Assignment 1 answer

1. What are the main components of a computer system?

      Answer: Hardware, software, data, and communications

2. Provide some advantages of client-server architecture.

easier administration, consistency of resources, more efficient and cost-   effective hardware procurement, easier availability and location by users

3. Using 4 bits perform the addition of 2_{10} and -5_{10} by 2's complement method

SOLUTION: 0010

            1011
          ——————
            1101

4. Show how 12.25 is represented in SEEMMMMM format

SOLUTION :

12.25 = .1225 x 10^2
S=0
EE=52
MMMMM = 12250, where the added zero is added to make five digits
Answer: 05212250

Assignment 2 answer

1. For LMC, write assembly code to add two numbers and then subtract a third number (the subtraction answer should be positive)

Mailbox	Mnemonic	Instruction Description
00	IN	input 1st Number
01	STO 98	store data
02	IN	input 2nd Number
03	ADD 98	add 1st # to 2nd #
04	STO 98	store data
05	IN	input 3rd Number
06	STO 99	store data
07	SUB 98	sub the sum from the 3rd Number
08	BRP 11	test
09	LDA 98	if negative, reverse order
10	SUB 99	sub the 3rd num from the sum
11	OUT	print the result
12	COB	stop
——————————————————————————————————		
98	DAT 00	data
99	DAT 00	data

2. Define the terms assembler and compiler in one line.

Compiler translates high level language into machine code.

Assembler converts or translates assembly language into machine code.

3. Briefly explain the four generations of programming languages?

Generation 1: Programmed directly in binary using wires or switches

Generation 2: Assembly language was introduced in this generation, human readable, converted directly to machine code

Generation 3: High level languages, while loops, if-then-else, structured. Most programming today including object oriented languages

Generation 4: in this generation natural languages, non-procedural , report generation was introduced and used programs to generate other programs.

Question No 1:

The increased computing power is one of the major motivational factor for multiprocessing as discussed in most of the literature for computer architecture. In addition to this factor write at least four other considerations for "multiprocessing" that make this phenomena attractive.

Solution:

1. Since the execution speed of a CPU is directly related to the clock speed of the CPU, equivalent processing power can be achieved at much lower clock speeds, reducing power consumption, heat, and stress within the various computer components.
2. Programs can be divided into independent pieces, and the different parts executed simultaneously on multiple CPUs.
3. With multiprocessing, increasing computational power may be achieved by adding more CPUs, which is relatively inexpensive.
4. Data dependencies and cache memory misses can stall the pipelines in a single CPU. Multiprocessing allows the computer to continue instruction execution in the other CPUs, increasing overall throughput.

Question No 2:

What are the most significant and interconnected methods used by the current organizational model of a Central Processing Unit to overcome the shortcomings of conventional CU/ALU model and to improve performance?

Solution:

1. Implementation of the fetch-execute cycle is divided into two separate units: a fetch unit to retrieve and decode instructions and an execution unit to perform the actual instruction operation. This allows independent, concurrent operation of the two parts of the fetch-execute cycle.
2. The model uses an assembly line technique called pipelining to allow overlapping between the fetch-execute cycles of sequences of instructions. This reduces the average time needed to complete an instruction.
3. The model provides separate execution units for different types of instructions. This makes it possible to separate instructions with different numbers of execution steps for more efficient processing. It also allows the parallel execution of unrelated instructions by directing each instruction to its own execution unit

Question No 3:

Write a code/program to evaluate the following arithmetic expression:

X= (A + B) * (((C - D / E) / F) * G)

        Using a general register computer with three-address instruction.

Answer1:   ADD R1, A, B

                  DIV R2, D, E

                  SUB R2, C, R2

                  DIV R2, R2, F

                  MUL R2, R2, G

                  MUL X, R1, R2

Question No 4:

Compare CISC and RISC based on each one characteristics.

Answer2:

CISC	RISC
1. Complex Instruction Set Computer.	1. Reduced Instruction Set Computer.
2. Variable length instruction format.	2. Fixed length, easily decoded instruction format.
3. A large variety of addressing modes.	3. Few addressing modes.
4. A large number of instructions.	4. Relatively few instructions.

Assignment 4 answer

1. Write the operation of LCD – Liquid Crystal Display.

- 1st filter polarizes light in a specific direction
- Electric charge rotates molecules in liquid crystal cells proportional to the strength of colors
- Color filters only let through red, green, and blue light
- Final filter lets through the brightness of light proportional to the polarization twist

2 Write the difference between RAID – Mirrored and RAID – Striped

RAID – Mirrored

Pair of disks contain the exact same stores of data

Reading data – alternate blocks of data are read from hard drives and combined

Access time is reduced by approximately a factor equal to the number of disk drives in array

Read failure – block is marked and then read from the mirrored drive

When using three or more mirrored drives, majority logic is used in the event of a failure. Fault-tolerant computers use this technique.

RAID – Striped

A file segment is stored divided into blocks on different disks

Minimum of three drives needed because one disk drive is reserved for error checking

Writes – block of parity words from each block of data is created and put on the reserved error checking disk

Reads – parity data is used to check original data

3. what is the difference between CAV and CLV?

- **CAV** – Constant Angular Velocity
  - Number of bits on each track is the same! Denser towards the center.
  - Spins the same speed for every track
  - simplicity and fast access

- **CLV** – Constant Linear Velocity
  - All tracks have the same physical length and number of bits
  - Constant speed reading data off a track
  - Drive has to speed up when accessing close to the center of the drive and slow down when accessing towards the edge of the drive

4. What is interlaced scan and progressive scan?

Interlaced: displaying the odd rows, row 1, row 3, row 5, and so on, and then coming back and displaying the even rows.

Progressive: The actual display is produced by scanning and displaying each pixel, one row at a time, from left to right, top to bottom.