The 5 Generations of Computing

Contents

Generation	Dates	Technology	Speed (operations/sec)
1	1946-57	Vacuum Tubes: ENIAC (17,500 vacuum tubes); UNIVAC	40000
2	Late 1950's-1960's	Transistors	200000
3	1965-71	Small & Medium scale integration; development of IC's; use of silicon chips	1,000,000
4	1972-	Large scale integration; microprocessor has thousands of IC's on a chip	10,000,000
5	1978-	Very Large Scale Integration: AI	100,000,000

Figure 1: Generations of Computing

Computers are such an integral part of our everyday life now most people take them and what they have added to life totally for granted.

1st Generation of Computers

These first generation computers relied on 'machine language' (which is the most basic programming language that can be understood by computers). These computers were limited to solving one problem at a time. Input was based on punched cards and paper tape. Output came out on print-outs.

The two notable machines of this era were the UNIVAC and ENIAC machines

1951 - UNIVAC I

Univac was the world's first *commercially* available electronic digital computer was produced in the **United States** in June 14, 1951

It was intended to replace the punched-card accounting machines of the day and used 5,000 vacuum tubes

UNIVAC was built from the start as a stored-program computer, so it was very different architecturally

Developed by Mauchly and Eckert who were the makers of **ENIAC**

The computer's usage lasted until 1970, until they were made obsolete due to fast advancing technology

2nd Generation of Computers

The replacement of vacuum tubes by transistors saw the advent of the second generation of computing.

Transistors:

Although first invented in 1947, transistors weren't used significantly in computers until the end of the 1950s.

They were a big improvement over the vacuum tube, despite still subjecting computers to damaging levels of heat.

However they were hugely superior to the vacuum tubes, making computers

- smaller,

- faster,
- cheaper and
- less heavy on electricity use.

They still relied on punched card for input/printouts.

The language evolved from cryptic binary language to symbolic ('assembly') languages. This meant programmers could create instructions in words.

3rd Generation of Computers

In 1964 the beginning of the third-generation computers came with the introduction of the IBM System/360. Thanks to the new *hybrid* circuits, the state of the art in computer technology allowed for 10 components per chip

- Previous to this, state of the art in computers allowed 1 component per chip, that is individual transistors

4th Generation of Computers

- By the early 70s the state of the art in computer technology allowed for 1000 components per chip

- The Intel corporation produced the first **microprocessor** chip which was a 4-bit chip.

    - Today's chips are up to _____ bit

- At approximately 1/16 x 1/8 inches in size, this chip contained 250 transistors and had all the computing power of ENIAC. It matched IBM computers of the early 60s that had a CPU the size of an office desk.

What filled a room in the 1940s now fit in the palm of the hand.

1975-1984: Personal Computer History

1975 - The Altair 8800 was released as a kit

It used the Intel 8080 CPU

- Bill Gates and Paul Allen wrote a BASIC compiler for the Altair and formed a company called *Micro-soft*
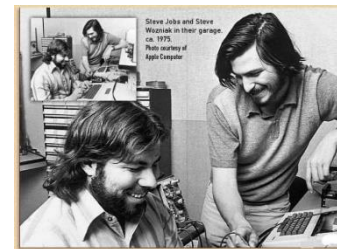
1976

- Apple's two Steves (Jobs and Wozniak) designed the Apple I, Apple's only "kit" computer
- Shugart introduced the 5.25" floppy drive
- Electric Pencil, the first word processing program was released

1977

- Apple introduced the Apple II, a color computer with expansion slots and floppy drive support;

- 1980 the Apple III was released but this had to be recalled

1978 – Software takes stage

Many new software packages were introduced to the market. This changed the perception of computer maybe being just an electric typewriter:

- VisiCalc, the first electronic spreadsheet was released

- WordMaster, soon to become WordStar, was released and went on to dominate the word processing industry for years.

- Atari leveraged its video game experience and household name to enter the personal computing market

- Epson shipped the TX-80, the first low-cost dot matrix printer

1979

- the database, Vulcan

- 300 bps modem introduced

- telecommunication as an aspect of personal computing established

Time magazine called **1982** "The Year of the Computer" as the industry grew up with an estimated 10 million PC's in use in the US alone

- Compared to ENIAC, microcomputers of the early 80s:

- Were 20 times faster (Apple II ran at the speed of ¼ Megahertz).

- Had a memory capacity as much as 16 times larger (Apple had 64 K).

- Were thousands of times more reliable.

- Consumed the power of a light bulb instead of a locomotive.

- Were 1/30,000 the size.

- Cost 1/10,000 as much in comparable dollars

1981   IBM introduced its first computer for the home user

1984   Apple introduced the Macintosh (with a GUI)

1989   Windows 1.0 was introduced for the PC

Microprocessors also moved out of the realm of desktop computers and into many areas of life as more and more everyday products began to use microprocessors.

4th generation computers saw the development of GUIs, the mouse and handheld devices.

5th Generation Computers

Computer devices with artificial intelligence are still in development

- Development of true artificial intelligence.
- Development of Natural language processing.
- Advancement in Parallel Processing.
- Advancement in Superconductor technology.
- More user-friendly interfaces with multimedia features.
- Availability of very powerful and compact computers at cheaper rates.