Programming Assignment 1

Title: To Perform Binary Addition on n-bit numbers

Objective:

To design and study n bit binary Adder

Pre-requisites:

1.Binary Arithmetic
2.Ripple carry Adder Theory

References: Computer Architecture and Organization
-John p. Hayes

Algorithm:

1.Convert 2 user entered decimal numbers into binary
2.Starting from LSB & going up to MSB , add the two bits & set their sum in the proper location of array result , set the carry and consider it for the next bit pair
3.Display the result
4.stop

Observations:

Note the binary numbers to be added and their Sum

Post Labs Assignments :

1.What is a serial adder?
2.Compare Serial Adder, Parallel Adder & Carry Look Ahead Adder

Programming Assignment-2

Title: To Perform Binary Sub tractor on n-bit numbers

Objective:

To design and study n bit binary Sub tractor

Pre-requisites:

1.Binary Arithmetic
2.2's complement Method of subtraction

References: Computer Architecture and Organization
-John p. Hayes

Algorithm:

1.Convert 2 user entered decimal numbers into binary
2.Take 2's complement
3.Perform binary addition as described previously
4.Check for carry left after adding MSB of the number.

a) If carry =1, drop it and report the answer
b)If carry =0 , take 2;s complement of the result and report answer with a minus sign
5.stop

Observations:

Note the binary numbers to be subtracted and their Difference

Post Labs Assignments :

1.Subctract 10101100 from 001101010 by 2's complement method
2.Subtract 01101101 from 11000101 by 2's complement Method

Programming Assignment-3

Title: To perform multiplication of two unsigned numbers with shift and add algorithm

Objective: To design and study n-bit binary multiplier with shift and add algorithm

Pre-requisites:

1.Binary arithmetic
2.Shift and add method of multiplication

references:

Computer Architecture and Organization
-John p. Hayes

Algorithm:

1.Intialise Q-multiplier, B multiplicand, c-carry accumulator=0
2.check for Qo
if Qo=1 a)accumulator=accumulator+B
b)Right shift C,A,Q by 1 bit
3.Repeat step 2 N number of times
4.Result is stored in integers A and Q
5.stop

Observations:

Note the binary numbers to be multiplied and their final answer

Post Labs Assignments :

1.What is array multiplier?
2.Implement hardware for unsigned Multiplication.

Programming Assignment-4

Title: Write a program to implement Booth's algorithm for multiplication
Objectives: Study of Booth's algorithm
Pre requisites: Knowledge of booth's algorithm and C programming
References : Computer Architecture and Organization
-John p. Hayes
Computer Architecture and Organization
-Stallings

Algorithm:

1.Begin
2.Initialize registers for result
3.Bring the multiplicand into register M
4.Bring multiplier into a register Q
5.Least significant bit of Q=Qo, Next LSB=Q-1
6.scan the multiplier bits
7.If two bits are same, the all the bits are right shifted by one bit
8.If two bits are different, then the multiplicand is added or subtracted from result
9.This addition and subtraction is followed by right shifted
10.Goto step 8 till count i.e. multiplier =0
11.End

Post Labs Assignments :
1.Explain Advantage of Booth's algorithm for Multiplication.
2. Explain Hardware implementation of Booth's Algorithm.
3. Explain Bit pair Recoding of multipliers.

Programming Assignment-5

Title: Write a program to implement Integer Division
Objectives: Study of Integer Division
Pre requisites: Knowledge of Integer Division algorithm and C programming
References : Computer Architecture and Organization
-John p. Hayes

Computer Architecture and Organization
-Stallings

Algorithm:
1.Shift C, AC, Q left by 1 bit.
2.AC <---AC-M [subtraction and checking the can be used for comparison]
3.If the sign of AC is negative (i. e. C=1), set Qo to 0 and add M back to AC ; otherwise, set Qo to 1.

Post Labs Assignments :
1.Perform division of the following positive numbers using restoring Division 1000 / 11 register size , n=4 bits.
2. Explain hardware Implementation of Integer division.
3. write an Algorithm for Non restoring Division Algorithm

Programming Assignment-6

Title: To implement LRU Replacement Algorithm in C Language
Objective: LRU Replacement Algorithm
Pre-Requisites: Replacement Algorithm and C Language.
References : Computer Architecture and Organization
-John p. Hayes
Computer Architecture and Organization
-Stallings

Algorithm: 1. Maintain a 2bit counter associated with each block of cache
2.When hit occurs , the counter of the blocks reffered is set to 0, counters with values originally lower than the reference one are incremented by one and all other remain unchanged.
3 a)When miss occurs and set is full , counter associated with set=0 and others incremented by one
b)When miss occurs and set is full, here block with highest count is removed and all others are incremented by one.
4) Continue steps 1-3 to replace or place other blocks.
5) stop

Post Labs Assignments :
1.Explain concept of virtual memory.
2.Explain TLB with its advantages.

Programming Assignment-7

Title: To implement FIFO Replacement Algorithm in C Language
Objective: FIFO Replacement Algorithm
Pre-Requisites: Replacement Algorithm and C Language.
References : Computer Architecture and Organization
-John p. Hayes
Computer Architecture and Organization
-Stallings
Algorithm: 1)when a new block occurs, check if the cache blocks empty If any one is empty , map this to the empty block of cache.
2)If a hit occurs, do nothing
3)If a miss occurs, replace the block which came first in cache with the new one.
4)Repeat 1-3 to map all blocks
5)stop
Post Labs Assignments :
1.Explain Demanding paging.
2.Explain paged segmentation.

Programming Assignment-8

Title: To study Direct mapping using c.
Objective: Direct Mapping technique.

Pre-Requisites: Direct mapping and C Language.
References : Computer Architecture and Organization
-John p. Hayes
Computer Architecture and Organization
-Stallings

Algorithm:

1) Enter the size of main Memory,Cache memory size
2) Enter size of each Block.
3) Number of blocks in main Memory and cache memory are calculated by dividing the size of main memory and cache memory by size of 1 block.
4) Enter the block number of main memory which is tobe mapped into cache.
5) The remainder obtained after dividing the value obtained in step 4 by total number of cache blocks is cache block number.
6) The quotient of above division gives the tag bits.
7) Display above result
8) stop.

Post Labs Assignments :

1.List out Advantages and disadvantages of Direct mapping.
2.What is Hit Ratio?
3.Explain Cache Organization.

Programming Assignment-9

Title: To study set associative mapping using c.
Objective: Set Associative Mapping technique.
Pre-Requisites: Set Associative mapping and C Language.
References : Computer Architecture and Organization
-John p. Hayes
Computer Architecture and Organization
-Stallings

Algorithm:

1) Enter the size of main Memory,Cache memory size
2)Enter size of each Block.
3)Number of blocks in main Memory and cache memory are calculated by dividing the size of main memory and cache memory by size of 1 block.
4)Enter whether it is 2 way associative or 4-way associative mapping
5)Calculate the number of sets in the cache memory.
6)Enter the block numbers of main memory which is to be mapped in cache memory
7)j=m
8)Calculate the tag bits
9)Display the above result

10) stop

Post Labs Assignments :

1. Design a 2way set associative memory with following details.
Cache consists of 32 words.
each Block consists of 4 words
size of main memory =256 words
Find number of bits in each of TAG, BLOCK/ SET and WORD.
2. Explain Difference between Associative and Set associative mapping.

Programming Assignment-10

Title: Case Study on SPARC.