



**METRO STATE
UNIVERSITY**

**ICS 232 Computer Organization & Architecture
Homework 1 - Chapter 1 - 10 points
Due Date: 9/4/2024**

Name: Anthony Quist

Note: Please post your homework to ICS232 D2L on or before the due date.

Read Chapter 1 – Introduction

Essential Terms and Concepts

2. What is an ISA?

- Instruction Set Architecture
 - The agreed upon interface between all the software that runs on the machine and the hardware that executes it.
 - The ISA allows you to talk to the machine.

4. Name the three basic components of every computer?

1. A processor to interpret and execute programs.
2. A memory to store both data and programs.
3. A mechanism for transferring data to and from the outside world.

28. How does the fetch-decode-execute cycle work?

1. The control unit fetches the next program counter to determine where the instruction is located.
2. The instruction is decoded into a language the ALU can understand.
3. Any data operands required to execute the instructions are fetched from memory and placed in registers in the CPU.
4. The ALU executes the instruction and places the results in registers or memory.



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29. What is a multicore processor?

- A multicore processor has two or more processor cores sharing a single die.
 - o Each core has its own ALU and set of registers, but all processors share memory and other resources.

Exercises

1. In what ways are hardware and software different? In what ways are they the same?

- Software are programs that are ran on a computer, where hardware is the physical components of a computer.

2. a) How many milliseconds (ms) are in 1 second? – 100ms
b) How many microseconds (μ s) are in 1 second? – 1,000,000 μ s
c) How many nanoseconds (ns) are in 1 millisecond? 1,000,000ns
d) How many microseconds are in 1 millisecond? 1,000 μ s
e) How many nanoseconds are in 1 microsecond? - 1,000ns
f) How many kilobytes (KB) are in 1 gigabyte (GB)? - 1,000,000KB
g) How many kilobytes are in 1 megabyte (MB)? - 1000MB
h) How many megabytes are in 1 gigabyte (GB)? - 1000MB
i) How many bytes are in 20 megabytes? – 20,000,000 bytes
j) How many kilobytes are in 2 gigabytes? – 2,000,000KB



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8. Briefly explain two breakthroughs in the history of computing.

- Third Generation: Integrated Circuit Computers
 - o Categorized by the microchip.
 - o Beginning of time-sharing and multiprogramming
- Fourth Generation: VLSI Computers
 - o Multiple transistors were integrated onto one chip.
 - o Helped create the first microprocessor.
 - o Allowed for the creation of super computers

12. List five applications of personal computers. Is there a limit to the applications of computers? Do you envision any radically different and exciting applications in the near future? If so, what?

- Games, word processors, spreadsheet applications, web browser, note taking application.
- I don't believe there is a limit to applications, I could see artificial intelligence creating different and exciting applications in the near future.

13. In the von Neumann model, explain the purpose of the:

a) processing unit – responsible for fetching instructions, decoding them, and performing the indicated sequence of operations on the correct data. The CPU consists of an ALU, registers, and a control unit.

b) program counter – register that holds the address of the next instruction to be executed.



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14. Under the von Neumann architecture, a program and its data are both stored in memory. It is therefore possible for a program, thinking a memory location holds a piece of data when it actually holds a program instruction, to accidentally (or on purpose) modify itself. What implications does this present to you as a programmer?

This could run a program instead of fetching a piece of data that is needed, this could result in the program crashing or other unexpected results. Potentially this could ruin an entire program or system depending on which program is ran instead of the data that should have been fetched.

19. Explain what it means to “fetch” an instruction.

It means to retrieve an instruction from the computer's memory.

23. What are the limitations of Moore's Law? Why can't this law hold forever? Explain.

The limitations of Moore's law are that transistors cannot get smaller forever. In order for Moore's law to hold the price of building new factories must not increase in price exponentially (which has already happened). We've already seen Moore's law growth start to flatten out.

Prepare for next class by reading Chapter 2 – Data Representation.

Read over the Group Projects document. Begin to decide which project may interest you and who you may like in your group.

Login into www.jblearning.com with the Course ID: 4AE6C2 to establish your access to the on-line chapters. Instructions are in your textbook in the card in the front of the book. Your access code is on the back of the card.

Optional Questions:



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1. If you have a nickname what name would you like me to use?

Tony

2. What other computer science classes have you taken?

ICS 140, ICS 141, ICS 240 (currently)

3. What computer programming languages do you know?

Python, Java, SQL

4. Is there anything else you would like to tell me that you will help you succeed in this class?