CSCI 320-54 – Assignment 3

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Objectives

This program manipulates data in memory and registers.

Equipment Used

EASY 68K simulator

Procedure

After execution, you need to display the contents of memory to determine all that has happened. You need to turn in a copy of memory before and after execution as well as the TRace mode listing.

1. After you run your program from the editor, click Options > Log Output.
2. Under Log Output:
    a. Specify your Log File name and path
    b. Select Instructions, Registers and Memory
    c. Specify Memory Range and Bytes
    d. Specify your output log file name and path
    e. Select Text only & click ok.
3. Do: Run > Log Start > Auto Trace.
4. The 2 output files will be saved on the path that you have mentioned above. Right-click and open as a text file and you should be able to see your trace through registers and addresses, and memory.

New Operations Learned

Trace mode.
MOVE.B
MOVE.L
MOVE.W
LEA.L
DC.W
DC.L
EQU

Program Description

This program initializes memory locations at specific values and sets up registers with initial contents. Then, it executes a sequence of instructions, each manipulating data in memory and registers.

SOURCE CODE

```
*-----------------------------
* Title      : Lab 2.c
* Written by : Thomas Hoerger
* Date       : 2/10/2024
* Description:
*-----------------------------
    ORG    $1000
* Initialize memory
MEMORY_START EQU $2518
MEMORY_END   EQU $2544

    DC.W 4433
    DC.W 4241
    DC.W 0000
    DC.W 0000
    DC.W 2553
    DC.W 0000
    DC.W $01EF
    DC.W $ABCD
    DC.W 5476
    DC.W $CC22
    DC.W $FF34
    DC.W $12FF
    DC.W $A267
    DC.W $1FEE
    DC.W $FFFF
    DC.W $FFFF
    DC.W $0100
    DC.W 0000
    DC.W $ABCD
    DC.W $FFFF
    DC.W 0000
    DC.W 0000

* Initialize registers
A3_START EQU $A3
A4_START EQU $A4
A6_START EQU $A6
D3_START EQU $D3
D5_START EQU $D5
D6_START EQU $D6

    ORG A3_START
A3: DC.L $002468FA
    ORG A4_START
A4: DC.L $00002544
    ORG A6_START
A6: DC.L $00002518
    ORG D3_START
D3: DC.L $00000000
    ORG D5_START
D5: DC.L $FFFFFFFF
    ORG D6_START
D6: DC.L $00000000
    |
```

```
START:
    MOVE.B 3(A6), D3        ; Instruction 1
    MOVE.W 4(A4), 6(A6)     ; Instruction 2
    MOVE.L (A6)+, D5        ; Instruction 3
    MOVE.W (A4)+, $002522   ; Instruction 4
    MOVE.B $00252E, -(A4)   ; Instruction 5
    LEA.L $00252A, A3       ; Instruction 6
    MOVE.W (A3), D6         ; Instruction 7

    SIMHALT             ; halt simulator


    END    START        ; last line of source
```

Figures 1 and 2 show the code properly entered in the simulator.

Results

After Execution of the program:

```
EASy68K execution log file: 2/10/2024 12:45:43 PM


00002540: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ----------------

D0=00000000 D4=00000000 A0=00000000 A4=00000000    T_S__INT___XNZVC
D1=00000000 D5=00000000 A1=00000000 A5=00000000 SR=0010000000000000
D2=00000000 D6=00000000 A2=00000000 A6=00000000 US=00FF0000
D3=00000000 D7=00000000 A3=00000000 A7=01000000 SS=01000000
PC=000000DA  Code=162E 0003              Line=   59      MOVE.B 3(A6), D3        ; Instruction 1

00002540: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ----------------

D0=00000000 D4=00000000 A0=00000000 A4=00000000    T_S__INT___XNZVC
D1=00000000 D5=00000000 A1=00000000 A5=00000000 SR=0010000000001000
D2=00000000 D6=00000000 A2=00000000 A6=00000000 US=00FF0000
D3=000000FF D7=00000000 A3=00000000 A7=01000000 SS=01000000
PC=000000DE  Code=3D6C 0004 0006         Line=   60      MOVE.W 4(A4), 6(A6)     ; Instruction 2

00002540: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ----------------

D0=00000000 D4=00000000 A0=00000000 A4=00000000    T_S__INT___XNZVC
D1=00000000 D5=00000000 A1=00000000 A5=00000000 SR=0010000000001000
D2=00000000 D6=00000000 A2=00000000 A6=00000000 US=00FF0000
D3=000000FF D7=00000000 A3=00000000 A7=01000000 SS=01000000
PC=000000E4  Code=2A1E                   Line=   61      MOVE.L (A6)+, D5        ; Instruction 3

00002540: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ----------------

D0=00000000 D4=00000000 A0=00000000 A4=00000000    T_S__INT___XNZVC
D1=00000000 D5=FFFFFFFF A1=00000000 A5=00000000 SR=0010000000001000
D2=00000000 D6=00000000 A2=00000000 A6=00000004 US=00FF0000
D3=000000FF D7=00000000 A3=00000000 A7=01000000 SS=01000000
PC=000000E6  Code=31DC 2522              Line=   62      MOVE.W (A4)+, $002522   ; Instruction 4

00002540: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ----------------

D0=00000000 D4=00000000 A0=00000000 A4=00000002    T_S__INT___XNZVC
D1=00000000 D5=FFFFFFFF A1=00000000 A5=00000000 SR=0010000000001000
D2=00000000 D6=00000000 A2=00000000 A6=00000004 US=00FF0000
D3=000000FF D7=00000000 A3=00000000 A7=01000000 SS=01000000
PC=000000EA  Code=1938 252E              Line=   63      MOVE.B $00252E, -(A4)   ; Instruction 5

00002540: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ----------------

D0=00000000 D4=00000000 A0=00000000 A4=00000001    T_S__INT___XNZVC
D1=00000000 D5=FFFFFFFF A1=00000000 A5=00000000 SR=0010000000001000
D2=00000000 D6=00000000 A2=00000000 A6=00000004 US=00FF0000
D3=000000FF D7=00000000 A3=00000000 A7=01000000 SS=01000000
PC=000000EE  Code=47F8 252A              Line=   64      LEA.L $00252A, A3       ; Instruction 6

00002540: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF ----------------
```

Figure 3 shows trace through registers and addresses, and memory after using auto trace.

Pencil Paper Part:

After Execution:

Registers: Content

A3: 00252A

A4: 00002542

A6: 0000251C

D3: 00000033

D5: 44334433

D6: 5476

Memory: Content

0000251B: 4433

00252A: 5476

00002522: A267

00002542: 0100

00002548: A267

Figure 4 is the pencil paper potion of the lab I did it in word.