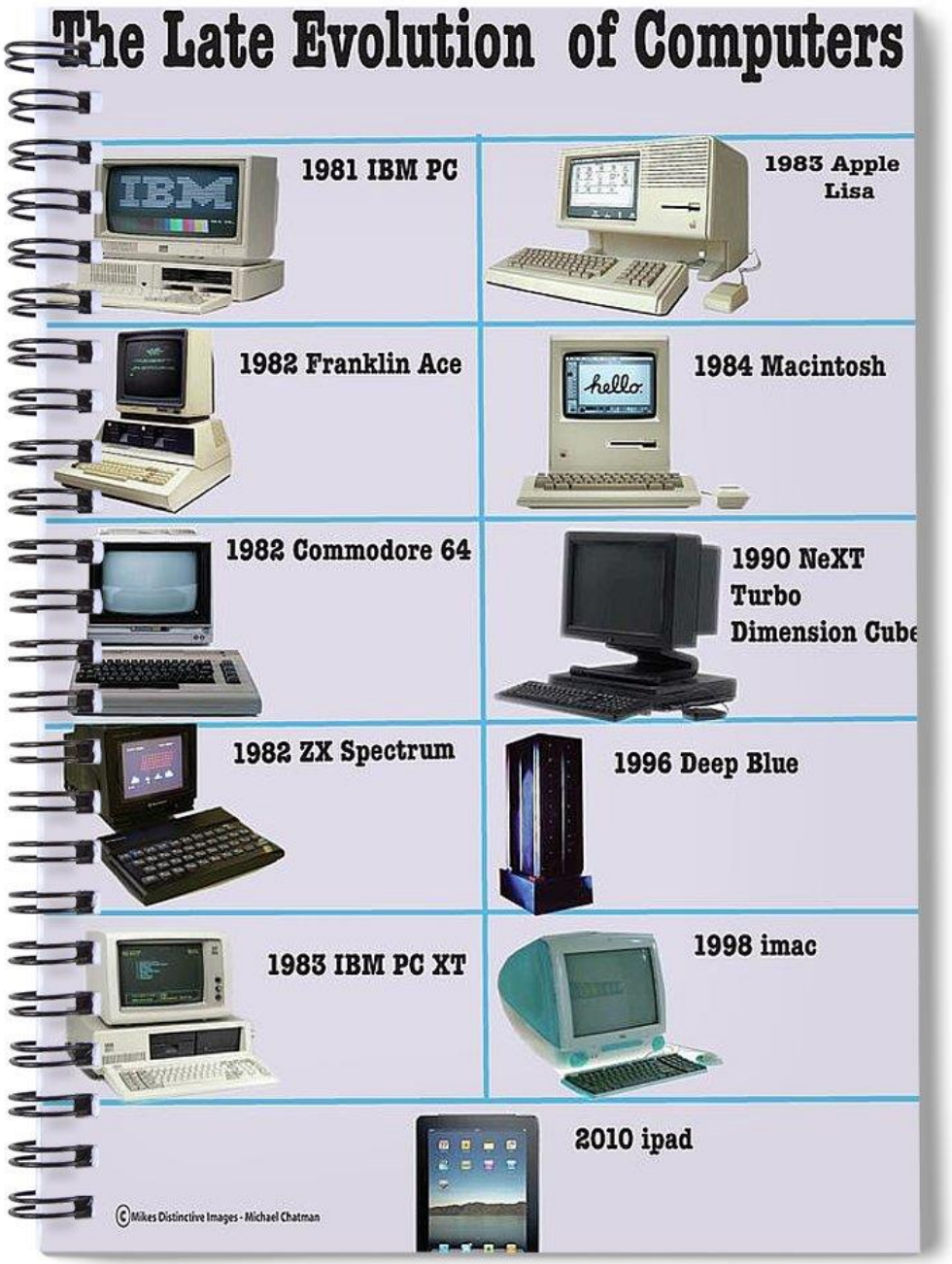
Computer History

Introduction to Computing

Robert M. Robles Jr.,MCGA

Computer History

In 40 years computers went from being giant expensive machines that only corporations could own to the personal computer we see today.



Early Calculating Devices

People have been using devices to aid in calculation for thousands of years.

Devices include

- fingers
- tally sticks (animal bones carved with notches)
- counting rods (I, II, III, IIII, IIIII, T)
- the abacus, …

Abacus – Calculator

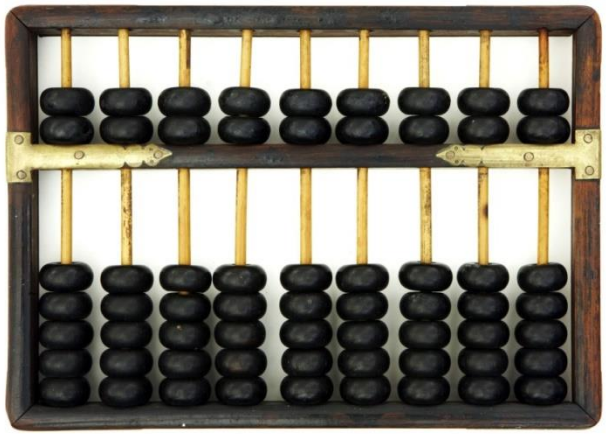
2700–2300BC

A counting device

Beads are moved to perform arithmetic functions

Still used by traders and clerks in Asia, Africa, …

Demonstration: https://www.youtube.com/watch?v=FTVXUG_PngE



Slide Ruler

An early analogue computer used primarily for multiplication and division.

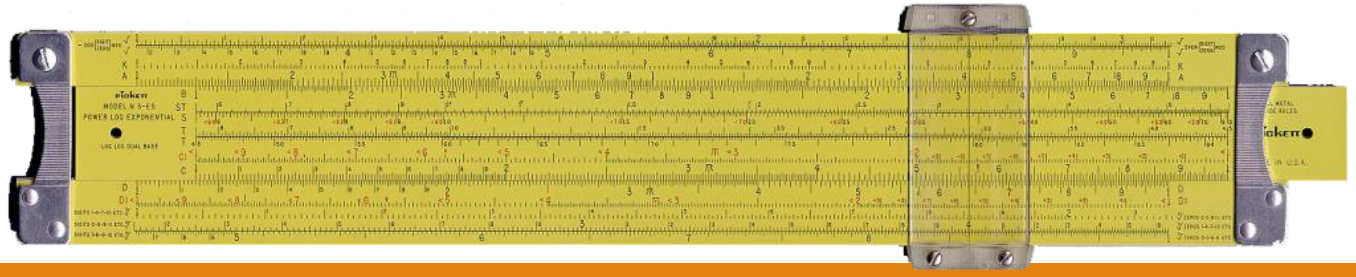
Invented by William Oughtred

Slide rulers were taken to the moon in the 1960s

http://www.youtube.com/watch?v=HD0NfshRyh8

Demonstration:

https://www.youtube.com/watch?v=waiprjueVpQ



1642

Pascaline

Blaise Pascal created the first mechanical calculator

Performed addition and subtraction

Was too expensive for the time, hence it didn't become a commercial device.

https://www.youtube.com/watch?v=3h71HAJWnVU

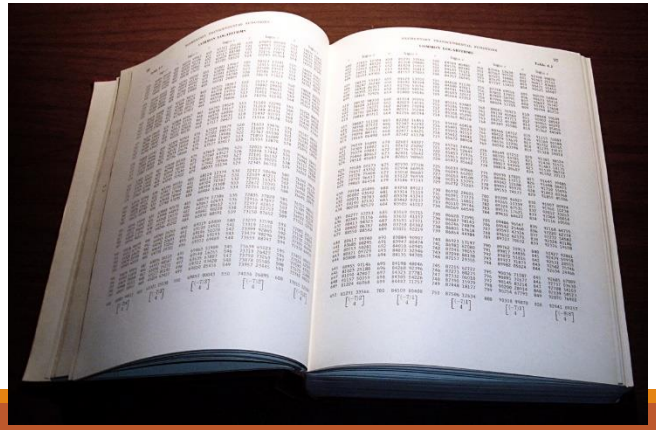
Tables

Mathematical tables were created by people called ’computers’.

They were large charts showing the results of calculations, e.g. multiplication, division, and trigonometry

However, these were known to be error prone,

Thus the need for more accurate math drove innovation.



Charles Babbage

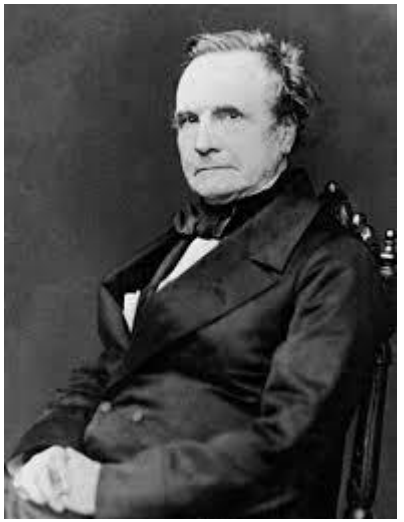
Noticed errors in mathematical tables (1820)

Created the difference engine to compute this math more accurately

Used tons of grant money as well as his own

Only built a small part, as he also had to construct the tools to build it

The difference engine wasn't finished, and he went on to design the Analytical engine.



1821

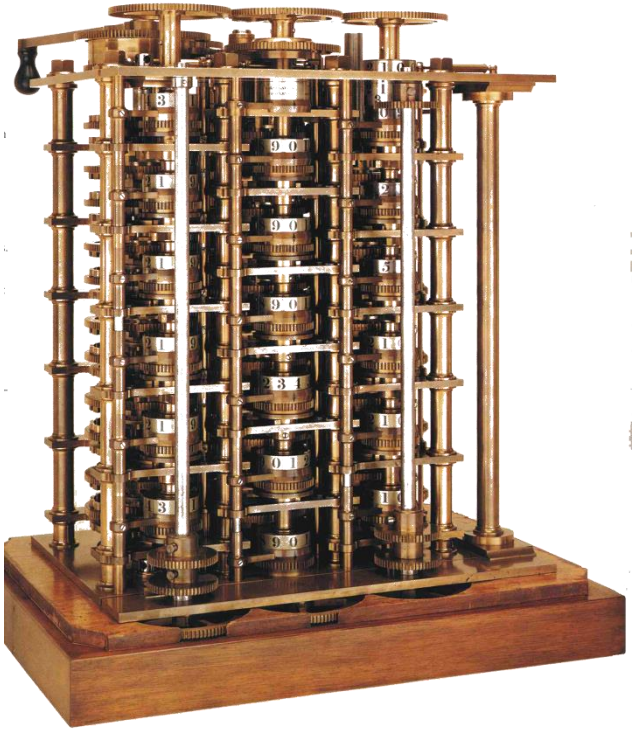
Difference Engine

The first mechanical computer

Created by Charles Babbage a “father of computing”

Compiled mathematical tables

- add, subtract, polynomial functions



Ada Lovelace

She wrote the first algorithm that would have been executed by the Analytical Engine

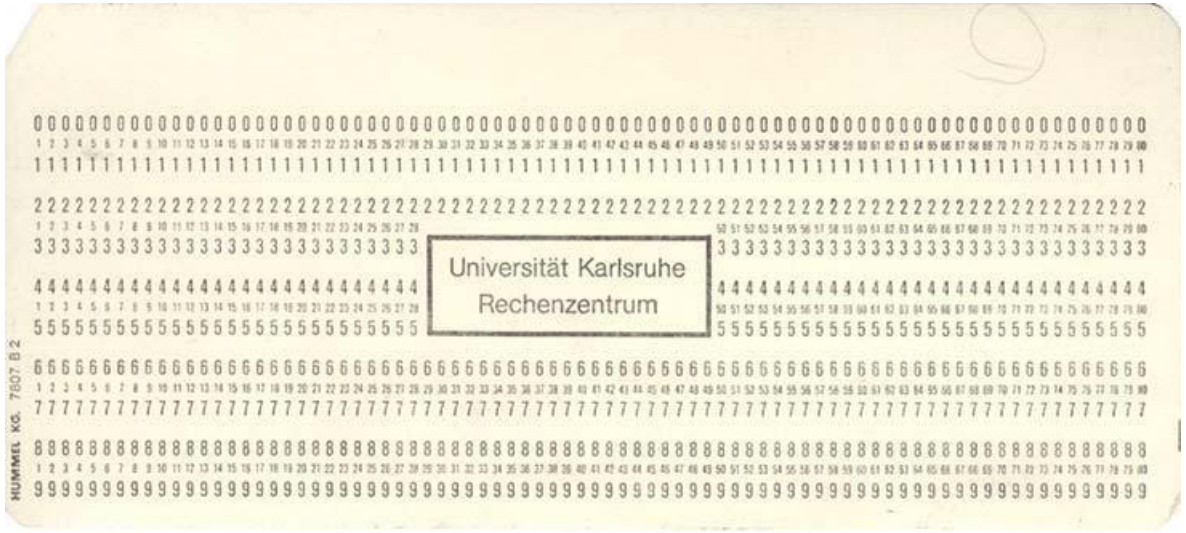
She is considered the worlds first programmer

What are Punch Cards?

Stiff paper that holds commands

Commands and data are indicated by holes/no holes

Early computers used these as input commands



Herman Hollerith

During the Industrial revolution the population 30% each decade.

They were still tabulating census data by hand.

In 1887 they still had not completed tallying the 1880 census data

Herman Hollerith an MIT prof introduced punch cards and a machine to read them to tally this information.

Took only 6 weeks to tally the 1890 census

He continued to improve the machine, and created the company IBM

1st Generation Computers

1951 – 1959

Based on Vacuum tubes

Vacuum tubes: Control electric current using the vacuum, and

Can be used to start/stop, or change the flow based on the current

Alan Turing

During WWII Turing created an electromechanical machine to break German Ciphers.

It is estimated that his efforts in breaking the ciphers reduced the length of the war by 2 – 4 years.

1944

Harvard Mark 1

A electro-mechanical computer

Created by Howard Aiken and Grace Hopper

Developed and built by IBM

Could store 72 numbers

Multiplication took 6 seconds

Used in WW II to compute artillery tables

Produced Mathematical Tables

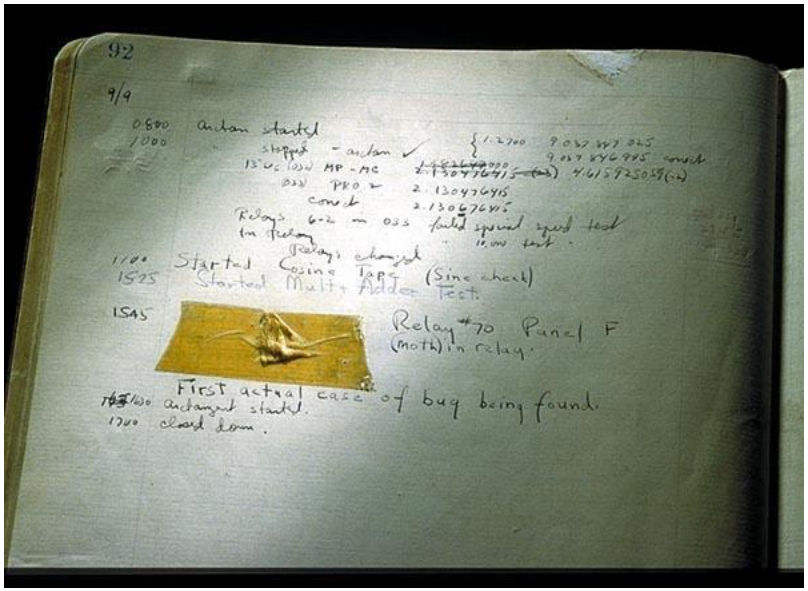
1947

First Computer Bug

Grace Hopper found the first computer bug while working on the Harvard Mark II

A moth was trapped between two relay switches

She took a photo to document it



1946

ENIAC

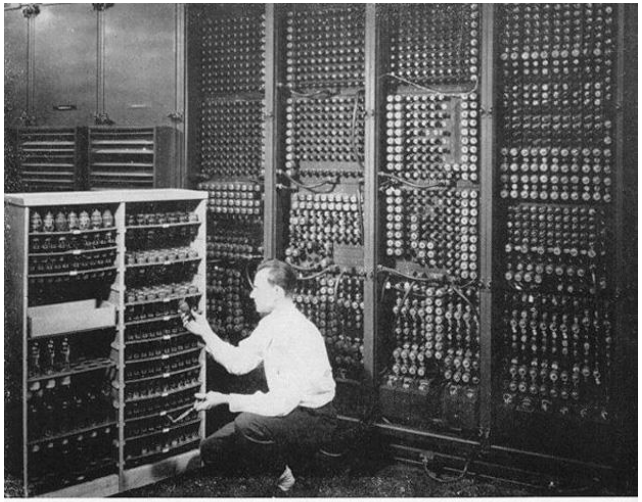
First electronic general purpose computer

Created at the University of Pennsylvania

Cost almost $500,000 (approx. $6,000,000 today)

One of first programs a study of the hydrogen bomb

A secret military project designed to improve the construction of artillery firing tables



Replacing a bad tube meant checking among ENIAC's 19,000 possibilities.

ENIAC

Contained 17,500 Vacuum tubes 7,200 crystal diodes, …

Tubes burnt out fast, hence the machine normally could only run for 10 to 30 minutes at a time

Speed was 1000 times of electro-mechanical machines (Wikipedia)

5000 adds, 357 multiplications, and 38 divisions per minute

UNIVAC

Inventors of ENIAC made UNIVAC which is a programmable (held data and printed)

Few people bought it as they didn't understand the value

Then they used it to project the 1952 presidential election, and it got the answer with <1% error

Second Generation Computers

Based on Transistors

1959-1965

Stored instructions in memory

Relied on punch cards for input and printers for output

Transistors

Replaced vacuum tubes

Invented at Bell laboratories

Enabled computers to be smaller, cheaper, more reliable, and efficient

Transistors work as switches on current, turning it on or off (like binary 0 or 1).

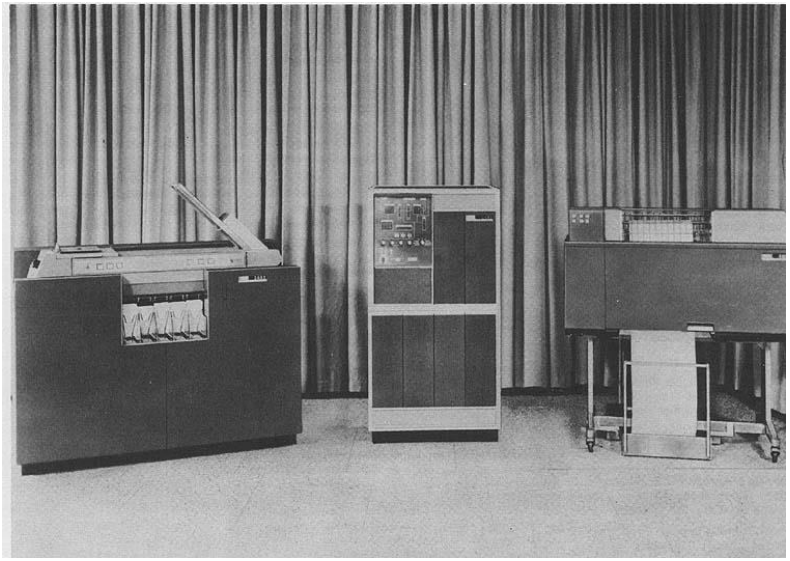
Still generate a lot of heat, but less than vacuum tubes

1960

IBM 1400

General purpose system

Used punch cards for input and line printer for output



Third Generation Computers

Modern computers

1965-1971

Used Integrated Circuits

Keyboards instead of punch cards

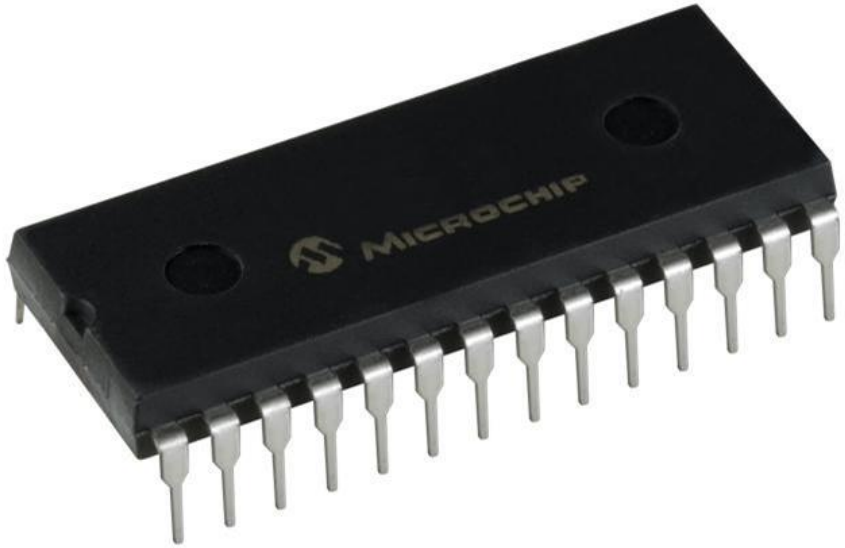
Monitors for display

Different applications used through operating system

Integrated Circuits

Small chips containing thousands of transistors

Invented by Jack Kilby, Nobel Laureate of Physics



1964

IBM 360

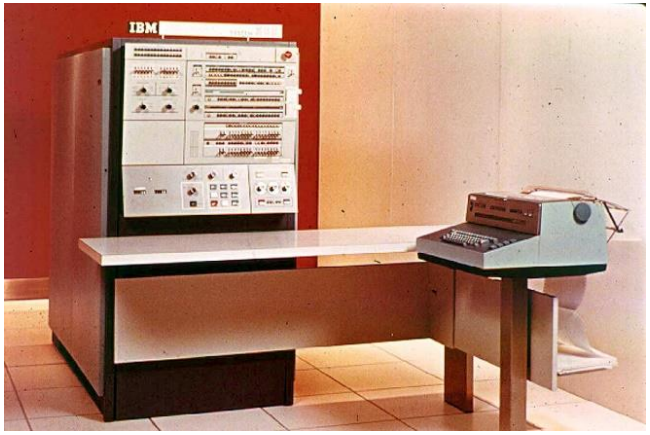
Small and large applications

Commercial and Scientific applications

From 8K to 8M of memory

Room sized

A whole suite of compatible computers for different needs



Fourth Generation Computers

Microprocessor

Development of the personal computer

1971 – 1981

Addition of GUI's, the mouse, and handheld devices

Microprocessor

Thousands of Integrated Circuits were built on a silicon chip.

Created by Intel corp.

Becomes the Central Processing Unit (CPU)

Allow computers to be smaller, more powerful, faster, and cheaper

1975

Altair 8080

First personal computer

Make it yourself kit

Switches for input, lights for output

No keyboard, and no monitor

People were so excited, within 3 months 4000 orders were placed

https://www.youtube.com/watch?v=ZKeiQ8e18QY

Altair 8080

Gates and Allen were trying to meet with MITS founder who created the Altair

They built an interpreter for the 8080 to make programming software for the machine easier.

Allen created a Bootstrapper to load the tape to load the program on a plane ride on final approach to their meeting

http://en.wikipedia.org/wiki/Altair_BASIC

1976

Apple I and II

Steve Wozniak and Steve Jobs built the Apple I in Wozniak's garage

Apple II had a color monitor, sound, and game paddles

1981

IBM PC

IBM released it’s first personal computer

Sold in companies such as Sears

BASIC

Beginners All-Purpose Symbolic Instruction Code

A programming language that students could learn

Used by Bill Gates and Paul Allen to write a program for the Altair

MS-DOS (Disc Operating System)

IBM hired Bill gates and Paul Allen to build an Operating System for the IBM PC

They bought the rights to an existing operating system built in Seattle

IBM allowed Gates and Allen to keep the marketing rights to DOS

Reverse Engineering

Companies like Compaq took apart IBM computers, and reverse engineered their BIOS to create very similar machines.

They built a fully compatible machine, and sold it for a bit cheaper.

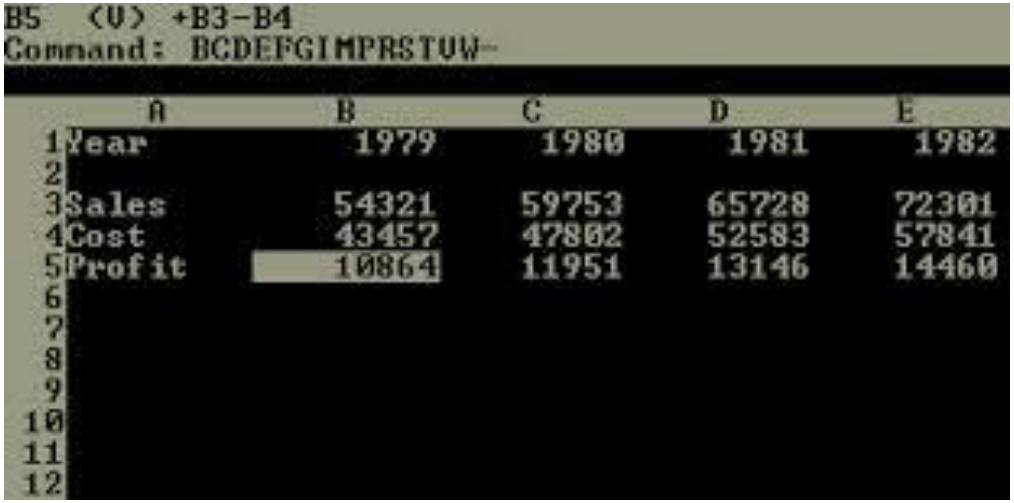
In first year they sold 47,000 pcs and made 111 million dollars

Hence, the competition began

And everyone bought Microsoft OS

Spreadsheets and Word Processing

In 1978 VisiCalc was created for Spreadsheets and WordStar was created for Word Processing



Graphical User Interface (GUI)

In 1972 Apple and Xerox were working on making a graphical user interface

WYSIWIG (What you see is what you get)

The idea being you want to be able to preview your work on the computer

Apple's 1984 Commercial

As Microsoft was aiming their products towards business users, apple tried to make the first user friendly PC.

https://www.youtube.com/watch?v=axSnW-ygU5g

This commercial was fighting out against IBM which they saw as Big Brother

Fifth Generation Computers

1990 - Present

Enhancement of Artificial Intelligence

Nanotechnology

Natural Language Processing

…

Cellular Phones and Smart Phones

Now we're able to have a ton of processing power is such tiny devices

Wearable Computing

Now we can track so much of what we do, and have the internet at our finger tips

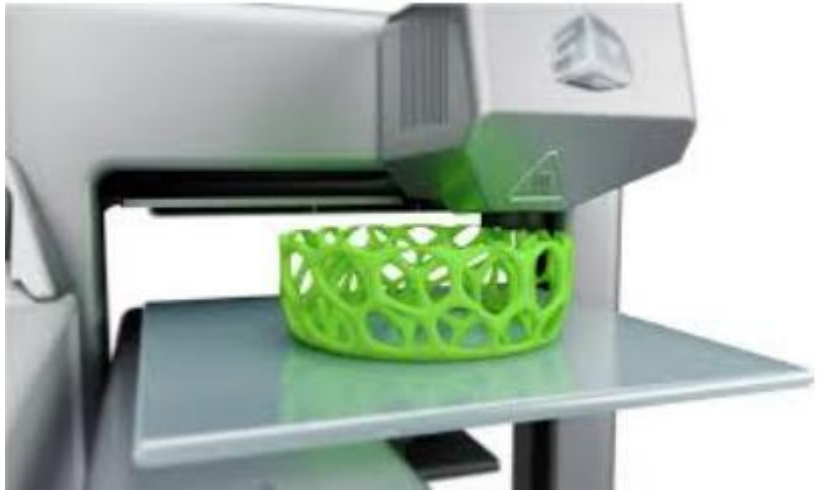
https://www.youtube.com/watch?v=JSnB06um5r4

3D Printing

Uses digital files to create 3d plastic objects

3D Printing is being used for:

- Prosthetic Legs in Dogs
- Human Organs (Not ready yet)
- Clothing



Artificial Intelligence

Teaching a computer to learn to think

Imagine the future of:

- SIRI
- Video Game Characters
- Self Driving Cars
- Online Customer Support
- Purchase Predictions,…