. Presper Eckert (1919-1995)

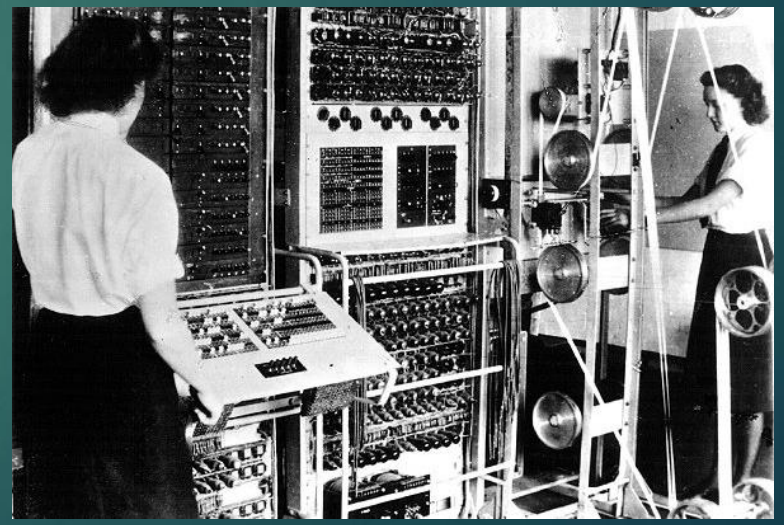


History of Computing

- Electronic Computers
  - ENIAC (1945)
    - First* fully programmable electronic computer; not just an electronic calculator
    - Programming required rewiring for each particular application; difficult operation
  - Colossus (1943)
    - British – "Bletchley Park"
    - Used to break Nazi Lorenz Code (Enigma Machine)



ENIAC Newsreel



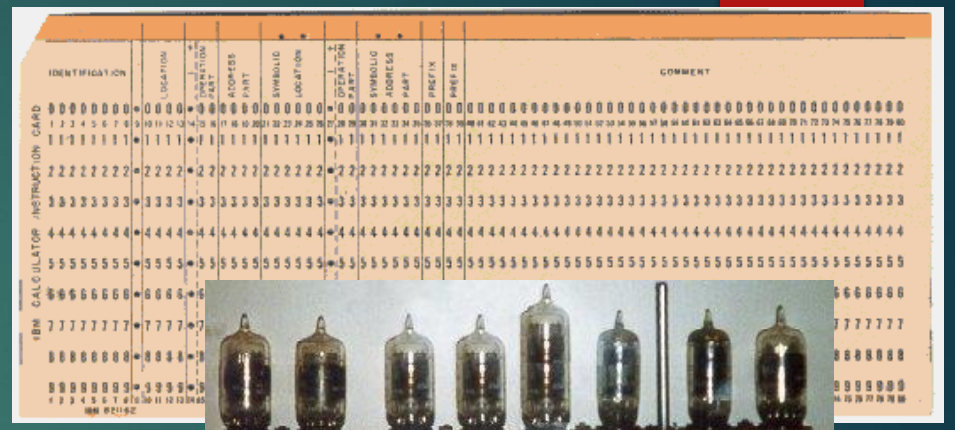
Colossus Mk II

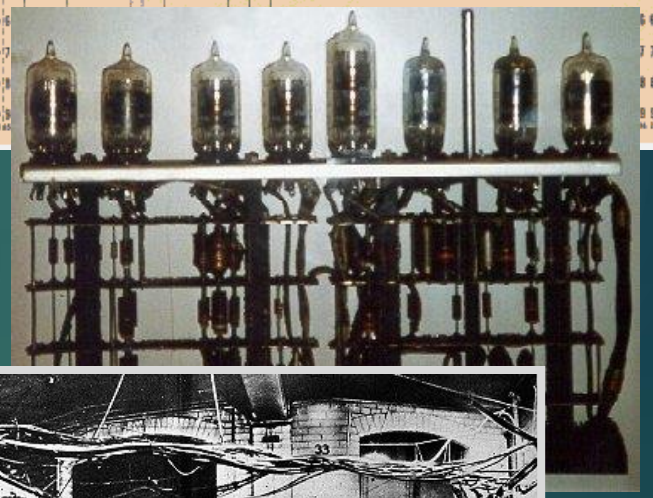
History of Computing

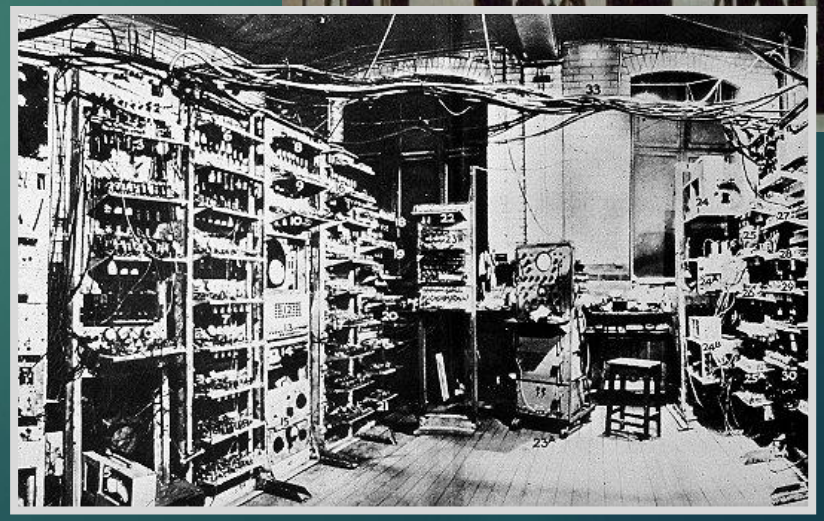
- Electronic Computers
  - Development of electronic computers takes place in distinct technological leaps
  - 4 Computer Generations
    - Each generation defined by specific tech innovations
    - Generations are a convenience of history; they are not exact but have some overlap

History of Computing

- First Generation - 1950s
  - I/O = punch cards & printer
  - Processor = Vacuum tubes
  - Stored Program Concept
    - Computer program is stored in computer memory
    - Reprogram the machine without rewiring it
    - Manchester Mk I (1948)

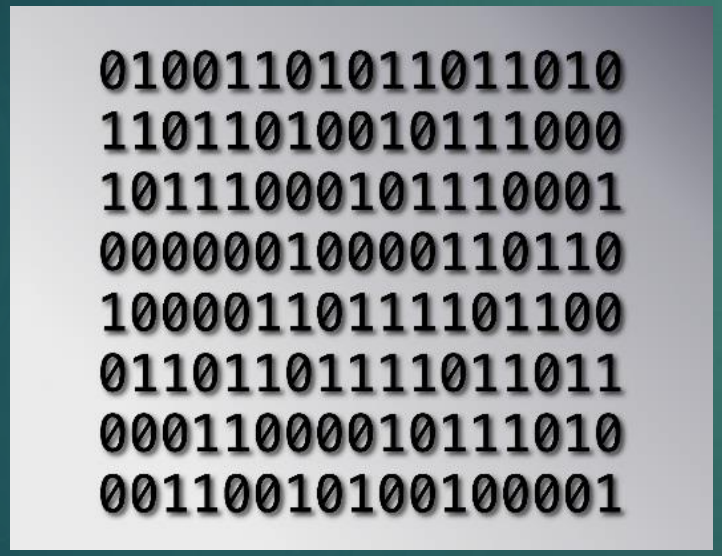






History of Computing

- First Generation - 1950s
  - Programming



Machine Language
Binary

```
                hello.asm

                .MODEL tiny ; all seg regs equal
                .CODE
                org 100h      ; .COM entry
start:          jmp short main
                .DATA
msg             db   'Hello, world!',0dh,0ah,0
                .CODE
sout:           mov cx,100h
sout1:          mov dl,[bx]
                inc bx
                or dl,dl        ; set flags
                jz sout2
                mov ah,02h ; chr out
                int 21h
                loop sout1
sout2:          ret
main:           mov bx,OFFSET msg
                call sout
                mov ah,4ch ; terminate
                int 21h
                end start
```

Assembler Language

```
C       Hello World in Fortran

        PROGRAM HELLO
        WRITE (*,100)
        STOP
  100   FORMAT (' Hello World! ' /)
        END
```

High-Level Language

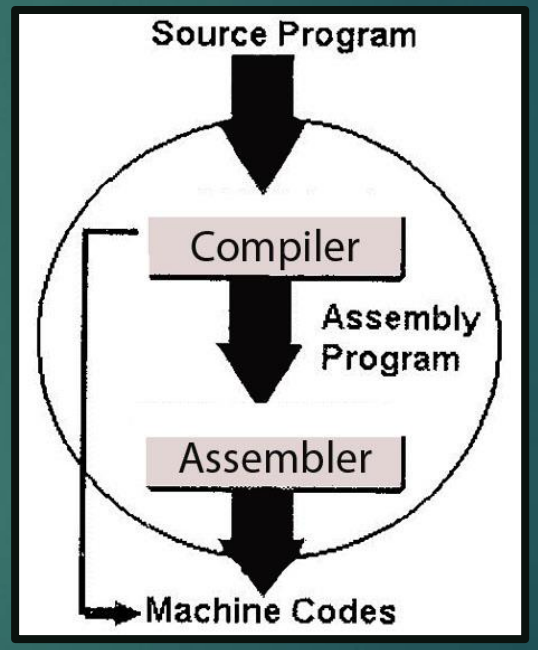
COLBAL
FORTRAN

History of Computing

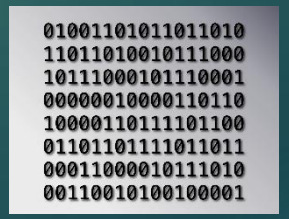
- First Generation - 1950s
  - Programming

```
C     Hello World in Fortran

      PROGRAM HELLO
      WRITE (*,100)
      STOP
  100 FORMAT (' Hello World! ' /)
      END
```



Grace Hopper (1906-1992)
Invent Compiler - 1952



History of Computing

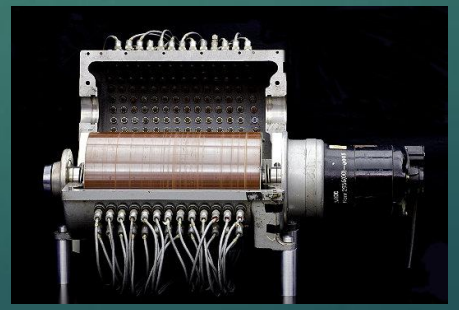
- First Generation - Memory

Serial Memory

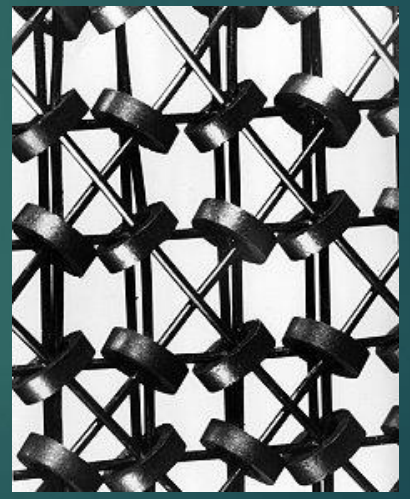
Mercury Delay Lines

RAM – Random Access Memory

Williams-Kilburn Tubes



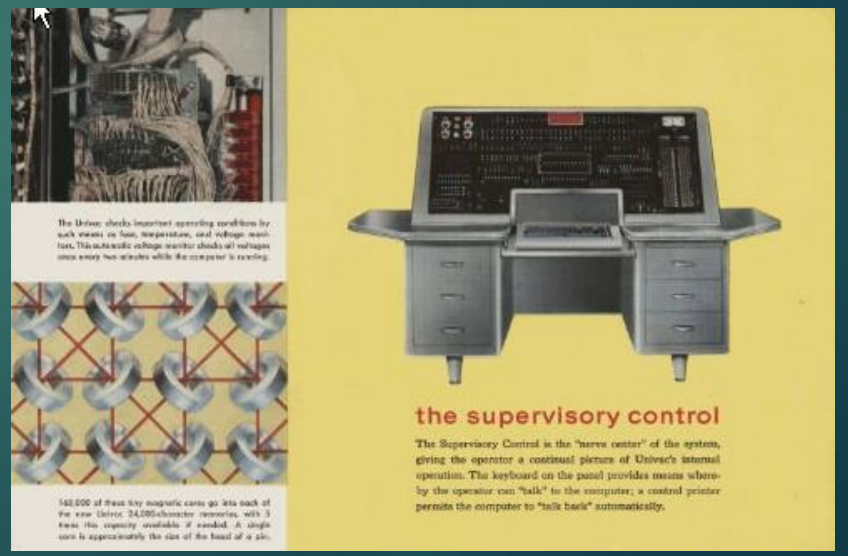
Magnetic Drum



Magnetic Core Memory

History of Computing

- First Generation - 1950s
  - UNIVAC (1951)
    - Eckert-Mauchly Division of Remington Rand Inc.
    - Used by US Census Bureau
    - Predicts Eisenhower's election in 1952



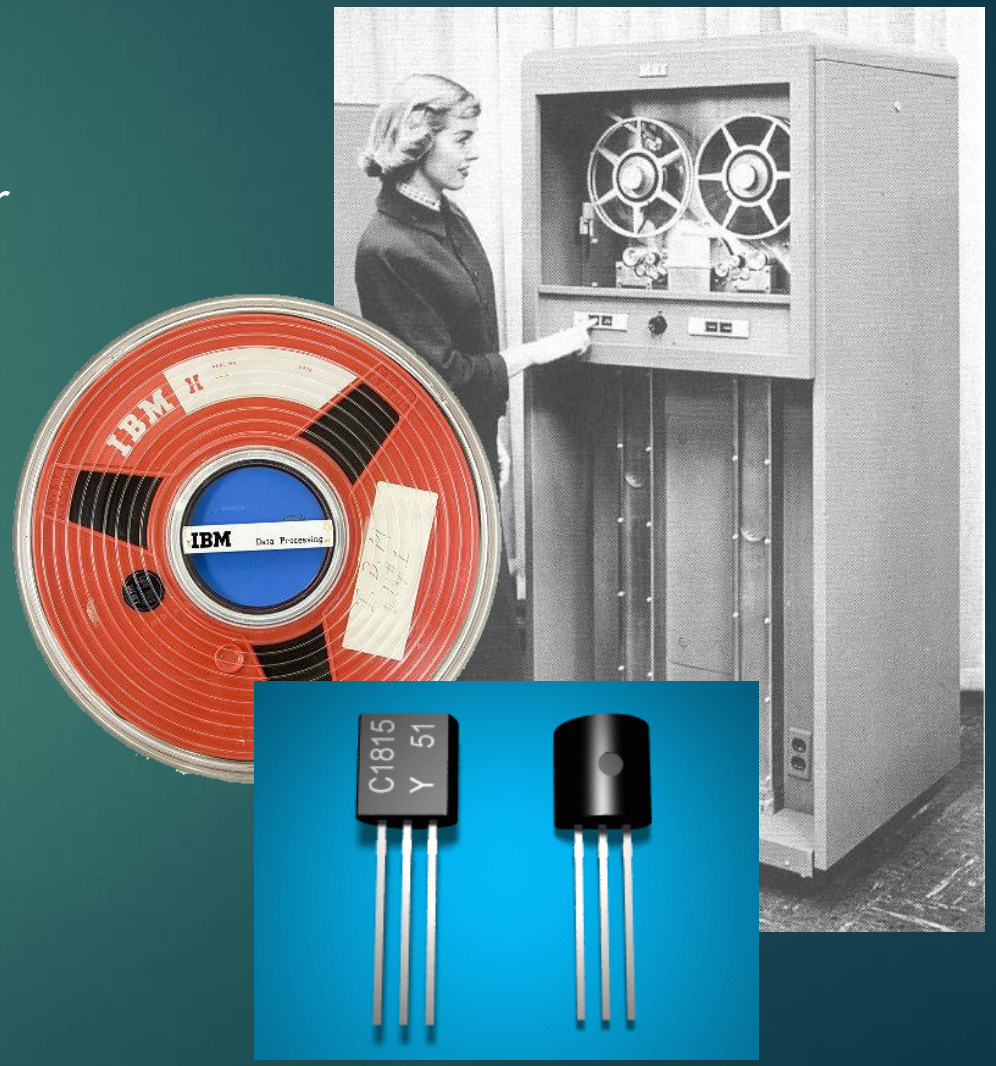
History of Computing

- First Generation - 1950s
  - IBM 701 (1953)

  - IBM 650 (1955)

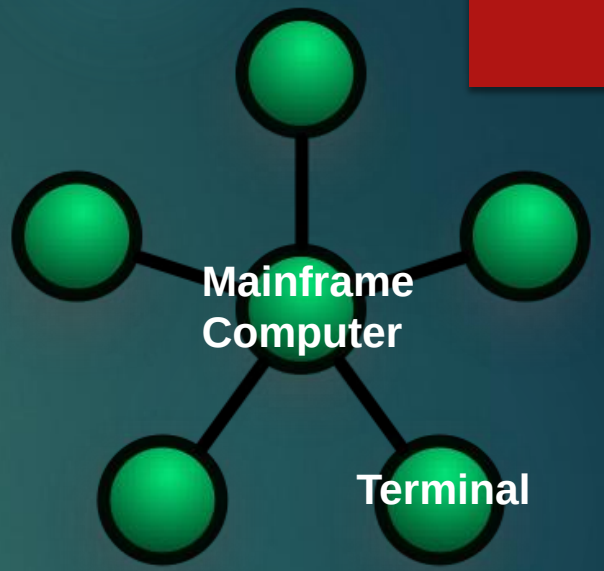
History of Computing

- Second Generation - 1960s
  - I/O = Tape & Printer/CRT Monitor
  - Processor = transistors
  - Memory = Magnetic Core
  - Time Sharing



History of Computing

- Second Generation - 1960s
  - Time Sharing
    - A number of users at different *terminals* simultaneously use a single computer for different purposes.



History of Computing

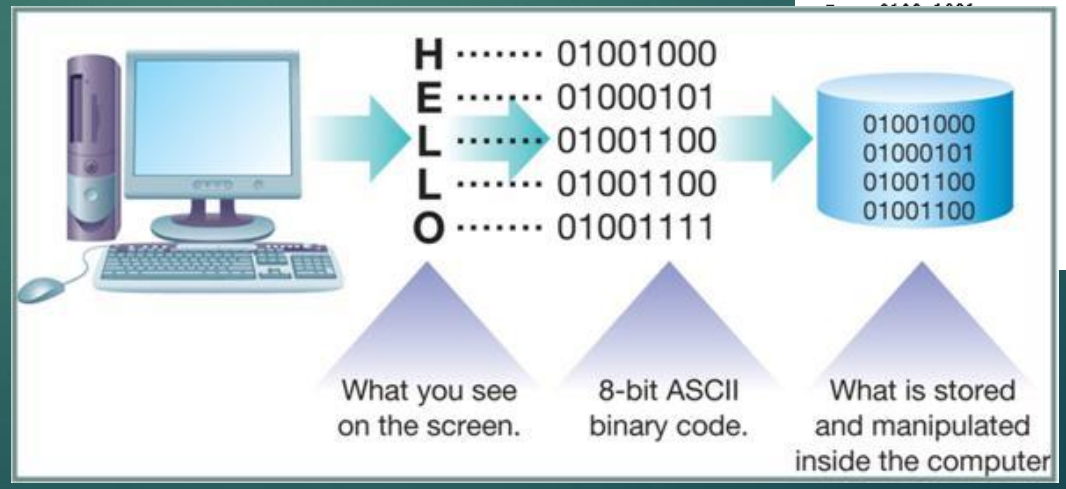
- Second Generation - 1960s
  - Time Sharing CMC
    - Chat – Synchronous interaction
    - Email – Asynchronous interaction
    - Bulletin Board – Broadcast interaction

History of Computing

- Second Generation - 1960s
  - Computer Standards
  - ASCII = American Standard Code for Information Interchange (1963)

ASCII Code: Character to Binary

0	0011 0000	O	0100 1111	m	0110 1101
1	0011 0001	P	0101 0000	n	0110 1110
2	0011 0010	Q	0101 0001	o	0110 1111
3	0011 0011	R	0101 0010	p	0111 0000
4	0011 0100	S	0101 0011	q	0111 0001
5	0011 0101	T	0101 0100	r	0111 0010
6	0011 0110	U	0101 0101	s	0111 0011
7	0011 0111	V	0101 0110	t	0111 0100
8	0011 1000	W	0101 0111	u	0111 0101
9	0011 1001	X	0101 1000	v	0111 0110
A	0100 0001	Y	0101 1001	w	0111 0111
B	0100 0010	Z	0101 1010	x	0111 1000
C	0100 0011	a	0110 0001	y	0111 1001
D	0100 0100	b	0110 0010	z	0111 1010
E	0100 0101	c	0110 0011	.	0010 1110
F	0100 0110	d	0110 0100	,	0010 0111
G	0100 0111	e	0110 0101	:	0011 1010
H	0100 1000	f	0110 0110	;	0011 1011
			0110 0111	?	0011 1111
			0110 1000	!	0010 0001
			0110 1001	'	0010 1100
			0110 1010	"	0010 0010
			0110 1011	(	0010 1000
			0110 1100	)	0010 1001
				space	0010 0000

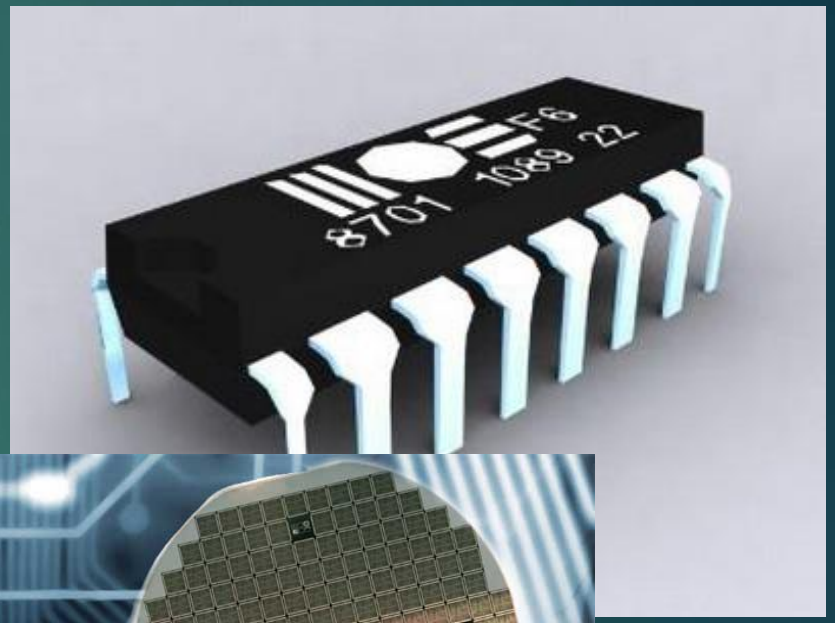


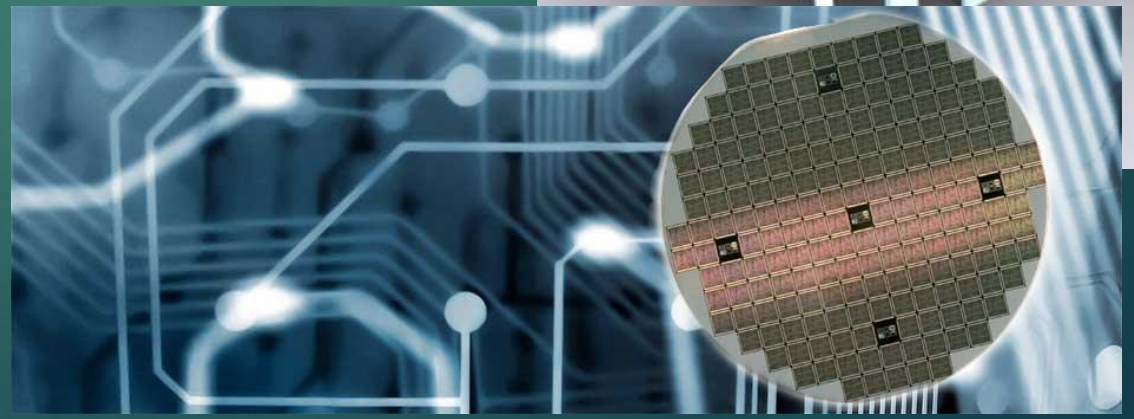
History of Computing

- Second Generation - 1960s
  - IBM 1401 & 1620 (1958)
    - Fully transistorized Computer for business and scientific research
  - IBM System/360 (1964)
    - Compatible computer
    - Large instruction set
    - Business or Scientific use

History of Computing

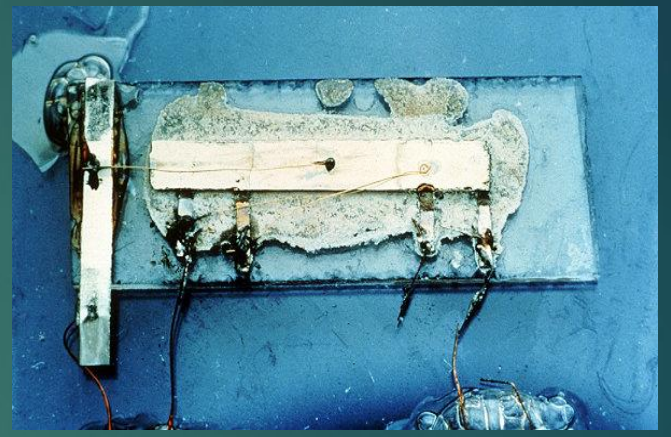
- Third Generation - mid 1960s to mid 1970s
  - I/O = Tape/Disk & CRT Monitor
  - Processor = Integrated Circuit
  - Memory = Integrated Circuit
  - Computer Networking Standards



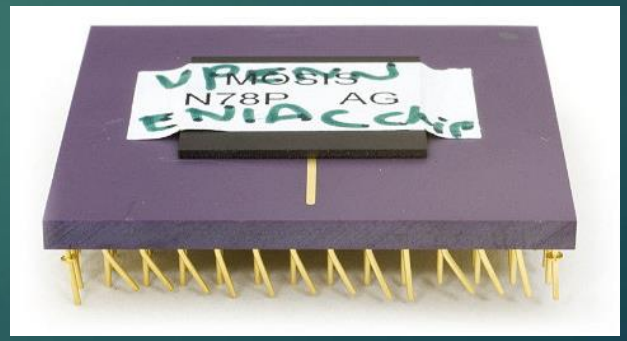


History of Computing

- Third Generation
  - Integrated Circuit
    - Many transistors and circuits integrated on a chip of silicon
    - Invented by Jack Kilby and Robert Noyce.
    - Less expensive to manufacture and more efficient than comparable systems comprised of transistors



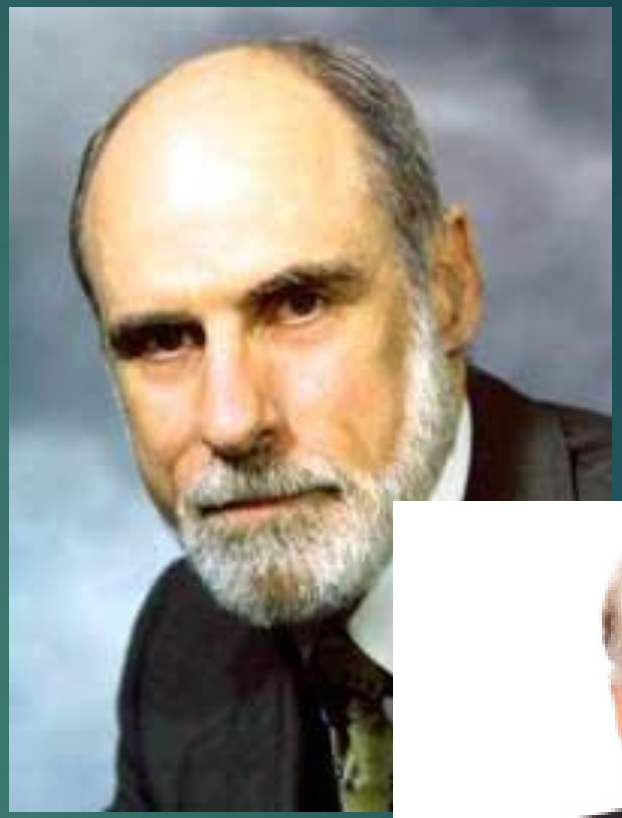
First Integrated Circuit - 1958



ENIAC on an IC chip - 1995

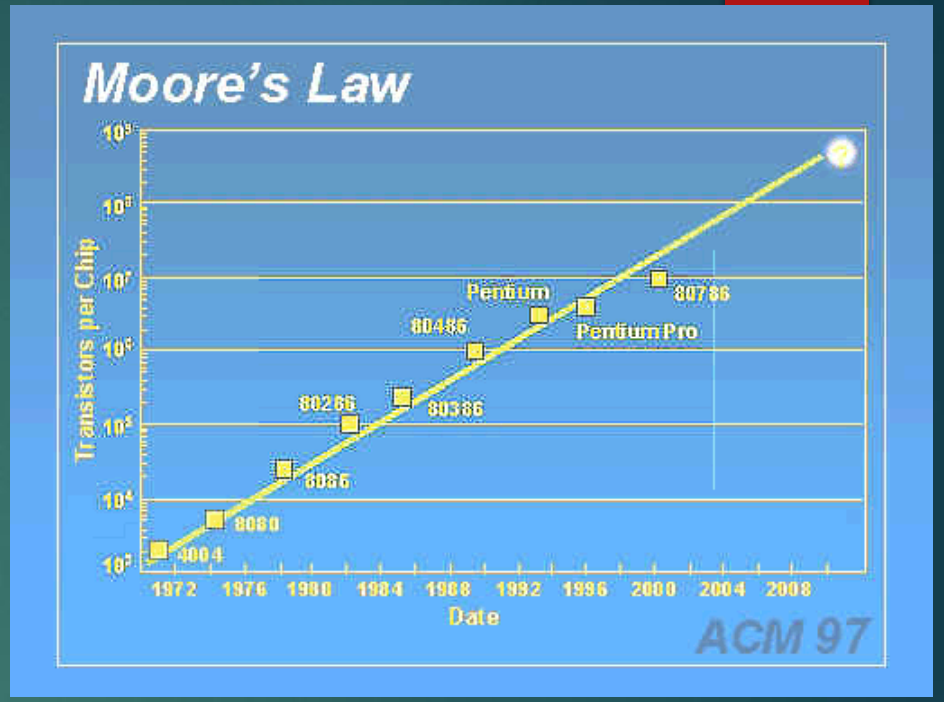
History of Computing

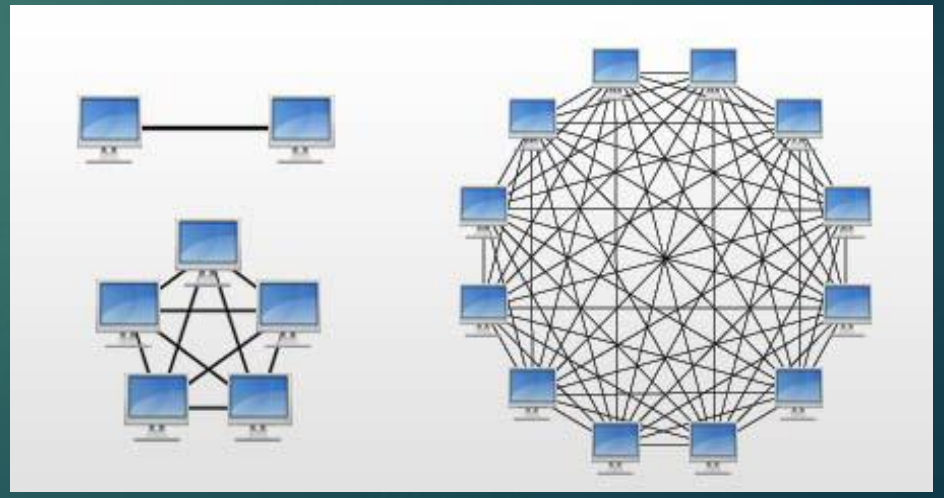
- Third Generation
  - Networking Standards
    - WAN standards (1968)
      - ARPANET
      - Vinton Cerf
    - LAN standards
      - Ethernet (1973)
      - Bob Metcalfe
    - Internetworking Protocols (TCP/IP) (1973)



History of Computing

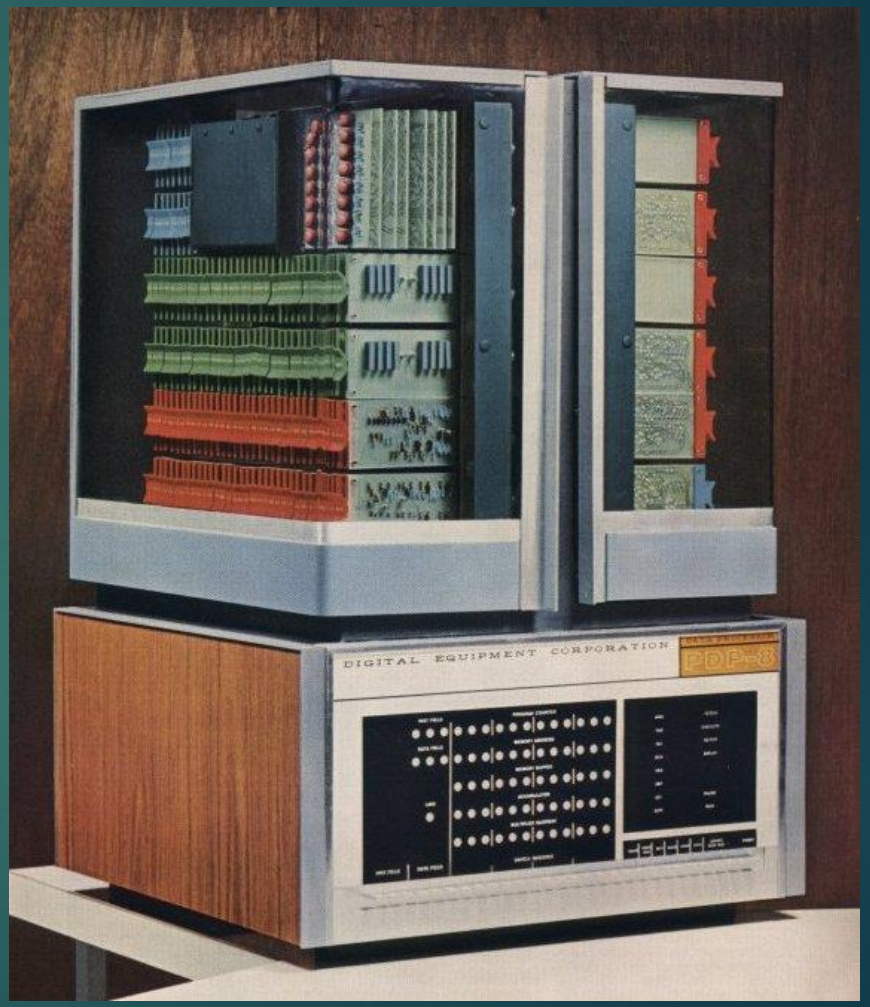
- Third Generation
  - Moores Law (1965)
    - Gordon Moore, CEO of Intel
    - Predicted that every 2 years the number of transistors on a chip of silicon doubles
  - Metcalfe Law (1973)
    - Bob Metcalfe, inventor of Ethernet LAN
    - $N = C^2$ - Value of a computer network (N) is equal to the square of the number of computers (C) connected to it.





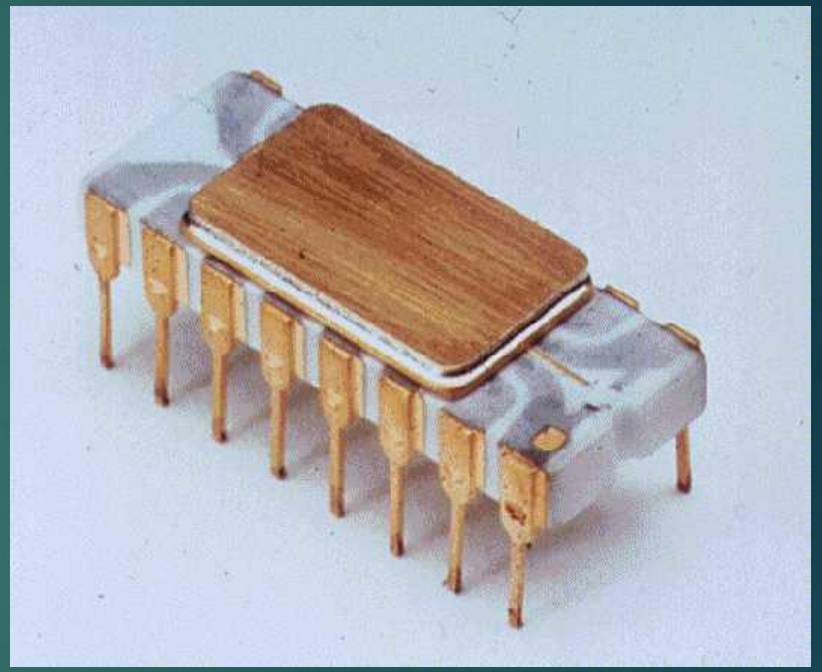
History of Computing

- Third Generation
  - DEC's PDP-8 (1965)
    - First commercially available minicomputer
    - IBM and other large corporations did not perceive any market for minicomputers
    - Left development to smaller companies – DEC



History of Computing

- Fourth Generation - 1975+
  - I/O = Disk, Keyboard & Monitor
  - Processor = Microprocessor
    - Ted Hoff of Intel
    - 5000+ transistor on one IC
    - Computer on a Chip
  - Memory = IC RAM
  - "Personal Computer"



Intel 4004
1st Commercial Microprocessor

History of Computing

- Fourth Generation - 1975+
  - MITS Altair (1975)
    - Sold as a DIY kit
    - Intel 8080 Processor
  - Apple I (1976)
    - $666.66
    - DIY Project

History of Computing

- Fourth Generation - 1975+
  - Apple II (1979)
    - Motorola 6502 Processor
    - Conceived of as a personal information appliance
    - Full-fledged microcomputer with I/O devices and disk storage
  - IBM PC (1981)
    - Intel 8088 Processor
    - MS-DOS Operating System
    - Compatible Computer

History of Computing

- Fourth Generation - 1975+
  - User-Interface
    - Command-line Interface
      - IBM PC/MS-DOS
      - Apple II/Apple OS
    - Graphical User Interface (GUI)
      - Macintosh
      - Windows

History of Computing

- Fourth Generation - GUI
  - Alto - Xerox (1971)
    - Mouse Driven GUI
    - LAN networking
  - Xerox did not commercialize the technology
    - Did not see a market for such a computer
    - Showed it to Steve Jobs in 1979

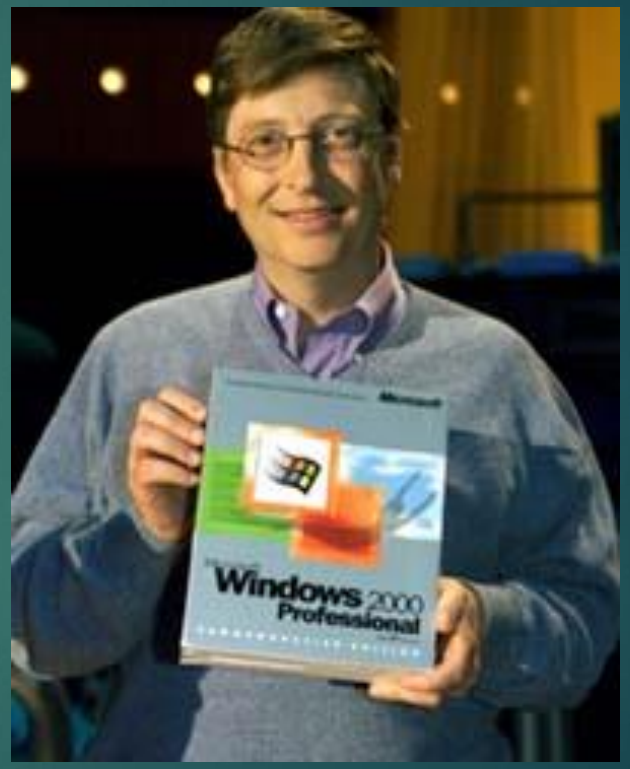
Alto Demo

History of Computing

- Fourth Generation - GUI
  - Macintosh (1984)
    - First commercially available GUI PC
    - Exploited all the elements of the Xerox Alto
    - Catapulted Apple to the forefront of PC development

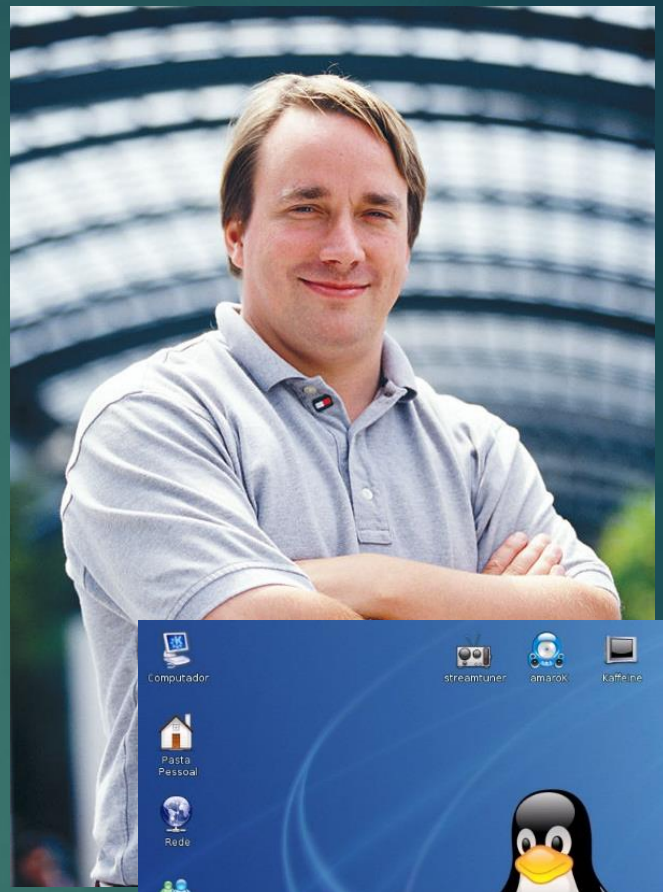
History of Computing

- Fourth Generation - GUI
  - Microsoft Windows (1990)
    - GUI for Intel based (IBM compatible) machines
    - Apple sued Microsoft for infringement of copyright over the GUI; Microsoft won
    - Proliferation of MS Windows



History of Computing

- Fourth Generation - GUI
  - Linux (1994)
    - Linus Torvalds
    - Open source operating system based on UNIX
    - Not a commercial product but a community supported open source project



History of Computing

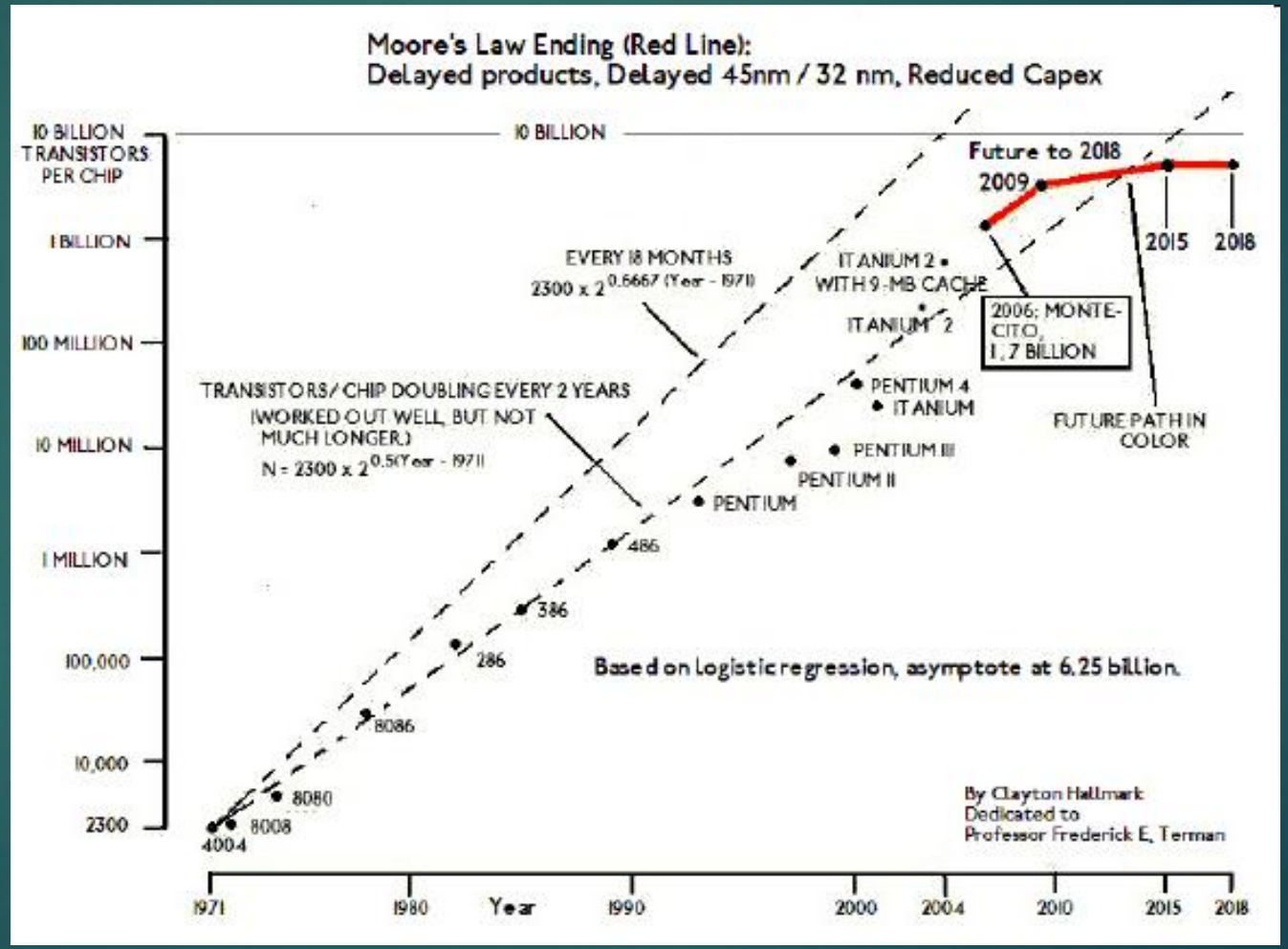
- Fifth Generation?
  - Technologically speaking we are still in the fourth generation
    - Microprocessor and Moores Law
    - At some point (10-20 years) we will reach a physical barrier to the number of transistors that can be placed on a single chip of silicon
    - The next generation is not yet defined

History of Computing

- Fifth Generation?
  - Quantum & Molecular Computers

http://www.youtube.com/watch?v=rUWfod_8JsM

History of Computing



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Availability: 4-5 years

by Russ Juskalian

https://www.technologyreview.com

Intelligent Machines

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Researchers have built the most sophisticated quantum computer yet, signaling progress toward a powerful new way of processing information.

by Will Knight November 10, 2017

IBM's 50-qubit machine.

IBM established a landmark in computing Friday, announcing a quantum computer that handles 50 quantum bits, or qubits. The company is also making a 20-qubit system available through its cloud computing platform.

IBM, Google, Intel, and a San Francisco startup called Rigetti are all currently racing to build useful quantum systems. These machines process information in a different way from traditional computers, using the counterintuitive nature of quantum physics.

Summary

- Inventor


Babbage

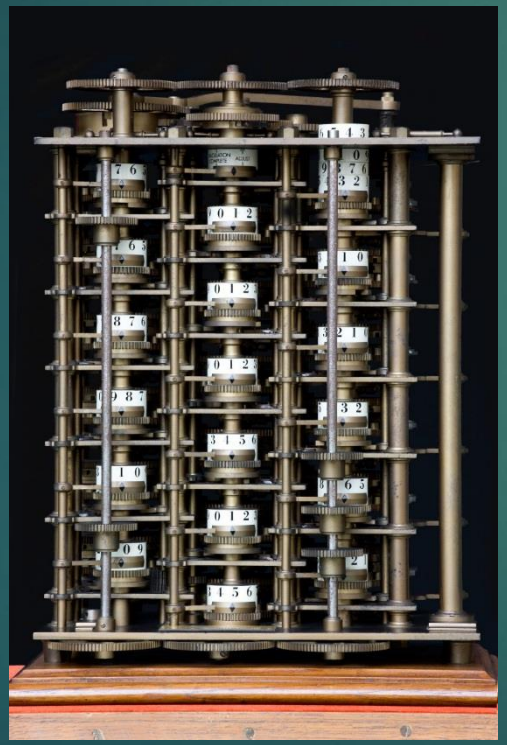

Zuse

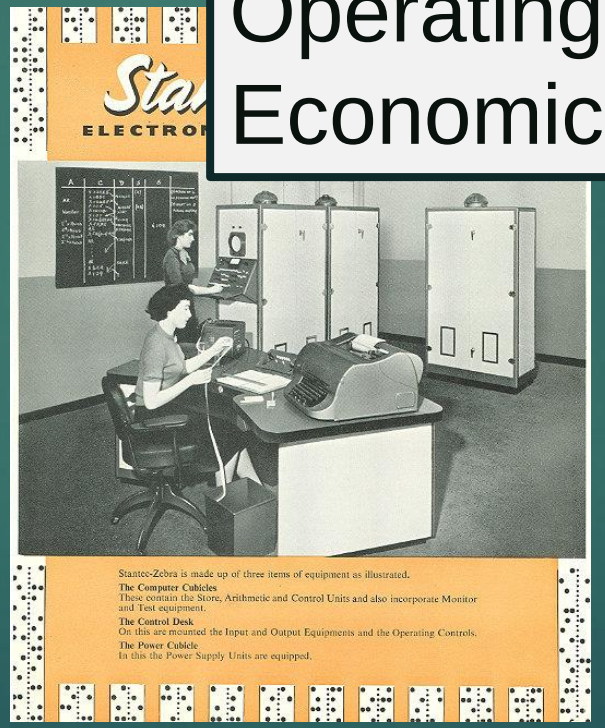

Eckert & Mauchly


Hopper

Summary

Size / Weight
Reliability
Operating Speed
Economics / Cost



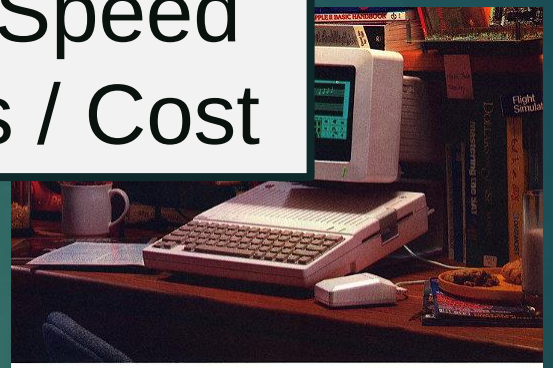


Stantec-Zebra is made up of three items of equipment as illustrated.

The Computer Cubicles
These contain the Store, Arithmetic and Control Units and also incorporate Monitor and Test equipment.

The Control Desk
On this are mounted the Input and Output Equipments and the Operating Controls.

The Power Cubicle
In this the Power Supply Units are equipped.



Why every kid should have an Apple after school.

Today, there are more Apple® computers in schools than any other computer.

Unfortunately, there are still more kids in schools than Apple computers.

So innocent youngsters (like your own) may have to fend off packs of bully nerds to get some time on a computer.

Which is why it makes good sense to buy them an Apple IIc Personal Computer of their very own.

Send them home to a good school system.

The IIc is just like the leading computer in education, the Apple IIe. Only smaller. About the size of a three-ring notebook, to be exact.

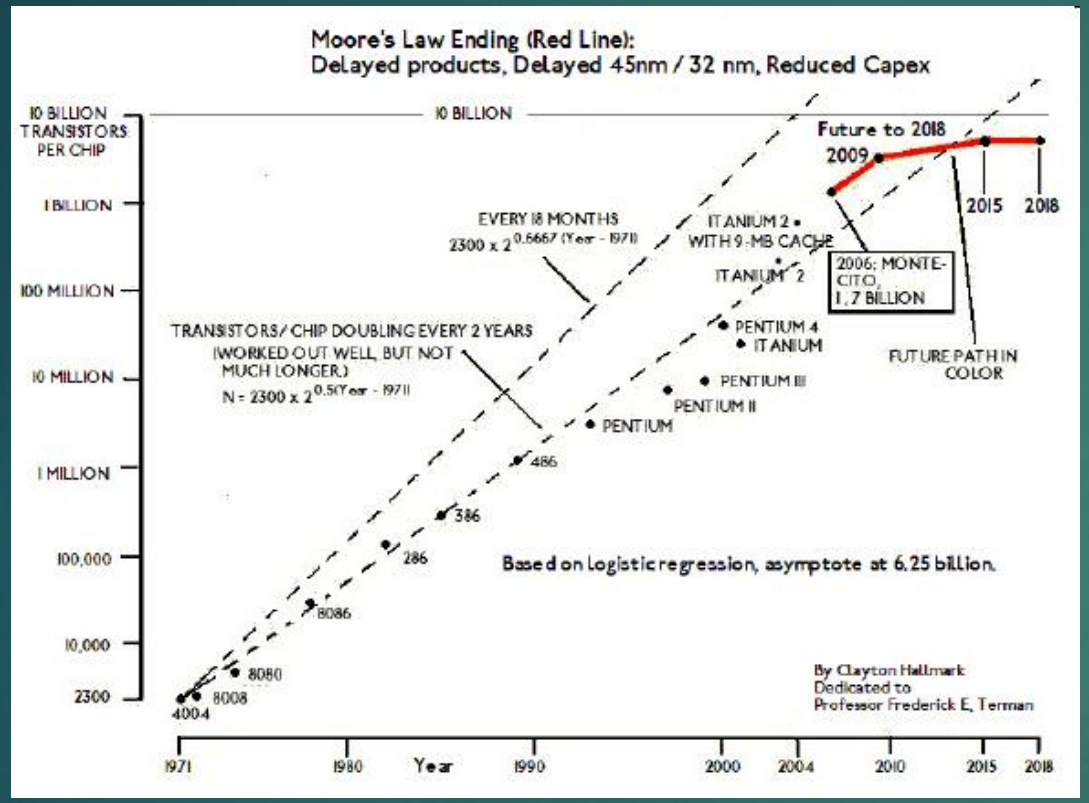
Of course, since the IIc is the legitimate offspring of the IIe, it can access the worlds largest library of educational software. Everything from Stickybear Shapes™ for preschoolers to SAT test preparation programs for college hopefuls.

In fact, the IIc can run over 10,000 programs in all. More than a few of which you might be interested in yourself.

For example, the best-selling, AppleWorks™ 3-in-1 integrated software package. Personal finance and tax programs. Diet and fitness programs.

Not to mention

Summary



Next-Gen Computers

Preview

Computer Hardware