Batch: A1 Roll No.: 16010120015

Experiment / assignment / tutorial No. (9)

Grade: AA / AB / BB / BC / CC / CD /DD

Signature of the Staff In-charge with date

TITLE: Study of basic computer organisation and architecture concepts through Virtual lab

AIM: Understanding Virtual Lab concepts

Expected OUTCOME of Experiment: Attaining multiple CO's

Books/ Journals/ Websites referred:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, TataMcGraw-Hill.
2. William Stallings, "Computer Organization and Architecture: Designing for Performance", Eighth Edition, Pearson.
3. Dr. M. Usha, T. S. Srikanth, "Computer System Architecture and Organization", First Edition, Wiley-India.

Pre Lab/ Prior Concepts:

The main aim of this experiment is to provide remote-access to Labs in various disciplines of Science and Engineering. These Virtual Labs would cater to students at the undergraduate level, post graduate level as well as to research scholars. Also, to enthuse students to conduct experiments by arousing their curiosity. This would help them in learning basic and advanced concepts through remote experimentation. It also provides

a complete Learning Management System around the Virtual Labs where the students can avail the various tools for learning, including additional web-resources, video-lectures, animated demonstrations and self evaluation.We can share costly equipment and resources, which are otherwise available to limited number of users due to constraints on time and geographical distances

Salient Features:

. 1. Virtual Labs will provide to the students the result of an experiment by one of the following methods (or possibly a combination)

- Modeling the physical phenomenon by a set of equations and carrying out simulations to yield the result of the particular experiment. This can, at-the-best, provide an approximate version of the 'real-world' experiment.
- Providing measured data for virtual lab experiments corresponding to the data previously obtained by measurements on an actual system.
- Remotely triggering an experiment in an actual lab and providing the student the result of the experiment through the computer interface. This would entail carrying out the actual lab experiment remotely.

2. Virtual Labs will be made more effective and realistic by providing additional inputs to the students like accompanying audio and video streaming of an actual lab experiment and equipment.

Observations

Title of Study Experiment: CPU Design

Brief description of experiment under study:

At the top level a computer consists of a CPU (central processing unit), memory, I/O components, with one or more modules of each type. These modules are interconnected in a specific manner to achieve the basic functionality of a computer i.e. executing programs.

Some of the basic features of this architecture are as follows:

- Data and instructions are stored in a single read-write memory.
- The contents of the memory are addressable by location.
- Execution occurs in a sequential manner (unless explicitly specified) from one instruction to the next.

Top level components and interactions among them:

- CPU exchanges data with memory. For this CPU uses two internal resisters.

1. Memory address register (MAR) which specifies the address for the next read or write
2. Memory buffer register (MBR) which contains the data to be written into memory or receives the data read from memory
3. I/O buffer (I/O BR) register is used for the exchange of data between an I/O module and the CPU

- A memory module consists of a set of a locations defined by sequentially numbered addresses. Each location contains a binary number that cam be interpreted as either an instruction or data.

- An I/O module transfers data from external devices to CPU and memory and vice versa.

- The basic function of a computer is to execute a program which consists of a set of instructions stored in the memory. Processing required for a single instruction is called an instruction cycle which consists instruction fetch and instruction execute. A register called program counter (PC) holds the address of the next instruction. Unless told otherwise the processor always increments PC after each instruction fetch so that the next instruction is fetched in sequence. The fetched instruction is fetched into a register called instruction register (IR).

- The program controller of digital computer works
  - (●) Synchronously
  - ( ) Progressively
  - ( ) Asynchronously
  - ( ) At random

- The minimum time delay required between initiation of two successive memory operations is called
  - ( ) Transmission time
  - ( ) Memory access time
  - ( ) Memory cycle time
  - ( ) Fetch Time

- General purpose internal registers are also called
  - ( ) Stack
  - ( ) Address register
  - ( ) Status register
  - ( ) Scratch pad

- The refreshing rate of dynamic RAMs is approximately once in
  - ( ) Fifty milli seconds
  - ( ) Two micro seconds
  - (●) Two milli seconds
  - ( ) Two micro seconds

- Microprogramming is designing of
  - ( ) ALU
  - (●) Control unit
  - ( ) CPU
  - ( ) None of these

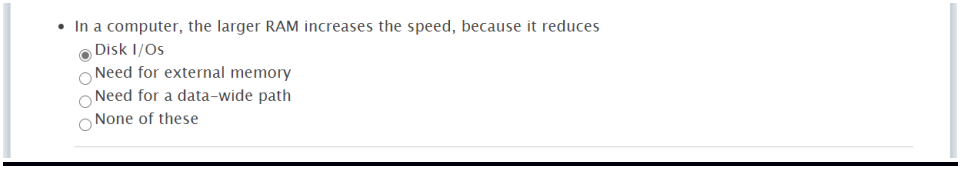
- How many units in a single bus structure can communicate at a time?
  - ( ) 4
  - ( ) 3
  - (●) 2
  - ( ) 1

- A single bus structure is found in generally
  - ( ) Main frames
  - ( ) Super computers
  - (●) Mini-and-micro computers
  - ( ) High performance machines

- What is the advantage of memory interfacing?
  - (●) Effective speed of the memory is increased
  - ( ) A large memory is obtained
  - ( ) The cost of the memory is reduced
  - ( ) A volatile memory is obtained

- During read operation what is fetched by the CPU?
  - ( ) Only instruction
  - ( ) Only data
  - ( ) Only address
  - (●) All of the above

- The technique which repeatedly uses the same block of internal storage during different stage of problem is called
  - ( ) Swapping
  - ( ) overlapping
  - (●) Overlay
  - ( ) None of these



Post Lab Descriptive Questions

1. What are the applications of the virtual lab case study / tool reviewed by you?

Applications of CPU:
The uses of the CPU are many and include performing calculations, running programs, and so on. ... The RAM sends many instructions to the CPU – which decodes the instructions and then processes these instructions and delivers the output based. All Computers Have CPUs. You will find a CPU in every electronic device.

Conclusion:

From this experiment, we learnt about the CPU and its components which mainly consist of registers, arithmetic and logic unit (ALU), Control Unit.

Date: 8.11.2021 **Signature of faculty in-charge**