

An Autonomous Institution

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DEPARTMENT OF INFORMATION TECHNOLOGY

PROBLEM SOLVING AND C PROGRAMMING

I YEAR - I SEM

Unit 1 – Introduction to Problem Solving Techniques

TOPIC 1 – FUNDAMENTALS

DUCTION TO PROBLEM SOLVING TECHNIQ

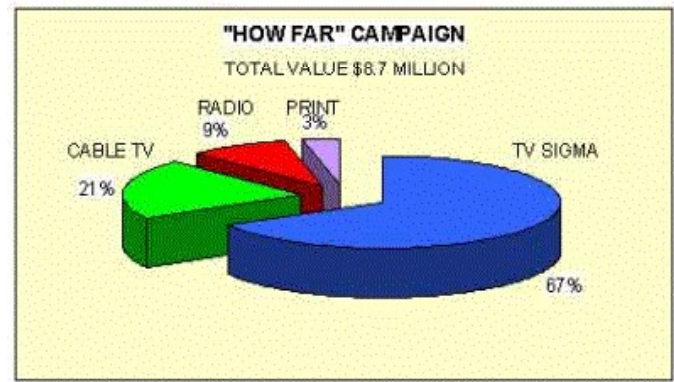
s - Computer Hardware – Computer Software - Algorithms -
statements, state, control flow, functions) - Notation (pseudo co
language) - Problem formulation - Algorithmic problem solving -
algorithms (iteration, recursion). Illustrative problems.



DATA



PROCESSING
SYSTEM



INFORMATION

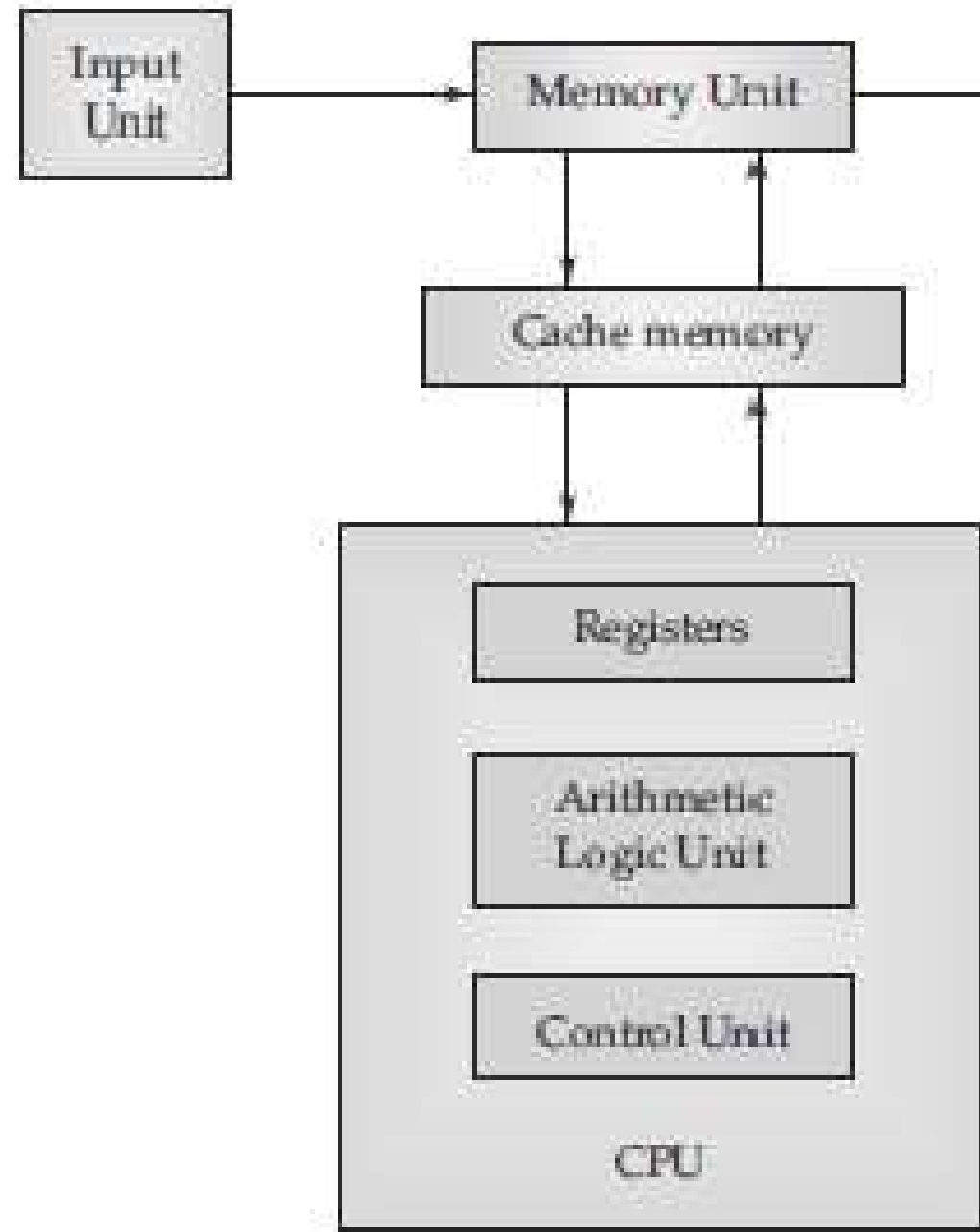
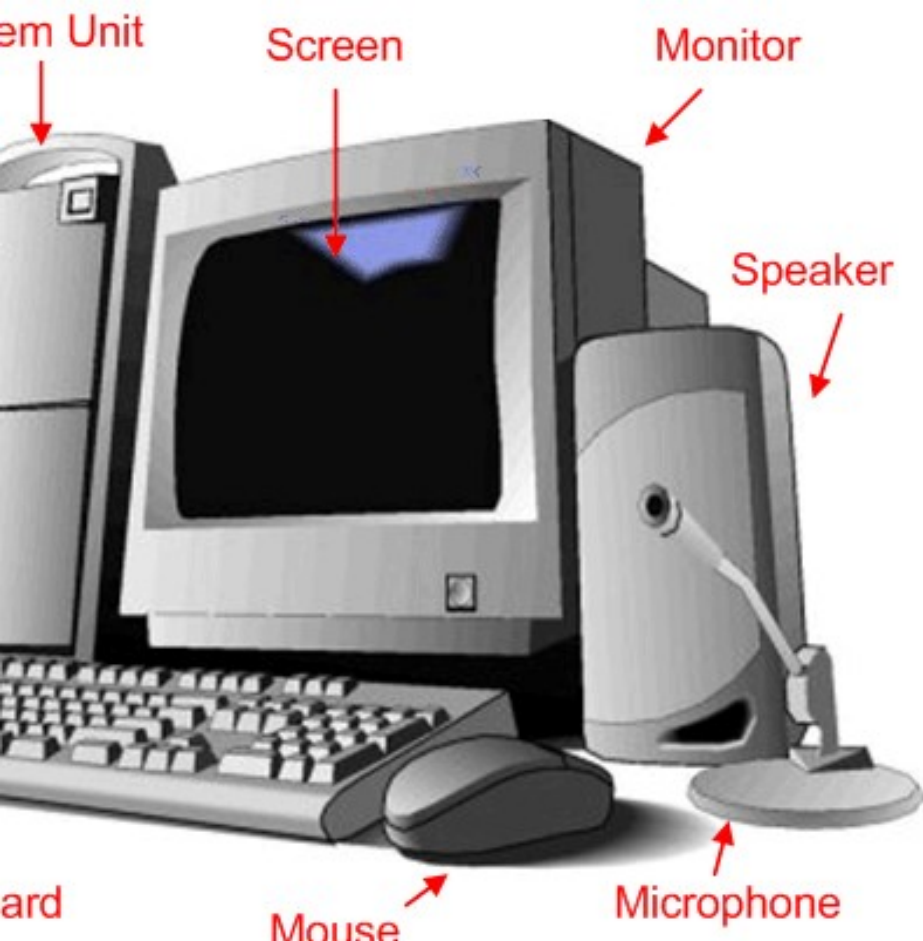
Central Processing Unit (CPU)

Memory Unit

Input Devices

Output Devices

Secondary Storage Devices



er is a fast electronic device that can solve large and complex problems in few seconds generally depends upon its hardware configuration.

Capacity:

er can store huge amount of data in its different storage components in many different forms. Computer system is generally divided into two categories, main memory and secondary storage.

er carries out calculations with great accuracy. The accuracy achieved by a computer depends on the hardware configuration and the instructions.

er produces results with no error. Most of the errors generated in the computer are human errors themselves. Therefore, they are very trustworthy machines.

er are versatile machines. They can perform many different tasks and can be used for many different purposes.

er can perform repetitive calculations any number of times with the same accuracy. Computers do not have human traits, such as tiredness, fatigue, lack of concentration, etc.

used in schools and colleges to teach students in a better and easy way. The
t more information about a specific topic or subject using the Internet.

used in different types of businesses to store a large amount of information in
atabase.

nnected with each other through Internet can be used to transfer data to and
puters. E-mail is one of the most common mediums that is used.

used by various scientists for the purpose of research and development. They
use of computer for research and analysis.

used by engineers for the creation of complex drawings and designs while
erent fields like automobiles and construction.

used in the entertainment industry for creating graphics and animations.

being increasingly used for online banking. Through online banking, the

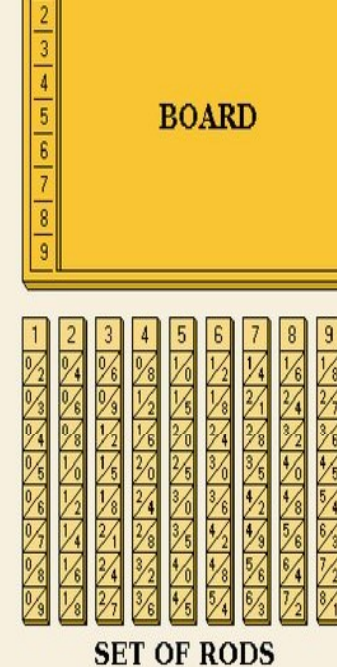


Abacus- Many centuries ago when man had to count the numbers, he thought of a device which can trace the numbers and thus the existence of ABACUS. It was the first calculating device which was developed in China about 3000 years ago. The name Abacus is derived from Greek word Abax which means table. This device basically consists of a rectangular wooden frame and beads. The frame has several horizontal rods and the beads which are passed through the rods. Counting was done by moving the beads from one end of the frame to the other.



Napier's Bones- It is a device which contains a set of rods made of bones. It was developed by John Napier, a Scottish Mathematician and hence the device was named as Napier's Bones. The device was mainly developed for performing multiplication and division. Later in 1614 he also introduced logarithms.

$7 \times 1 =$	7
$7 \times 2 =$	14
$7 \times 3 =$	21
$7 \times 4 =$	28
$7 \times 5 =$	35
$7 \times 6 =$	42
$7 \times 7 =$	49
$7 \times 8 =$	56
$7 \times 9 =$	63



EVOLUTION OF COMPUTER SYSTEMS

Pascaline-Pascaline is a calculating machine developed by Blaise Pascal, a French Mathematician. It was the first device with an ability to perform additions and subtractions on whole numbers. The device is made up of interlocked cog wheels which contains numbers 0 to 9 on its circumference. When one wheel completes its rotation the other wheel moves by one segment. Pascal patented this device in 1647 and produced it on mass scale and earned a handful of money.



UNIVAC (Universal Automatic Computer) was the first computer to use transistors and Ekert and Mauchly designed the ENIAC, which was the first computer to operate at the rate of several million operations per second.



THIRD GENERATION (1956-1963)

replaced by transistors.

device that transfers electronic signals through resistors

to spark the production of a wave of second generation computer. Transistors can transfer electronic signals across a resistor. Transistors had many advantages over vacuum tube technology.

smaller than vacuum tubes

longer up time

more reliability

less heat

more flexible



In this generation microelectronics technology was introduced that made it possible to integrate large number of circuit elements into very small surface of silicon known as chips. This new technology was called *INTEGRATED CIRCUIT* or *INTEGRATED CIRCUIT*.

Advantages A new concept in this generation was that of a family of computer which allowed computer to be upgraded and expanded as necessary.

- Silicon chips were reliable, compact and cheaper.
- Sold hardware and software separately which created the software industry.
- customer service industry flourished (reservation and credit checks)

FOURTH GENERATION (1971-PRESENT)

It took only 55 years for the 4 generations to evolve. The growth of the computer industry led to the development of technologies of computer inventions. There are many types of computers as:

- Apple Macintosh



- IBM

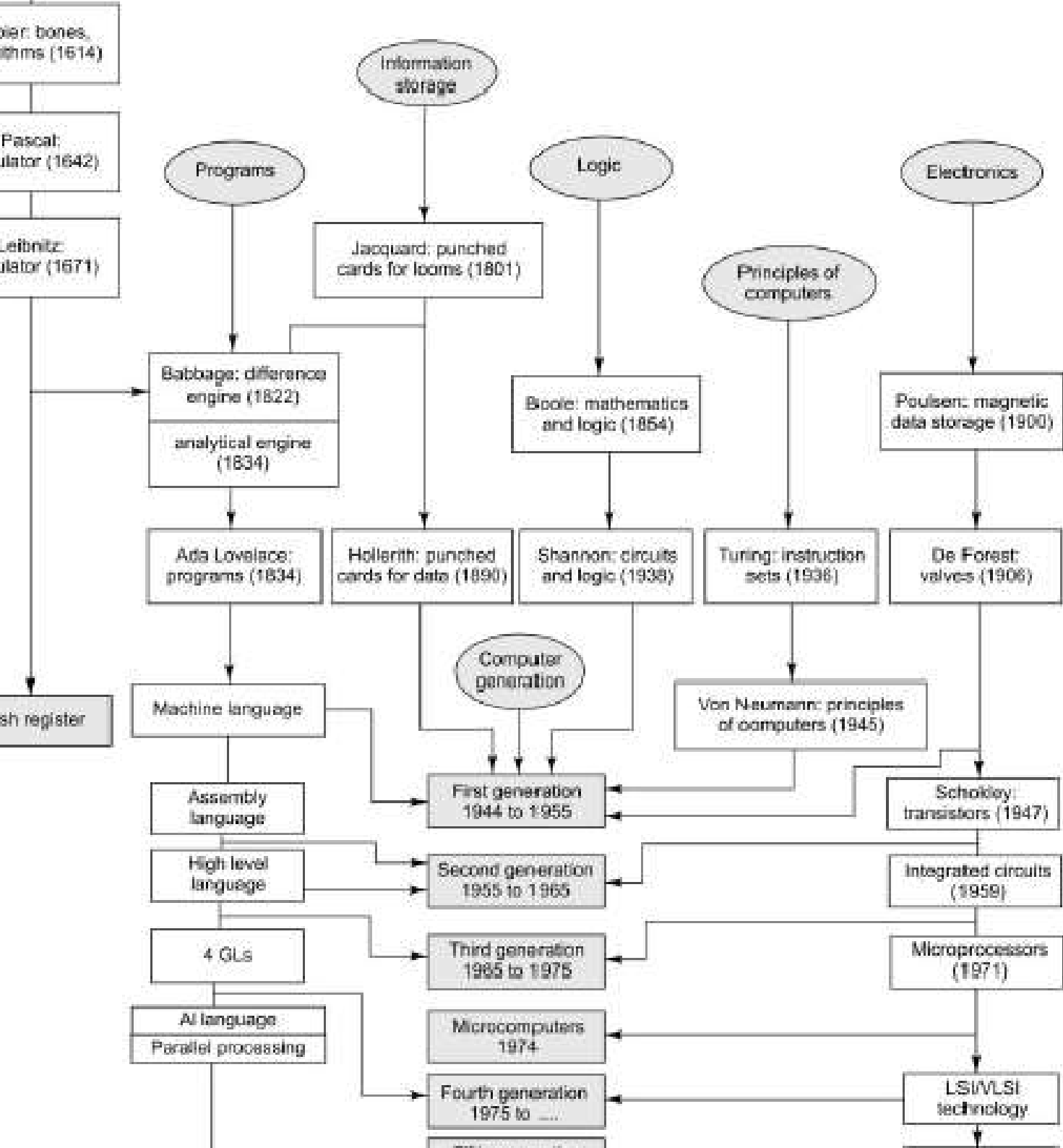


- DELL



- ACER





Devices that make up the computer are called Hardware.

Units are responsible for entering, storing and processing the given data and displaying the output to the users.

Hardware units of a general purpose computer are keyboard, mouse, memory, and printer.

Software refers to a set of programs and instructions that help the computers in their processing.

Software is necessary for the proper functioning of a computer.

Software is divided into two types of software, viz. Application Software and System Software

Input data are the raw facts and pieces of information that is usually entered into the computer system by the user, so as to generate the desired output and are of two types:

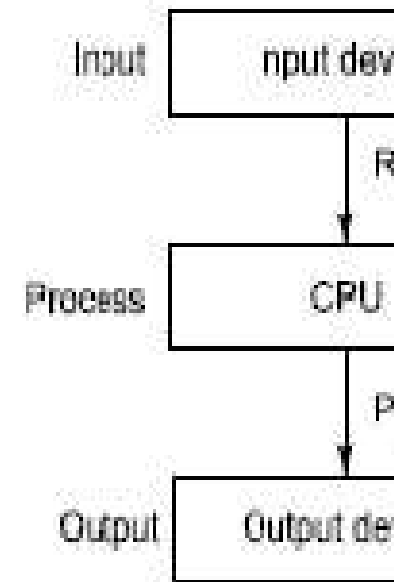
Textual data: The data, which are represented in words or text form

Numerical data: The data, which are represented in numerical form

Computer systems are designed by the people, for the people.

Users of computer systems include the people who design and build hardware and software

systems (software people) and the people who actually use computer systems for their



bus that is used to connect the different internal components of the computer system for the purpose of transferring data as well as addresses amongst them.

There are three types of buses in a computer system.

1. Serial bus or a parallel bus.

2. One bit of data is transferred at a time amongst the various components.

3. In a parallel bus, several bits of data can be transferred at a time amongst the various hardware components.

The width of bus is measured in terms of the number of bits transferred at a time amongst the two components.

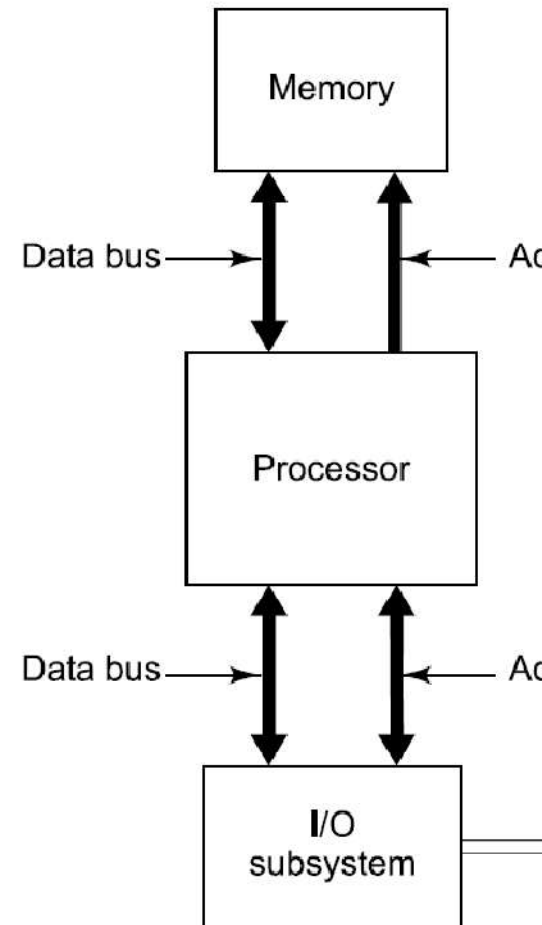
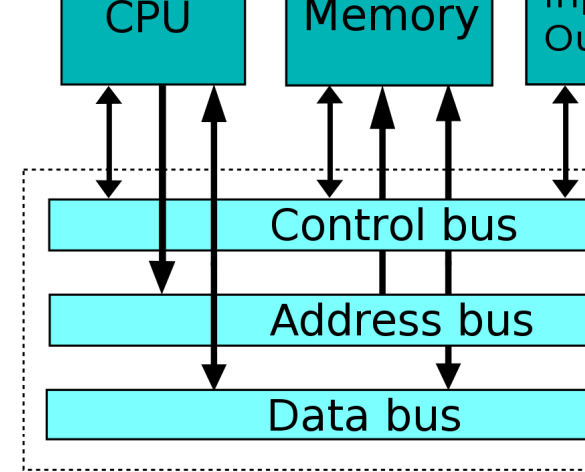
The bus system used in a computer system.

There are two different types of buses according to the type of data transferred by them.

1. **Data bus and the address bus.**

In addition to the address bus, a third type of bus known as control bus also exists in a computer system.

The bus system manages the transfer of data and addresses among various components of a computer system.



computer system is used to transfer data amongst the different internal

data bus also affects the overall processing power of a computer

systems use 32-bit data buses for data transfer.

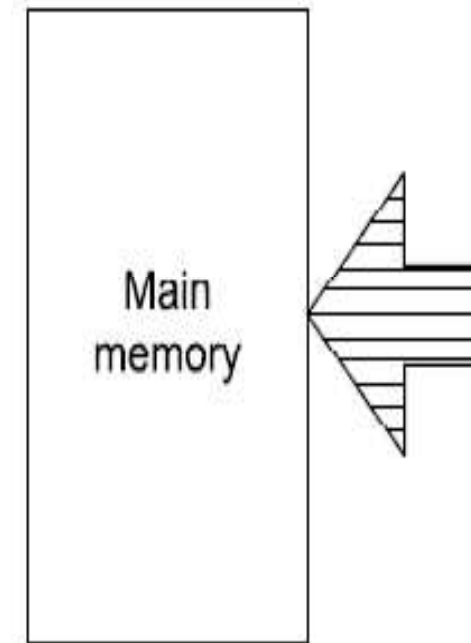
These buses are capable of transferring 32 bits of data at a time.

The data bus implemented between the main memory and the computer system.

It is that a bidirectional data bus is implemented between the main processor of the computer system.

The data bus allows the transfer of data in both the directions.

It is generally bidirectional in nature in most computer systems.



is also known as memory bus.

Memory addresses for read and write memory operations.

Number of address lines that determine the range of memory addresses that can be accessed using the address bus.

n-bit address bus can be used to reference 2^n memory locations.

The address bus can also be a serial or a parallel bus.

The address bus, used for transferring memory locations between processor and memory.

The address bus between the main memory and the processor of a computer system is unidirectional.

The data bus may also be bidirectional.

The address bus between the processor and the I/O system is bidirectional.

