



Computer Performance Issue

How Computer performance improved after ULS last generation of computer

Lecture 2

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I. Computer Performance and Evaluation

Computer performance is the efficiency of a given computer system, or how well the computer performs, when taking all aspects into account. A **computer performance evaluation** is defined as the process by which a computer system's resources and outputs are assessed to determine whether the system is performing at an optimal level. It is similar to a voltmeter that a handyman may use to check the voltage across a circuit. The meter verifies that the correct voltage is passing through the circuit. Similarly, an assessment can be done on a PC using established benchmarks to see if it is performing correctly.

In evaluating a computer's performance, a number of parameters are used to determine the result. Examples are latency, speed, throughput, bandwidth, and more, which will be discussed next in the lesson. Standards, or points of reference, are used against the parameters, and an assessment is given. This process is known as benchmarking. It is not an easy task to create benchmarks for assessing computer performance. The primary challenge is that technological characteristics are constantly changing. This means that benchmarking has to be constantly updated, too. This makes computer evaluation a complex process.

II. Computer Performance Parameters

1. Response Time

A functioning computer environment comprises millions of data transmission cycles consisting of user requests and system responses. The **response time** is defined as the total time lapse between the completion of an inquiry or demand made on a system resource and the receipt of a response. In real life, it can be compared to the time between placing an order to receiving a delivery.

2. Latency

Latency is the term used to describe the state of existence of something in transition. Every transmitted piece of information on a computer system travels over some sort of medium. Computer latency is defined as the time it takes to communicate a message, or the time the message spends traveling the geographical distance ('on the wire') before it gets to its desired destination. This can be compared to the time one spends on an aircraft, traveling from one geographical location to another.

3. Speed

The term speed is usually in reference to the clock speed of the processor. The clock speed is defined as the clock cycles per second, which determines the rate at which instruction processing takes place. It is usually measured in megahertz (MHz) or gigahertz (GHz). Computer speed is one of the leading parameters in assessing a computer's performance. It



can be compared to the horsepower of an engine. The higher the horsepower, the faster the car can move.

4. Throughput

Computer function consists of millions of data transmissions between devices and components. The computer's throughput is defined as the number of units of information that can be successfully processed at any given time. The throughput is commonly measured using bits per second (bps)—more specifically, megabits per second (Mbps) and gigabits per second (Gbps). For example, if the post office can receive and process a maximum of 1000 items per day, then that's its throughput.

5. Bandwidth

Bandwidth is a measure of the maximum rate at which data can be transferred between components of the computer system, or the amount of data that is sent at any particular time across a specific connection. This term could be applied to network connections or computer performance. Consider our post office outlet again. It can process 1000 items a day, but not all of the items at the same time. There are only a few counters, and each counter can only help one customer at a time. This is similar to bandwidth.

III. Generations of Computer

During the period of time, there has been a constant decrease in size, increase in speed, decrease in cost and increase in efficiency of a computer due to the change in technology, which is called generation of computer. There are all together 5 generation of computers, during which following events took place.

1. Size of computers decreased drastically.
2. Speed of computers increased significantly.
3. Power consumption decreased from kilowatts to few watts.
4. The heat generated by computer reduced drastically.
5. The storage capacity increased from few bytes to terabytes.
6. The processing speed increases few Kilo Hz to Giga Hz.
7. Software become very user friendly and powerful
8. Price of computers decreased significantly from millions of dollars to few hundred dollars.



So

- a. The computer has evolved from a large-sized simple calculating machine to a smaller but much more powerful machine.
- b. The evolution of computer to the current state is defined in terms of the generations of computer.
- c. Each generation of computer is designed based on a new technological development, resulting in better, cheaper and smaller computers that are more powerful, faster and efficient than their predecessors.

IV. First Generation of Computers (1945- 1955) Vacuum Tubes

- The computers in this generation used vacuum tube technology for building central processing unit (C.P.U).
- They were very big in sizes, taking up entire room.
- A single computer consisted of 1500 of vacuum tube so they consumed a lot of electricity and generated massive amount of heat.
- Due to heat the computer used to malfunction and was so usually kept inside air conditioned environment.
- Magnetic drum or punched cards were used as secondary storage.
- There were not available for commercial purpose as the cost was very high.
- They had to rely on machine language to perform operations.
- They were used by government for census, defense, etc.
- There was no programmed operating system and all operations had to be performed by user themselves.



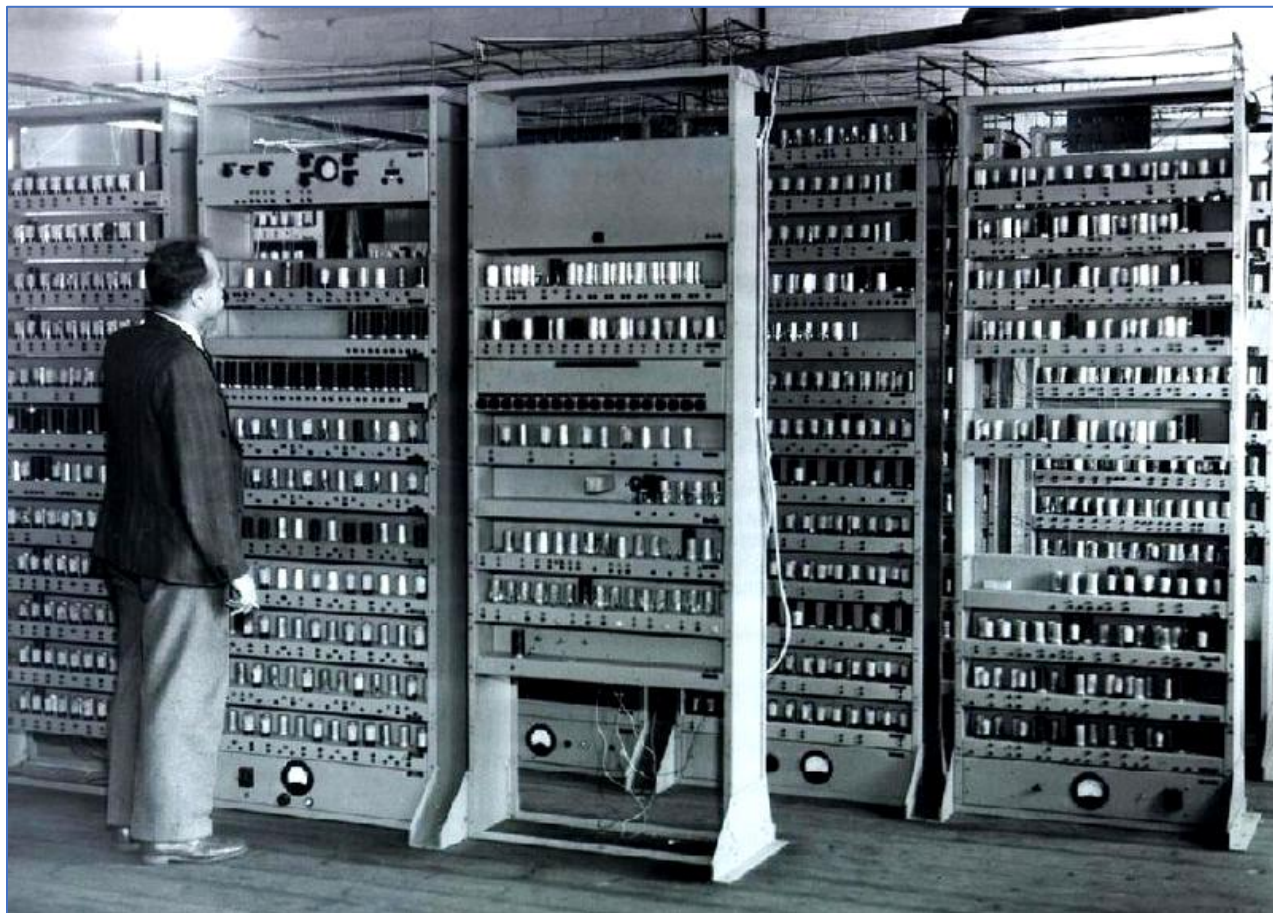


Figure 1 First generation computer

Advantages

It was only electronic device

First device to hold memory

Disadvantages

- Too bulky i.e large in size
- Vacuum tubes burn frequently
- They were producing heat
- Maintenance problems

V. Second generation of computer (1955- 1964) Transistors

- The transistor made computer to be smaller, faster, and cheaper, more efficient and reliable than the first generation of computer.
- Heat generated by computer was significantly less than that of 1st generation because 1000 vacuum tube were placed by 1 transistor.
- Processing speed was in few Kilo Hz (58 Kilo Hz).
- Magnetic core (ferrite) memory was used as internal storage.
- Magnetic tapes/ drums/ disk were used as secondary storage.
- This generation of computer started their instruction memory for the first time.
- Operating system was batch processing type.
- It still relied on punch card for input and output.

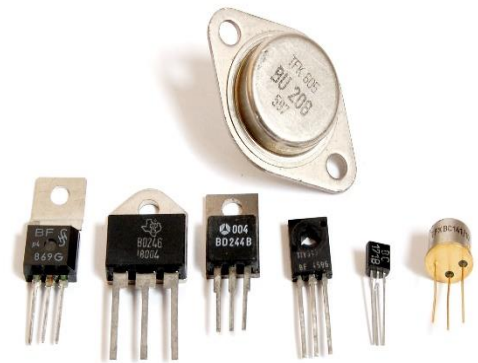




Figure 2 Second generation computer

Advantages

Size reduced considerably

The very fast

Very much reliable

Disadvantages

- They over heated quickly
- Maintenance problems

VI. Third generation of computer (1964- 1975) Integrated Circuits

- In this generation large number of transistor would be fabricated in silicon chips called Integrated circuit (IC).
- The invention of IC reduced the size of computer.
- They consumed less electricity and were more reliable than the previous generation.
- Processing speed was in mega Hz.
- Semiconductor memory used as primary storage.
- Magnetic tapes/ Disk were used as secondary storage.
- Key board and video display were introduced as input and output devices respectively.



Figure 3 Third generation computer



Advantages

- ICs are very small in size
- Improved performance
- Production cost cheap

Disadvantages

- ICs are sophisticated

VII. Fourth generation (1975 - Present) Microprocessors:

- In this generation very large scale integration (VLSI) and ultra large scale integration (VLSI) technology was introduced.
- Due to this, it was possible to build CPU in a single chip known as microchip.
- Size of computer reduced significantly, some of the computer fit on the palm of hand.
- Cost was reduced drastically so that ordinary people were able to purchase desktop computer, small computer such as Laptop and hand held devices like palmtop, PDA (Personal Digital Assistant).
- Processing speed is very high, measured in Giga Hz.
- Multimedia, networking, distributed computing was introduced.
- Faster input and output device such as mouse, joysticks were introduced.
- Artificial intelligent (AI) in software level such as voice recognition, robot disk, pattern classification, identification, etc. was possible
- Graphical user interface (GUI) operating system such as MS Windows was used in this generation.



Figure 4 Forth generation computer

Advantages

Totally general purpose computers.

Smaller in size and much reliable.

The heat generated was negligible.

No cooling system required in many cases.

Portable and cheap.

Much faster computation.

Disadvantages

Very advanced technology was required to fabricate the ICs (Integrated Circuits).

A high-quality and reliable system or technology can only make the ICs.

Cooler is required (Fan)

The latest technology is required for the manufacturing of Microprocessors.

VIII. Fifth generation computer (Present & beyond) Artificial Intelligence

- This computer will have logical power, decision making capability and expert system similar to human beings.
- They will use parallel processing so that heavy processing will be possible.
- Biochips made up of protein fiber Gallium Arsenide (GA) will be used as memory device.
- Knowledge information processing system (KIPS) Architecture will be used.
- The goal of fifth-generation computing is to develop devices that respond to natural language input and are capable of learning and self-organization.



Figure 5 Fifth generation computer



Advantages

The main **features of the fifth generation computer** are,

- ULSI technology
- These computers are much faster than other generation computers.
- It is easier to repair these computers.
- These computers are much smaller in size than other generation computers
- They are portable and easy to handle.
- Development of true artificial intelligence.
- Advancement in Parallel Processing
- Advancement in Superconductor technology.

Disadvantages

- They tend to be sophisticated and complex tools.
- They can give more power to companies to watch what you are doing and even allow them to infect your computer.