Ramaiah Institute of Technology
(Autonomous Institute, Affiliated to VTU)
Department of CSE
Tutorial-1

Programme: B.E
Course: Computer Organization
Term: Jan to May 2018
Course Code: CS45

Name: MANOJA.U	**Marks:** /10	**Date:**
USN: 1MS18CS068	**Signature of the Faculty:**	

Activity I: Assembling and disassembling of a computer

Objective: To demonstrate the functional units of a system.

Assembling of a system: A PC computer is a modular type of computer, it can be assembled using hardware components made by different manufacturers, so as to have a custom built computer according to one's specific needs.

Disassembling of a system: When referring to hardware, **disassemble** is the process of breaking down a device into separate parts. A device may be disassembled to help determine a problem, to replace a part, or to take the parts and use them in another device or to sell them individually.

Activity to be performed by students: Identify the different parts of the system including its interconnection. Observe the assembly and disassembly procedure.

Answer the following questions.

1. Write down the detailed procedure to assemble a system.

2. Explain how troubleshooting a system helps to trace and correct the faults in a system

3. List out the procedure to install extra memory card to a system

4. With a diagram explain different cables used to connect function units in a system.

5. Discuss the safety precautions one should take while removing components of a system

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Subject :	COMPUTER ORGANIZATION & Architecture	Subject Code:	

① Write the detailed procedure to assemble a System.

Ans

① Remove side panels on Case :- After removing the case from the box, the panels are removed from this case with the screws.

② Insert motherboard :- In assembly process, as I was just transporting the parts from one case to another, leaving the CPU cooler installed was the easiest option. Depending on the motherboard, case, CPU and CPU fan, this might need to be done before installing or one in place

③ Check Clearances :- Being that this computer includes high performance components, some of them are large enough that clearance can become an issue.

④ Front Panel connection :- Once the graphics card was removed again, it is time to attach the connection for the buttons, light, USB ports & audio connections.

⑤ Install power supply :- The powersupply, from the previous case was modular so only the cables that are needed are plugged into the unit.

6. Power motherboard:- With the motherboard power being the largest cable and sometimes just long enough, Namely this cable first and plug it into the board, if there is a second cable for the CPU remember to connect it as well.

7. Installing optical drive:- The optical drive for this computer is a CD/DVD read/write combo.

8. Installing the hard drives:- The size and number of hard drives your computer contains is completely dependent on your style of use and storage needs.

9. Connect Cables:- The cables are keyed so they will only fit in one direction into the board, the cable that is attached to the optical drive.

10. Install RAM:- If your computer use more than one stick refer to the manual for which slot to install the sticks.

11. Install graphics card & Expansion cards:- If your computer does not come with a graphics card integrated into the motherboard, then insert one.

12. Find product:- The assembly of a brand new computer can take several hours just to remove and mount in a closet.

(2) Explain how trouble shooting os system helps to trace and correct failure in the system.

Ans Trouble shooting is a systematic approach to problem solving thod is often used to find and correct issues with complex machine, electronic, computer and software system.

The first step in troubleshooting is gathering information on the issue, such as undesired behaviour or a lack of expected functionality other important information include related symptoms and special circumstance that may be required to reproduce the issue.

Once the issue and how to reproduce it are understood, the next step might be to eliminate unnecessary components in the system and verify that the issue persists, to rule out incompatibility and third-party causes.

Continuing, assuming the issue remains, one might next check common cause, Depending on the particular issue and the trouble shoots experience they may have some ideas. They may also check product documentation and or conduct research on or support database or through a search engine.

(3) List out the procedure to install external memory card to a system.

Ans (1) Disconnect the power cable from your system and if needed, unplug other back-panel cable so that you can safely move your system on to its side

(3) List out the procedure to install extra memory card to System.

Ans Step 1:- Disconnect the power cable from the system and if needed, unplug other back-panel cables so that you can safely turn your system on to its side.

Step 2:- Remove the side panel to give you full access to the interior and locate the RAM slots. They are most commonly found next to the processor and its cover if you already RAM in your system, eject it by pressing firmly on the tabs on the motherboard at either end of the slot. The memory slots will pop out and you can remove them gently.

Step 3:- To install the new RAM, line up notches in the bottom of the stick in gap in the slot on the motherboard. As it goes the clamps will clamp in and hold the memory securely.

Step 4:- Once the sticks have clicked into, confirm that the clips are locked into hold the sticks firmly in their slots. and close the PC back up plug all the cables back in and then to boot the system.

(4) Explain with neat diagrams various cable used to connect functional unit in a system.

Ans 1) VGA cable:- Also known as D-Sub cable, analog video cable, connect one end to computer, monitor television connect other end to: VGA port on computer.

2) DVI Cable:- connect one end to computer monitor connect other end to DVI port on computer.

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3) HDMI Cable: Connect one end to computer monitor, television. Connect other end to HDMI port on computer.

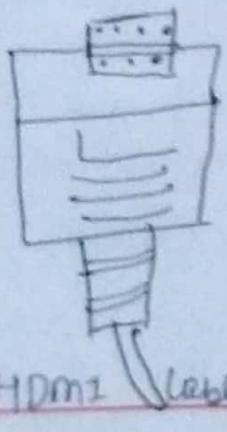
4) PS/2 Cable: Connect one end to PS/2 keyboard, PS/2 mouse Connect other end to PS/2 ports on computer. purple PS/2 port keyboard.

5) Ethernet Cable: Connect one end to router, network switch Connect other end to ethernet port of computer.

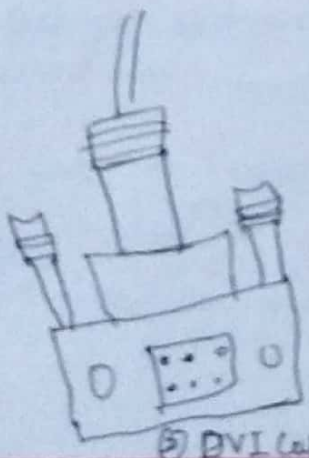
6) USB Cable: Connect one end to USB device, connected other end to USB ports on computer.

7) Computer power cord (Kettle plug): Connect one end to AC power source Connect, other end to power supply unit Computer monitor.

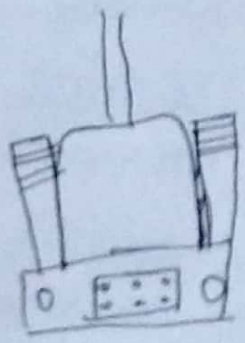
⇒ Diagrams



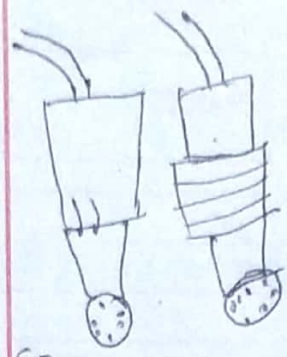
HDMI Cable



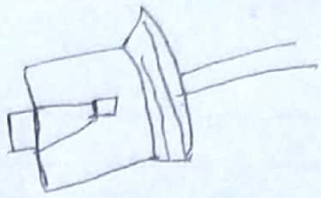
② DVI Cable



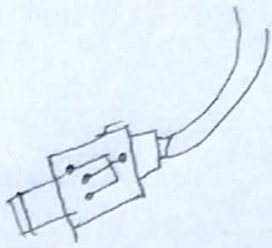
③ VGA Cable



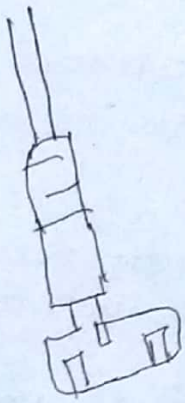
④ PS/2 cable



⑤ Ethernet cable



⑥ USB cable



⑦ Computer power cord (kettle plug).

⑤ List the safety precaution while removing the component from the system.

Ans A few warning and remarks before you start disassembling your computer.

1) Fully shutdown and unplug the computer before you make any attempt to disassemble the tower.

2) Take off any metal objects on your arm or finger. Such as bracelet ring or watches. Even if unit is unplugged there may still be some residual electric charge

3) make sure your hands are completely dry to avoid damaging any internal parts as well as to avoid electrocution.

4) work in a cool area to avoid perspiration for the less room as less in the premises are.

5) Before touching any part within the case, put your hands against another metal, but you to remove static charg, which may damage sensitive device.

6) prepare to place to keep any screws you may remove

7) Handle all parts with care:

8) If a component doesn't come easily, don't forcefully remove it.

9) Be careful when handling the motherboard.

10) When attempt to remove the power source as both attached to the side of the unit to unplug all cable all connected.

11) when removing any cable, wire or ribbon make use of grop the wire its base or head to keep it from breaking

12) Be careful not to drop any small parts into unreachable areas such as inside computer fan or disk drive.

13) Take note that those - may damaging thing to computer are moisture, shock and dust.

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Tutorial -II

Programme: B.E
Course: Computer Organization

Term: Jan to May 2020
Course Code: CS45

Name: 1MS18CS068 (MANOJA.U)	**Marks:** /10	**Date:**
USN: 1MS18CS068	**Signature of the Faculty:**	

Activity II: Demonstrating Datapath and instruction execution stages using MarieSim Simulator

Objective: To simulate inter communication between CPU and memory.

Simulator Description: MarieSim is a computer architecture simulator based on the MARIE architecture. It provides users with interactive tools and simulations to help them deepen their understanding of the operation of a simple computer. One can observe how assembly language statements affect the registers and memory of a computer system.

Activity to be performed by students:

1. Draw the interconnection between memory and a processor.

2. List out the steps required to execute an instruction.

3. Write and execute assembly language program to compute
   i) f=(g+h)*(i+y)
   ii) $d=b^2-4ac$

4. Describe the factors affecting the performance of a processor

3. Results and Snapshots:

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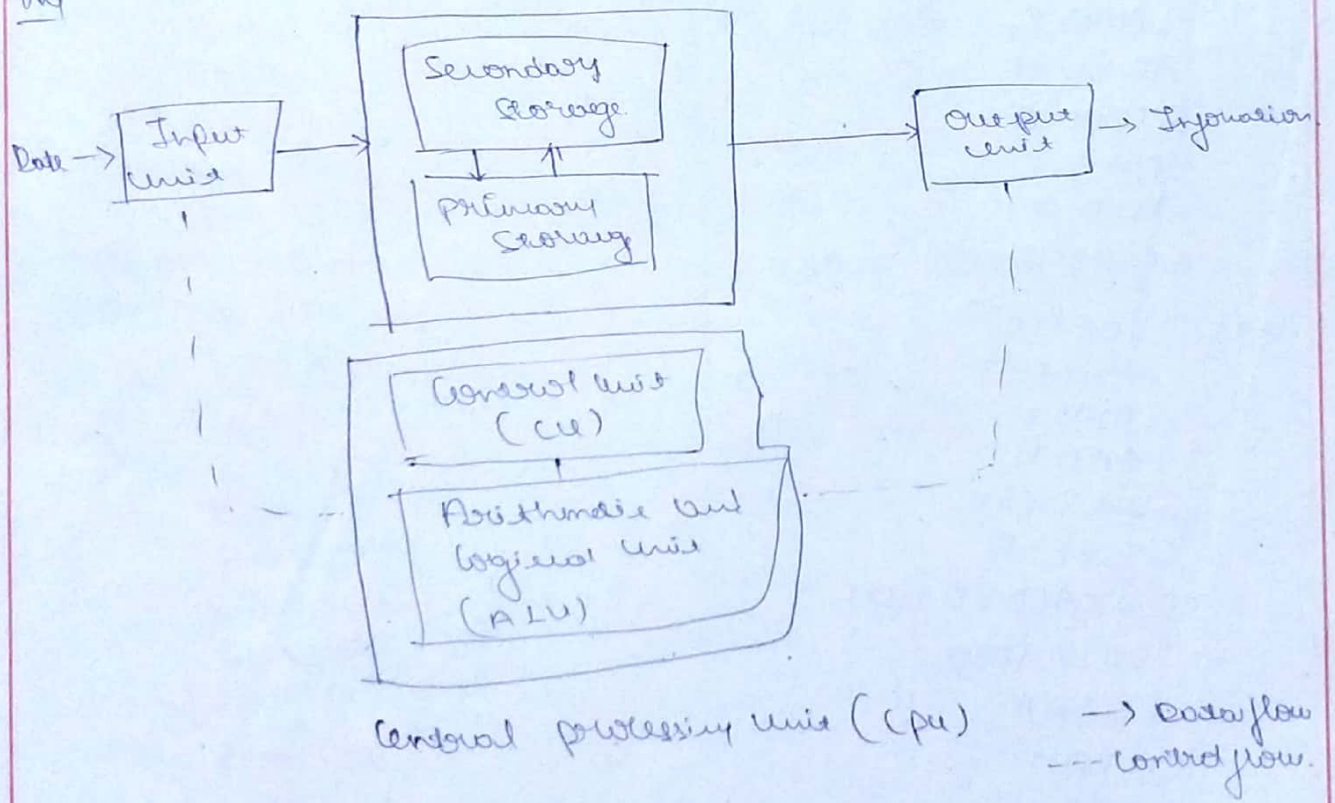
USN/Roll No. :	1MS18CS068	Sem/Sec:	IV 'B'
Subject :	COA LAB	Subject Code:	

(1) Draw the interconnection between memory and processor.

Ans



(2) List out the steps required to execute an instruction.

Ans There are 6 steps involved in the execution of instruction:

(1) Fetch instruction

(2) Decode information.

(3) perform ALU operation

(4) Access memory

(5) update register file

(6) update the program counter (PC)

3) write and execute the assembly language program to compute:

i) $f = (g+h) * (i+j)$

```
    LOAD G
    ADD H
    STORE A
    LOAD I
    ADD Y
    STORE B
loop LOADA
    ADD I
    STORE F
    LOAD B
    SUBT ONE
    STORE B
    SKIPCOND 400
    JUMP loop
    LOADF
    OUTPUT
    HALT
G DEC 9
H DEC 5
Y DEC 8
```

```
I   DEC 2
A   DEC 0
B   DEC 0
f   DEC 0
one DEC 1
```

ii) $d = b^2 - 4ac$

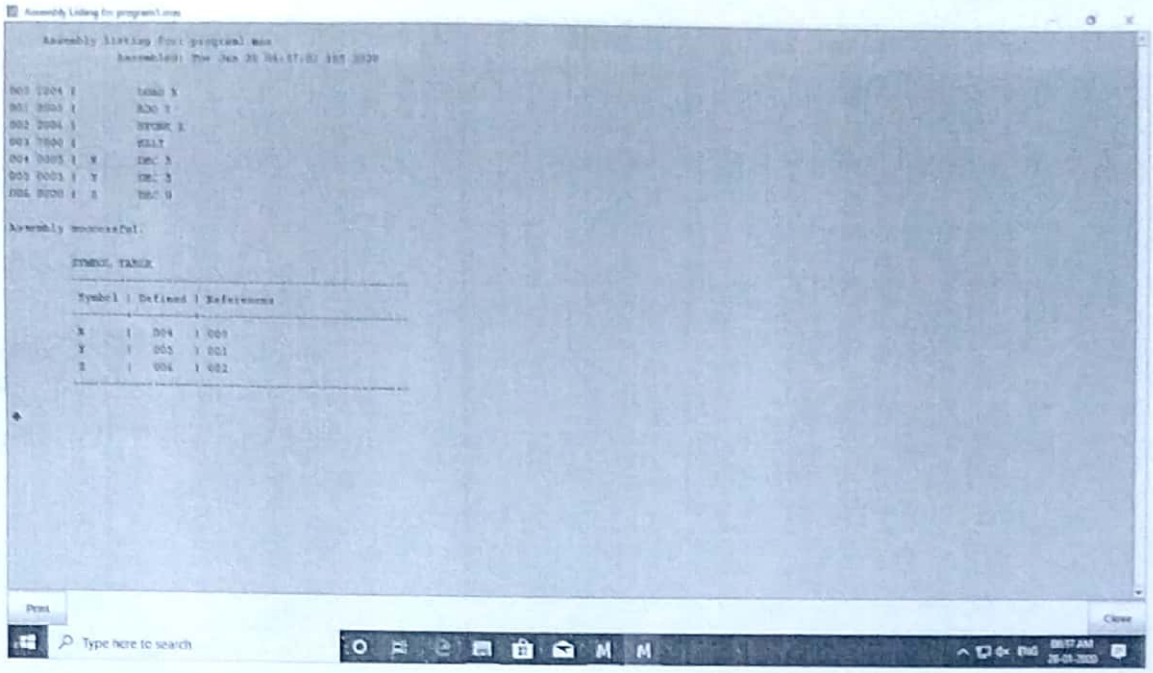
Ans

```
    LOAD B
    STORE 0
first LOAD B
    ADD x
    STORE x
    LOAD 0
    SUBT one
    STORE 0
    SKIPCOND400
    JUMP first

Second LOAD A
    ADD Y
    STORE Y
    LOAD C
    SUBT one
    STORE C
    SKIPCOND400
    JUMP Second

Third LOAD four
    ADD Z
    STORE Z
    LOAD Y
    SUBT one
    STORE Y
    SKIPCOND400
    JUMP third
LOAD D
ADD x
SUBT Z
OUTPUT
HALT
A   DEC 6
B   DEC 3
C   DEC 2
0   DEC 0
X   DEC 0
Y   DEC 0
Z   DEC 0
D   DEC 0
one DEC 1
four DEC 4
```

(4) Describe the factors affecting the performance of a processor.

Ans:- There are few factor affecting the performance of processor:

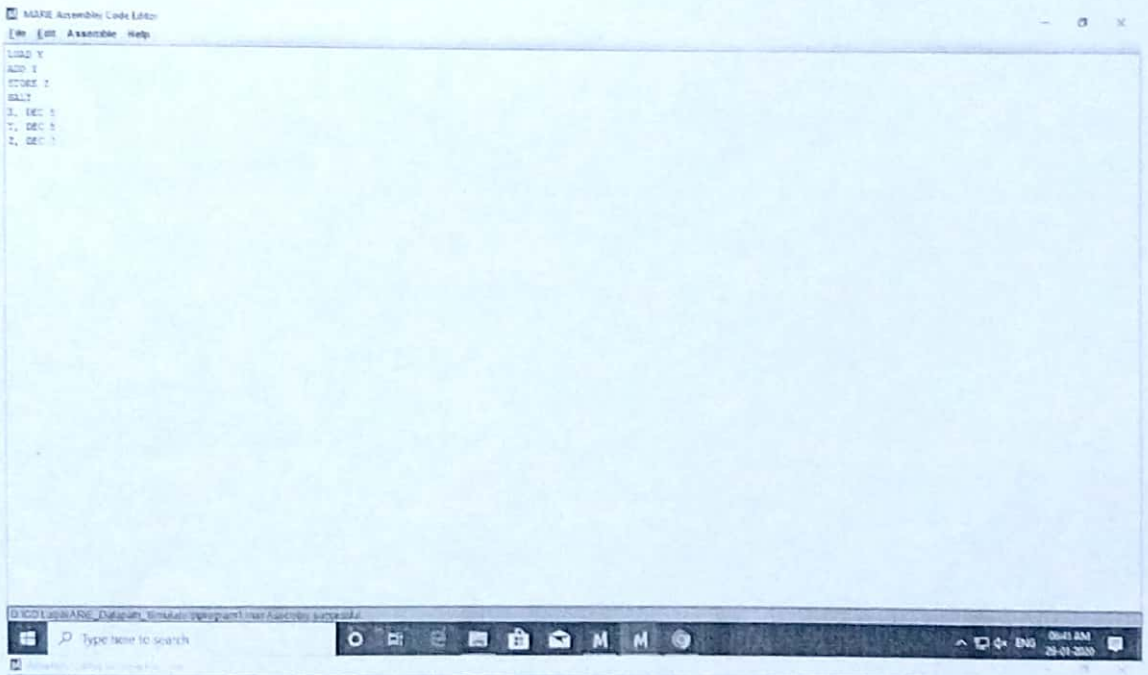
- **Multiple Cores**: Nowadays we have dual, quad and even octa core processor with its own fetch and execute cycles However the software should make use of the multiple cores.
- **Clock Speed**:- The processor requires a clock pulse in order to operate correctly one clock cycle = 1Hz APC clock speed is normally in GHz region
- **Cache memory**:- It is a small amount of high performance RAM that is built into the processor. This RAM stores the data which has to be repeatedly used by the processor and it doesn't not require a request from memory
- **Word length**:- The number of bits the CPU can process simultaneously, for example, an 32-bit processor is faster than an 16 bit processor because of the wider word length.
- **Address Bus width**:- It is the width of the address bus and determine the maximum amount of addressable locations. For Example, an address bus of 8 bit means that you can have 256 address (0 to 255)
- **Data Bus width**:- It is the number of bits that can be transfer simultaneously from one device to another. If the data bus is 16 bits and the address bus is 32 bits, so the data is fetched in 2 X 16 bit groups.



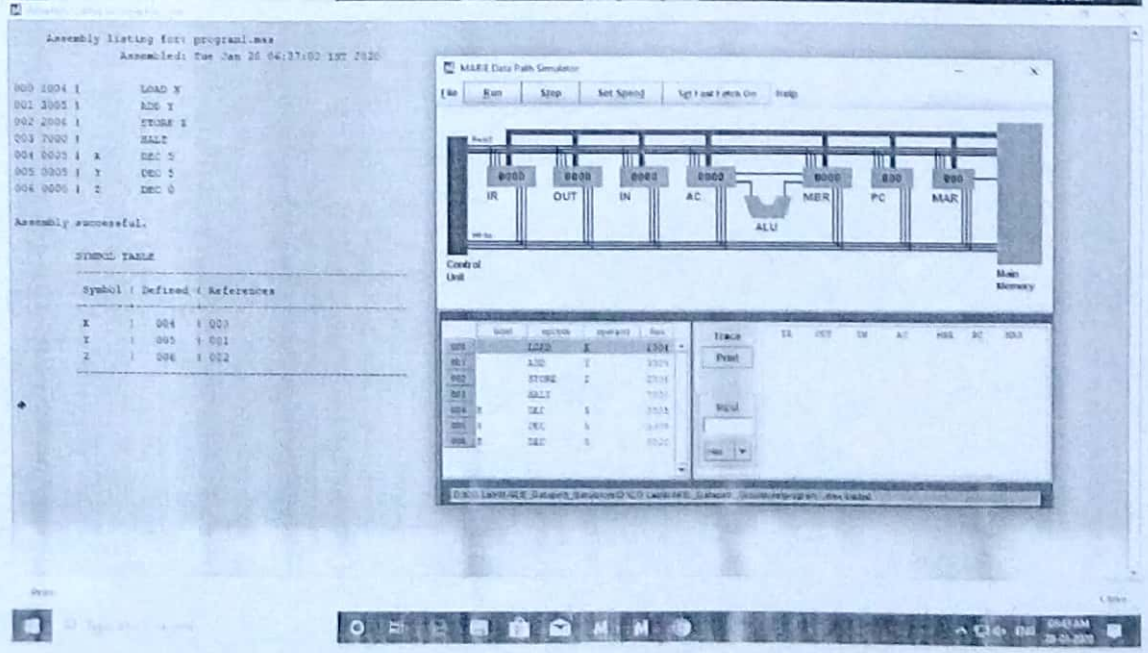
```
    Assembly listing for: program1.mas
            Assembled: Tue Jan 28 04:37:02 IST 2020

000 1004 I         LOAD X
001 3005 I         ADD Y
002 2006 I         STORE Z
003 7000 I         HALT
004 0003 I  X      DEC 3
005 0003 I  Y      DEC 3
006 0000 I  Z      DEC 0

Assembly successful.

        SYMBOL TABLE

        Symbol | Defined | References

        X      |   004   | 000
        Y      |   005   | 001
        Z      |   006   | 002
```

Print

Close



```
MARIE Assembly Code Editor
File  Edit  Assemble  Help
LOAD X
ADD Y
STORE Z
HALT
X, DEC 3
Y, DEC 3
Z, DEC 0
```



```
    Assembly listing for: program1.mas
            Assembled: Tue Jan 28 04:37:02 IST 2020

000 1004 I         LOAD X
001 3005 I         ADD Y
002 2006 I         STORE Z
003 7000 I         HALT
004 0003 I  X      DEC 3
005 0003 I  Y      DEC 3
006 0000 I  Z      DEC 0

Assembly successful.

        SYMBOL TABLE

        Symbol | Defined | References

        X      |   004   | 000
        Y      |   005   | 001
        Z      |   006   | 002
```

MARIE Data Path Simulator

Run Step Set Speed Set Fetch On Help

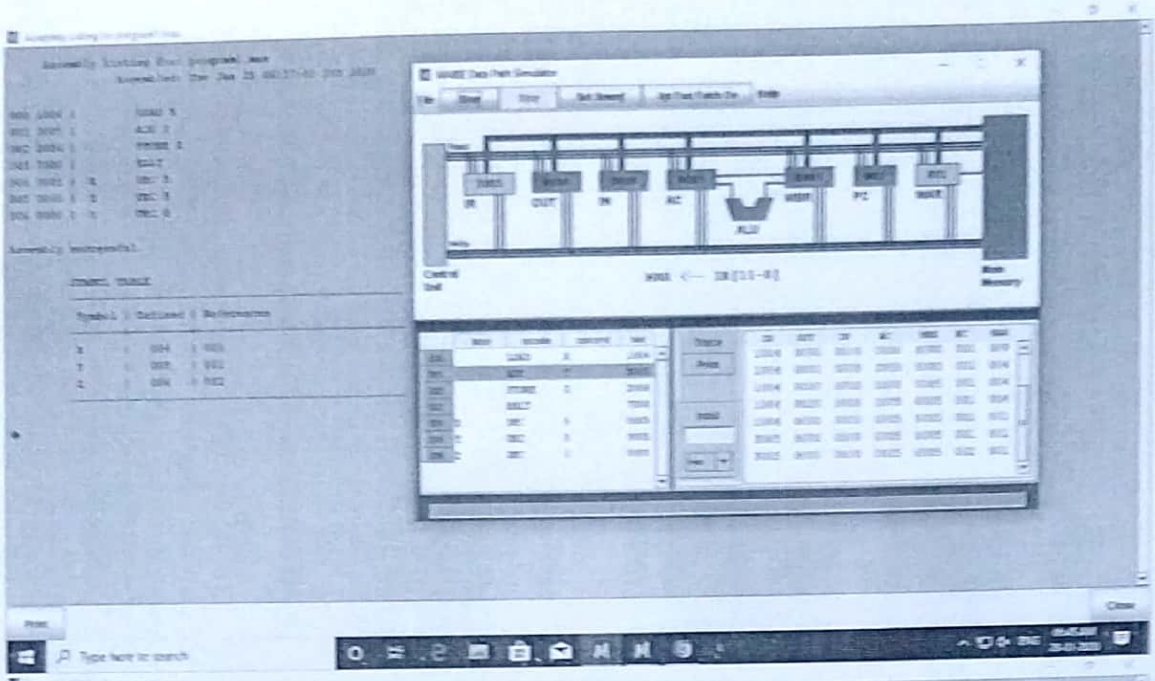
IR OUT IN AC MBR PC MAR

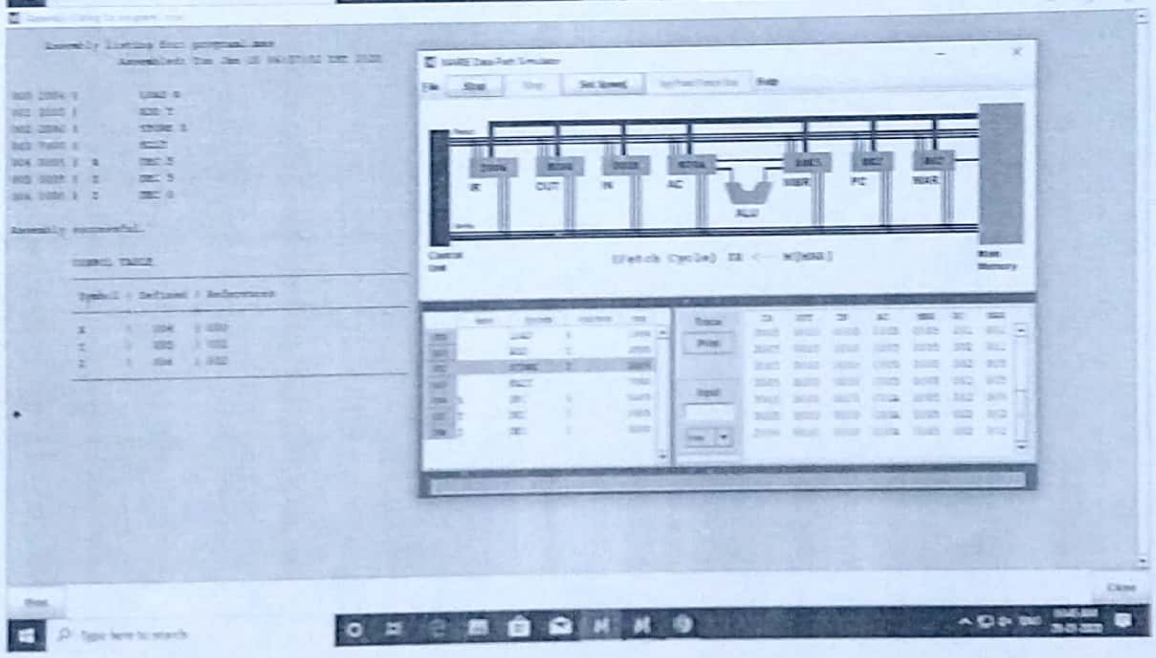
ALU

Control Unit

Main Memory

Trace Print Input





⇒LAB 3

Name: MANOJA.U

USN: 1MS18CS068

Objective: To simulate ARM Instruction set using ARM sim Simulator.

Simulator used: ARMsim 1.91 is a desktop application running in a windows environment. It allows user to simulate the execution of ARM assembly language programs on a system based on the ARM7TDMI processor.

ARM enable the user both to debug ARM assembly program and to monitor the state of the system while a program executes

Activity to be performed by students.

① write a ARM program to perform basic arithmetic operations.

② write an ARM program to demonstrate the working of load and store instructions.

③ write an ARM program to evaluate expression $f = (g+h) - (i+j)$

④ write an ARM program to find the sum of all elements of an array

⑤ write an ARM program to find the factorial of a number.

Answers

① Ans
```
MOV R5,#10
MOV R6,#20
ADD R7,R5,R6
SWI 0X11
```

②
```
MOV R1,#0X00000070
MOV R3,#0
MOV R4,#50
STR R4,[R1,R3]
LDR R6,[R1,R3]
SWI 0X11
```

IMS18CS068

(3) Ans

```
MOV R6, #30
MOV R7, #40
MOV R8, #10
MOV R9, #20
MOV R3, #0
MOV R5, #0X00000050
ADD R1, R6, R7
ADD R2, R8, R9
SUB R1, R1, R2
STR R1, [R5, R3]
SWI 0X11
```

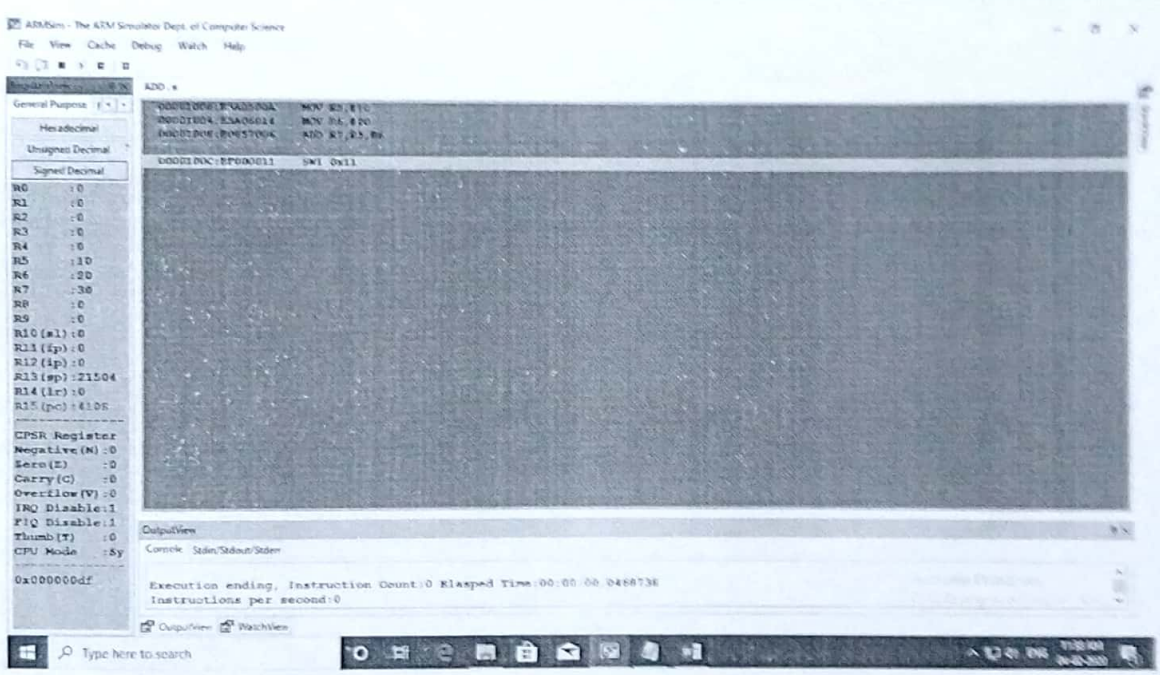
(4)

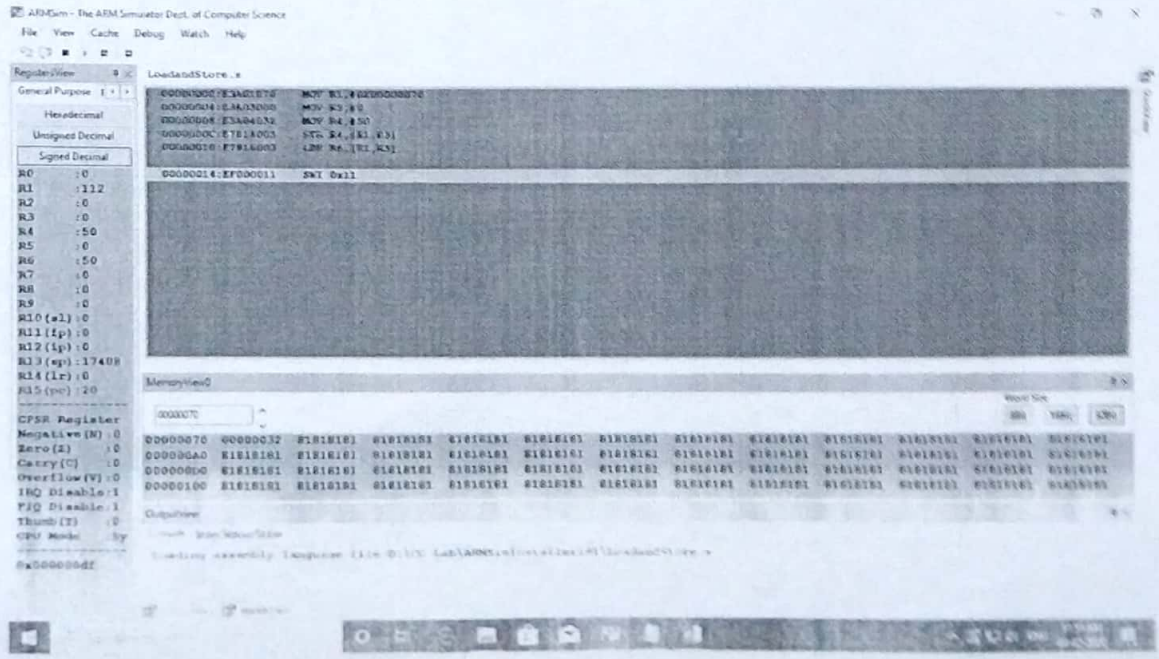
Ans

```
MOV R0, #5
LDR R1, =array
loop LDR R2, [R1], #4
   ADD R3, R3, R2
   SUB R0, R0, #1
   Cmp R0, #0
     BNE loop
array DCD 0x00000001, 0x00000002, 0x00000003,
                0x00000004, 0x00000005.
        SWI 0X11
```

(5)

```
MOV R1, #5
MOV R0, #1
 MOV, R3, #1
Loop: MUL R3, R0, R3
      ADD R0, R0, #1
      SUB R1, R1, #1
      Cmp R1, #1
        BGE loop
      SWI 0X11
```

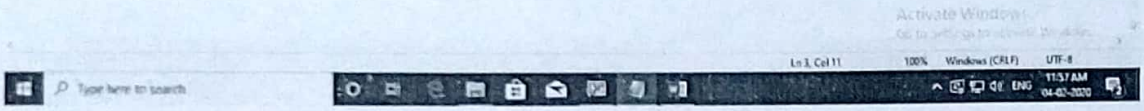


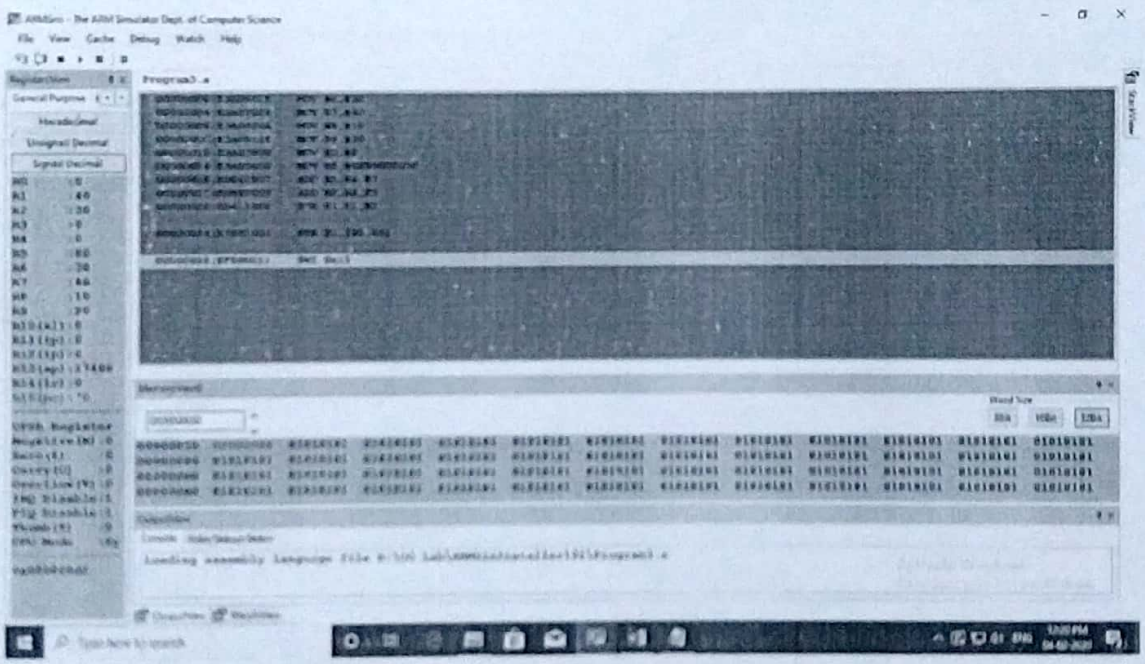


LoadandStore - Notepad

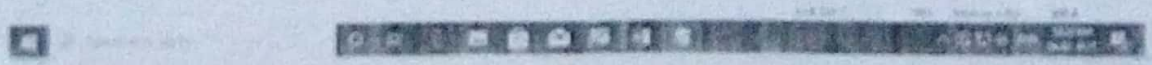
File Edit Format View Help

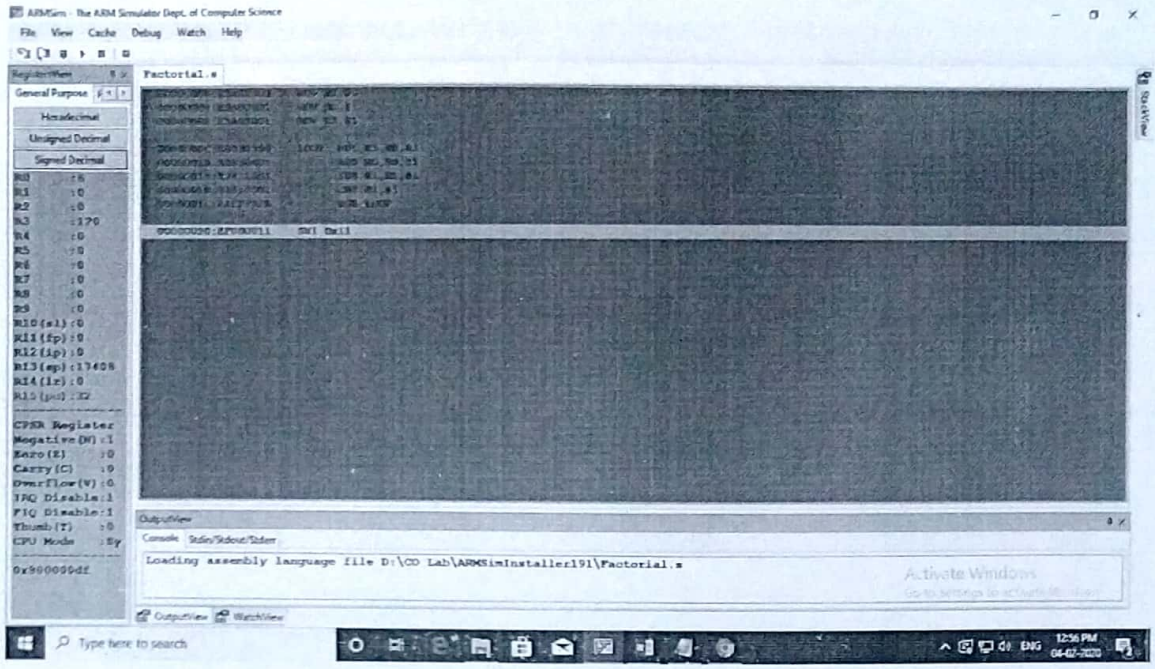
```
MOV R1,#0X00000070
MOV R3,#0
MOV R4,#50
STR R4,[R1,R3]
LDR R6,[R1,R3]

SWI 0x11
```






```
MOV R6,#30
MOV R7,#40
MOV R8,#10
MOV R9,#20
MOV R3,#0
MOV R5,#0X00000050
ADD R1,R6,R7
ADD R2,R8,R9
SUB R1,R1,R2

STR R1,[R5,R3]

SWI 0x11
```





Factorial - Notepad

File Edit Format View Help

```
MOV R1,#5
MOV R0,#1
MOV R3,#1

LOOP: MUL R3,R0,R3
      ADD R0,R0,#1
      SUB R1,R1,#1
      CMP R1,#1
      BGE LOOP

SWI 0x11
```

LAB-4

Name: MANOJ A V
USN: 1MS18CS068

① Fibonacci series.

```
Ans  mov r0,#0
     mov r1,#1
     mov r2,#20
     mov r3,#0
     ldr r4,=0x00002000
     mov r5,#0
     Loop: str r0,[r4,r5]
     add r6,r0,r1
     mov r0,r1
     mov r1,r6
     add r5,r5,#4
     add r3,r3,#1
     cmp r3,r2
     blt loop
     SWI 0x22
     SWI 0x11
```

② Search an element in the array.

```
A1   ldr r0, =0x00002000
     mov r1,#14
     mov r2,#17
     mov r3,#18
     mov r4,#12
     mov r5,#16
     mov r6,#20
     str r1,[r0]
     str r2,[r0,#4]
     str r3,[r0,#8]
     str r4,[r0,#12]
     str r5,[r0,#16]
```

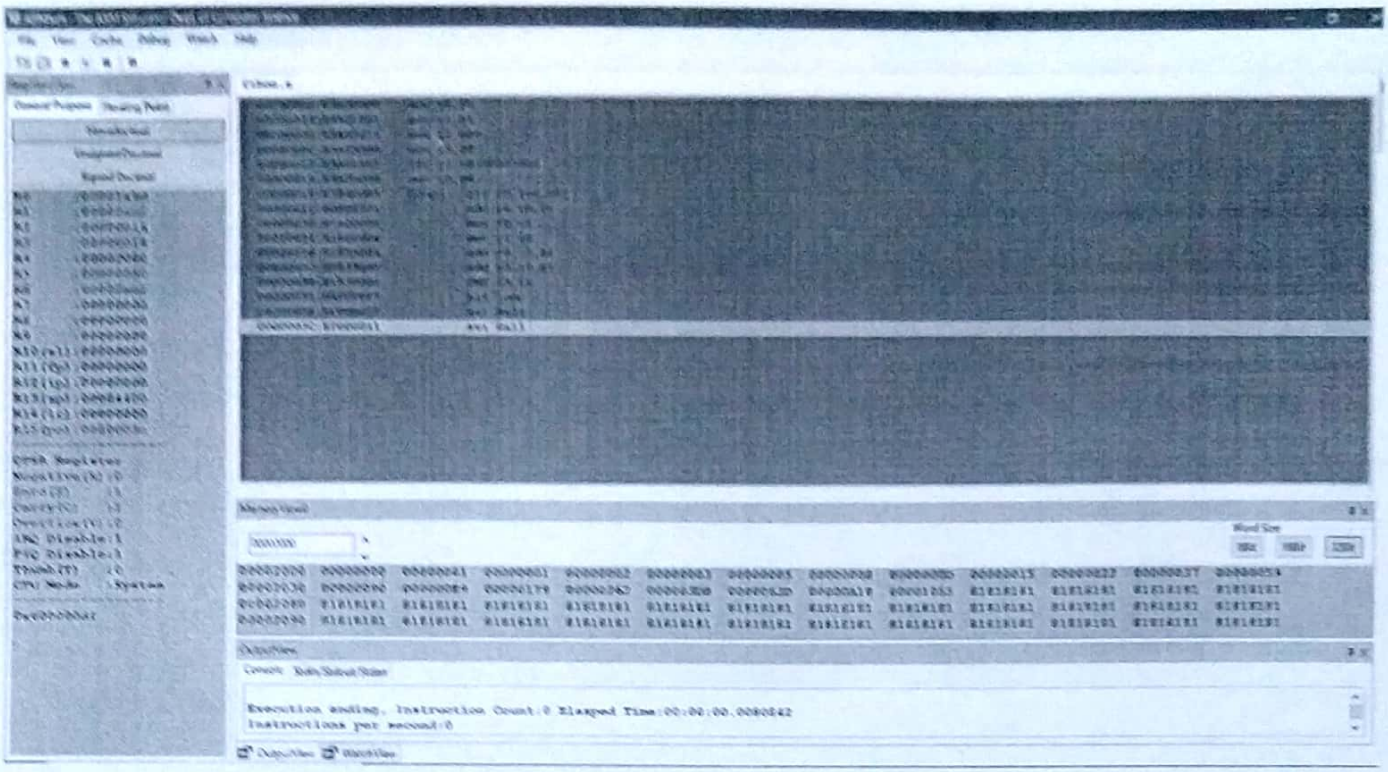
```
Str r6, [r10, #20]
mov r3, #'y'
mov r8, #4
mov r4, #'n'
mov r1, #16
ldr r10, =0x00002000
mov r5, #4
loop: ldr r2, [r10, r5]
      sub r8, r8, #1
      add r5, r5, #4
      cmp r1, r2
      beq print
      cmp r8, #0
      beq print
      bne loop
print: str r4, [r10]
       ldr r0, [r10]
       swi 0x00
       b end
print: str r3, [r10]
       ldr r0, [r10]
       swi 0x00
end swi 0x11
```

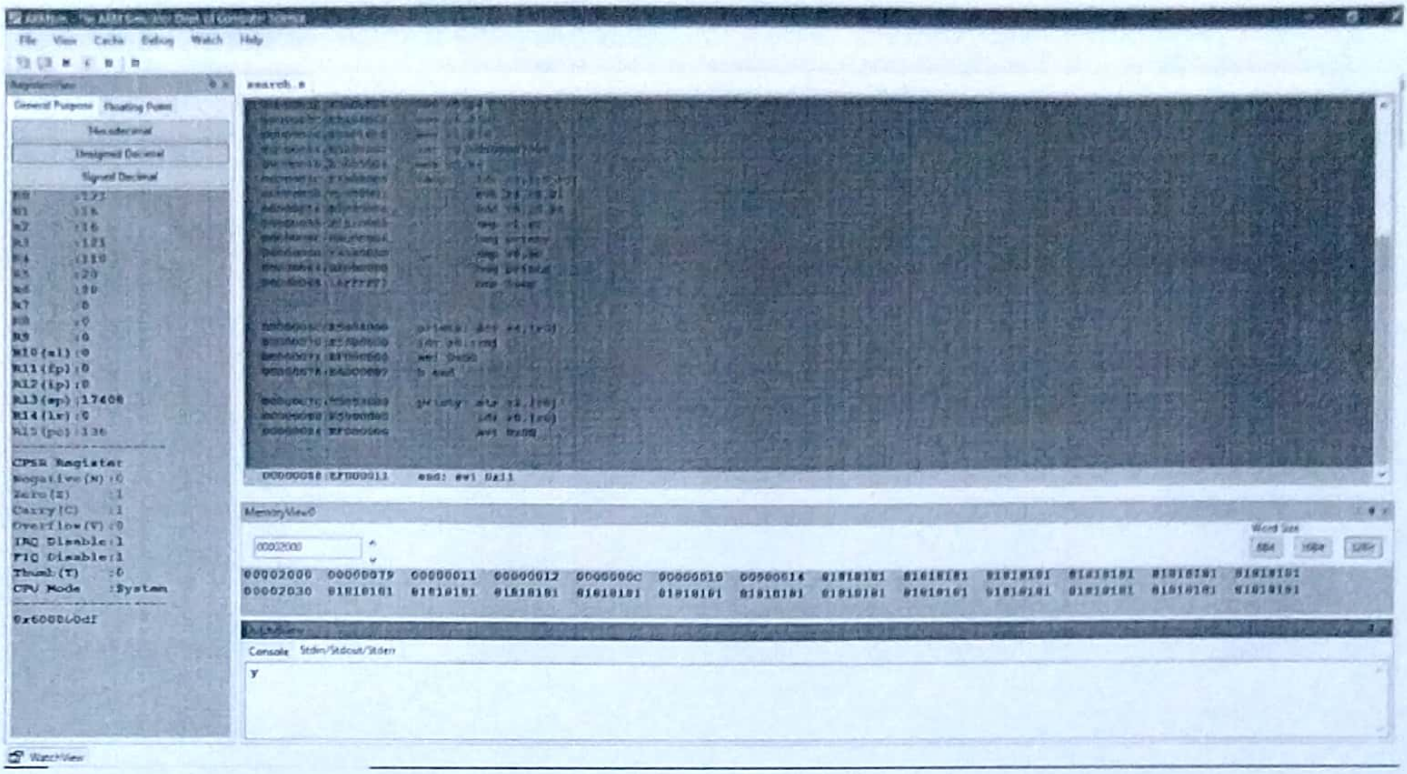
(3) Reverse an array.

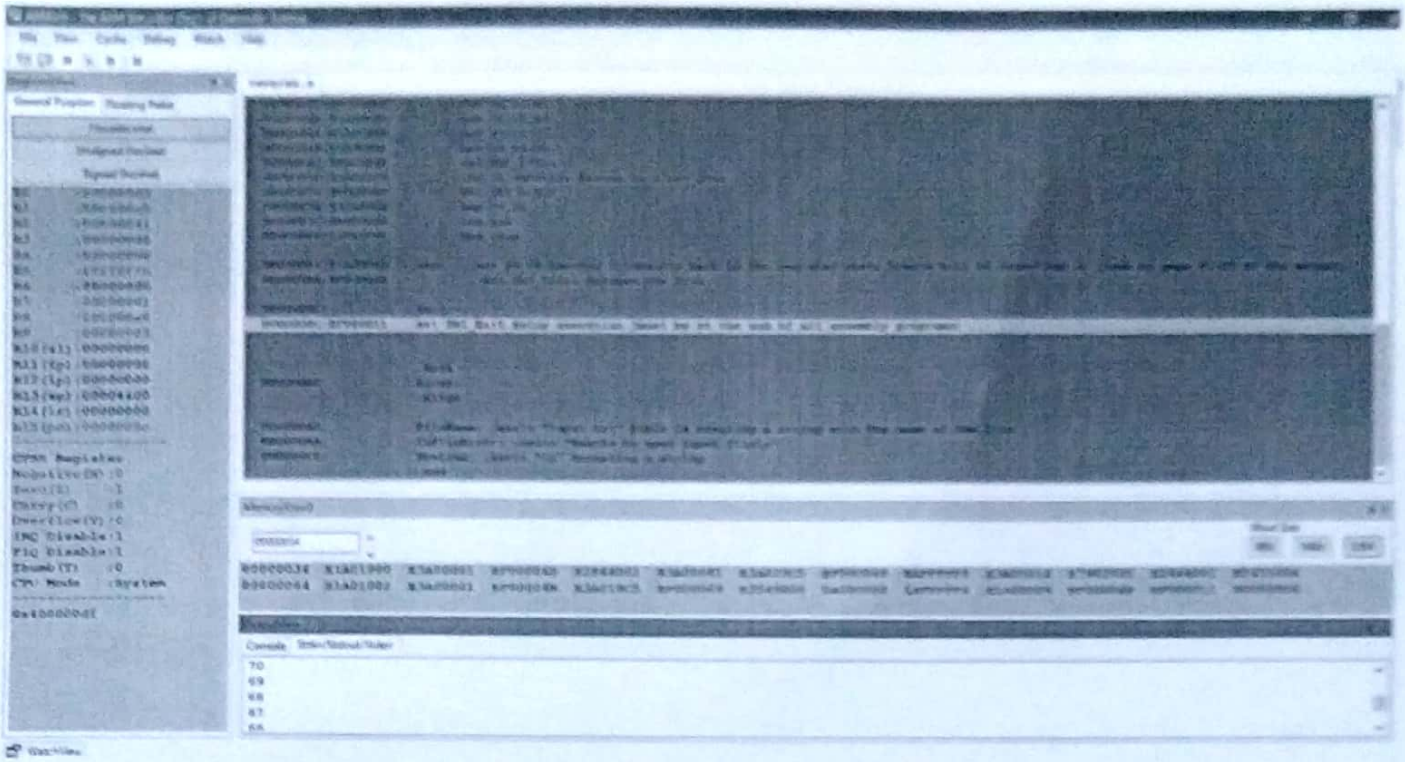
```
• Eqn SWI-open, 0x66
• Eq  SWI-clos, 0x68
• Eq  SWI-print, 0x6b
• Eq  SWI-RdInt, 0x6c
• Eqr Student, 1
• eq  SWI-PrStr, 0x69
• eq  SWI-Exit, 0x11
 global_start
 text
 LDR r0, =Filename
 mov r1, #0
 SWI SWIopen.
 bcs Exit
 mov r9,r0
 mov r5,#0
Loop start:
mov r5, #Student
mov r0, r9
 LDR r8, =Array
 bcs afterloop
 str r0, [r2,r5]
  add r5,r5,#4
  mov r1, r0
  mov r0, #student
  str SWI-print
  add r4,r4,#1
```

after loop:

```
mov r5,#20
loop: LDR r12,[r8,r5]
      SUB r4, r4,#1
      SUB r5, r5,#4
       mov r1, r2
        beq end
        beq loop
End: mov r0, r9
       SWI_close
Exit: SWI SWI Exit.
```







Ramaiah Institute of Technology
(Autonomous Institute, Affiliated to VTU)

Department of CSE

Programme: B.E **Term: Jan to May 2019**
Course: Computer Organization **Course Code: CS45**

Activity VI: ~~Designing memory system using Logisim simulator~~ Designing an ALU to perform Arithmetic and logical functions using Logisim Simulator

Name: MANOJA.U	**Marks:** /10	**Date:**
USN: 1MS18CS068	**Signature of the Faculty:**	

Objective: ~~To simulate the writing operation of memory~~ To simulate the working of Arithmetic and Logical unit using Simulator.

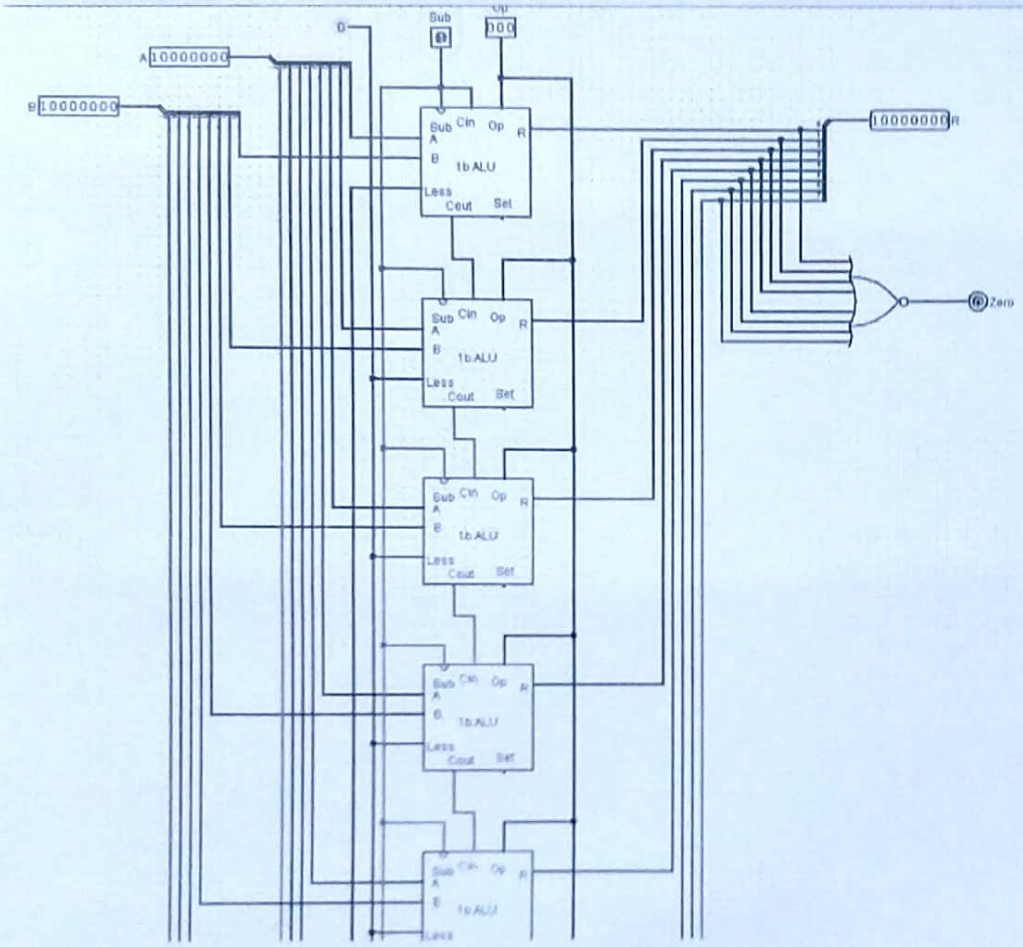
Simulator Description: Logisim is an educational tool for designing and simulating digital logic circuits. With its simple toolbar interface and simulation of circuits as you build them, it is simple enough to facilitate learning the most basic concepts related to logic circuits. With the capacity to build larger circuits from smaller sub circuits, and to draw bundles of wires with a single mouse drag, Logisim can be used (and is used) to design and simulate entire CPUs for educational purposes.

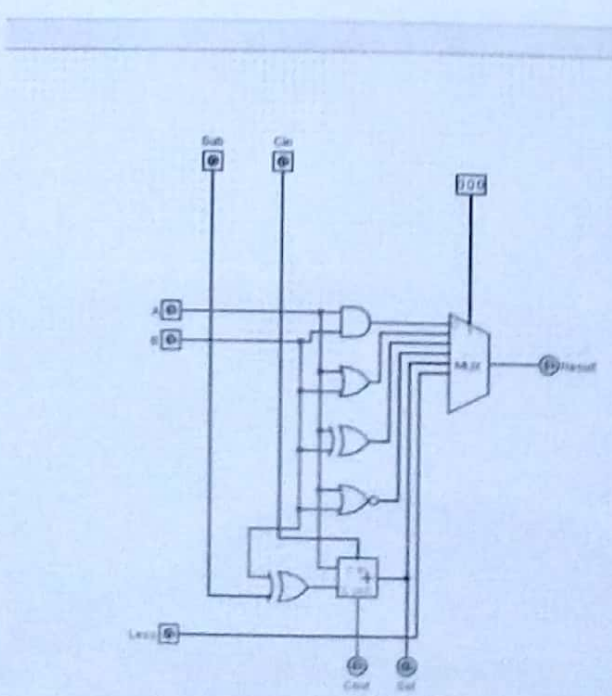
Activity to be performed by students:

List out the steps in designing memory system

1. Add the two i/ppins . Name them A and B
2. Add OR, and, ex-OR, not gates and a 1-bit adder.
3. Connect the A's and B's of all the gates to their respective pins.
4. Add an output pin and name it Result
5. Add a 1-bit multiplexer with 3 select bits.
6. Connect outputs of all the gates to the mux
7. Connect 3-bit input pin to mux
8. Add I/P pin to Cin, and output pin to Cout.
9. Add an ex-OR gate. Connect it's O/P to Cout. The first i/p must to connected B and the second to another i/p pin lab
10. Add another i/p and name it Sel. Connect it to the mux
11. Add an output pin and name it Set, Connect it to the multiplexer O/P of adder unit

=> SNAPSHOTS





Computer Organization Lab

Activity VI: Designing memory system using Logisim simulator.

Name: MAMOTA.V	**Date:**
USN: 1MS18CC068	**Signature of the Faculty:**

Objective: To simulate the writing operation on memory.

Simulator Description: Logisim is an educational tool for designing and simulating digital logic circuits. With its simple toolbar interface and simulation of circuits as you build them, it is simple enough to facilitate learning the most basic concepts related to logic circuits. With the capacity to build larger circuits from smaller sub circuits, and to draw bundles of wires with a single mouse drag, Logisim can be used (and is used) to design and simulate entire CPUs for educational purposes.

Activity to be performed by students:

List out the steps in designing memory system

1. Add a RAM with separate load and store selected
2. Add a counter and connect Q to A of the RAM
3. Add a controller buffer and connect its O/P to the RAM
4. Add a clock and connect to the I/P of the buffer
5. Add a TTY unit with 32 rows and columns. make the connections with RAM.
6. Add a 7-bit random number generator, connect Q to D.
7. Add another controlled buffer, connect it to TTY. Also add an i/p pin to the buffer.
8. Connect the output of the second buffer to the counter.
9. Connect a button to the counter.

=> SNAPSHOTS