

Assignment 1 - Even Semester, AY 2023-24

1. Which of the architecture is power efficient? Part-A
- a) RISC
2. To reduce the memory access time we generally make use of
- c) Cache
3. In CISC architecture most of the complex instruction are stored in.
- c) Transistors.
4. CISC stands for.
- a) Complex Instruction Set Computer.
5. What does ISO stands for?
- c) International Standards Organisation.
6. Parts of the Instruction format are.
- d) All the mentioned.
7. Which of the following is the subcategories of computer architecture?
- d) All of the mentioned.

Part-B

8. a) Differentiate between Third and Fourth Generation computers.

→ Third generation Computers

- i) Third generation Computer (1965-1971) were characterized by the use of integrated circuits (ICs) and transistors.

- ii) Computers were still relatively large and often required dedicated spaces or rooms for operation.

Fourth generation Computers

- Fourth generation Computers (1971-1980s) saw the development of microprocessor, which integrated thousands of transistors onto a single chip.

- ii) Computers, with the introduction of microprocessor, became significantly smaller and more portable.

iii) Computers had improved performance compared to Second generation computers, with faster processing speeds and more memory.

iv) Computers were used primarily for business, scientific, and military applications, performing tasks such as data processing, simulations, and calculations.

iii) Computers marked a significant leap in performance and capability due to the introduction of microprocessor.

iv) Computers expanded the range of applications significantly, with the proliferation of personal computers for home and office use.

b) What is Program Counter?

→ The Program Counter plays a crucial role in the execution of programs by keeping track of the current instruction's memory address and facilitating the sequential execution or redirection of program flow within a computer's CPU.

9. a) Give one example of One address format.

→ ADD A

In this example, "ADD" is the opcode (operation code) that specifies the operation to be performed, and 'A' is the operand, which represents the memory address of the data to be used in the operation. This format implies that the instruction operates on the accumulator and the memory location specified by the operand address, typically adding the value stored at that memory address to the value in the accumulator.

b) Differentiate between MAR and MDR.

→ MAR

i) The memory address register is a register within the CPU that holds the memory

MDR

i) The memory data register is a register within the CPU that holds the actual data or

of the data or instruction currently being accessed or fetched from the memory.

- ii) The MAR is used during the fetch phase of the instruction cycle to specify the address in memory from which data or instruction need to be read or written.
- iii) It is typically a binary register whose width determines the maximum addressable memory size of the computer system.

Instruction fetched from memory to be written to the memory.

- ii) During the fetch phase, the MDR stores the data or instruction read from memory before it is processed by the CPU or transferred to another register.
- iii) Like MAR, It is also a binary register whose width matches the word size of the computer system, determining the maximum size of data that can be transferred between the CPU and memory in a single operation.

10. a) Give one example of Two address format.

→ MOV A, B

In this example, "mov" is the opcode that specifies the operation to be performed 'A' is the source operand, and 'B' is the destination operand. This format implies that the value stored in the source operand 'A' is moved or copied to the destination operand 'B'. The same instruction format can be used for various operations such as addition, subtraction, multiplication, etc., where the result is stored in the destination operand.

- b) Write the advantages of 5th generation computers over 4th.
- i) These computers utilize advanced AI techniques such as natural language processing, machine learning.
- ii) Computers often employ parallel processing and distributed computing architectures, allowing for the simultaneous execution of multiple tasks or computations across multiple processing units.
- iii) These computers feature natural language interfaces that enable users to interact with the computer using human language inputs.
- iv) Computers often feature advanced user interfaces, including graphical user interfaces (GUIs) and touch-screen interfaces.

11. a) Give one example of Three address format.

→ ADD C, A, B

In this example, "ADD" is the opcode that specifies the addition operation to be performed. The operands 'A' and 'B' represent the values to be added, and 'C' represents the destination where the result of the addition operation will be stored. So, the result of adding the values stored in operands 'A' and 'B' will be stored in operand 'C'.

b) Write the Von Neumann Bottleneck.

→ The Von Neumann Bottleneck highlights the limitations of traditional computer architectures in terms of data and instruction processing, leading to potential performance bottlenecks and inefficiencies in program execution. Various approaches, such as caching, pipelining, and parallel processing, have been developed to mitigate the effects of the bottleneck and improve overall system performance.

Part - c

13. a) Fixed Program concept and Stored Program Concept- which one is better as per their need? justify your answer.

→ Advantages of fixed Program Concept:-

- i) Fixed program computers have a simpler design since they are dedicated to executing a specific set of instructions or tasks.
- ii) Fixed program computers is predictable and consistent.
- iii) Since fixed program computers do not allow for the execution of arbitrary instructions, they are less susceptible to security vulnerabilities such as unauthorized code execution.
- iv) Fixed program computers cannot adapt to changing requirements or run different programs, limiting their versatility.
- v) Fixed program computers are suitable for specialized tasks.

Advantages of stored Program Concept:-

- i) Stored program computers can execute a wide range of programs and adapt to changing requirements by loading different sets of instructions from memory.
- ii) Users can write and execute custom programs, increasing productivity and enabling innovation in software development.

The choice between the fixed program concept and the stored program concept depends on the specific requirements of the computing system.

fixed program computers are suitable for specialized tasks where simplicity, predictability, and security are critical, while stored program computers are better suited for general-purpose computing tasks requiring flexibility, versatility, and productivity.

b) What is Instruction Set?

→ Instruction Sets vary between different CPU architectures and processor families, reflecting the specific capabilities and features of each architecture. They are designed to provide a standardized interface for software developers to write programs that can be executed efficiently on the CPU, regardless of the underlying hardware implementation. Additionally, compilers and assemblers translate high-level programming languages or assembly language programs into machine code instruction from the instruction set, enabling software execution on the CPU.

c) Write the types of Instruction Set.

→ Instruction Sets can be categorized into several types based on their characteristics and functionality. Some common types of Instruction Sets include:

- Complex Instruction Set Computer (CISC).
- Reduced Instruction Set Computer (RISC).
- Very long Instruction word (VLIW).
- Explicitly Parallel Instruction Computing (EPIC).