

EECS 388: Computer Systems and Assembly Language

Lab 3

Assembly Language: Shifting and Addition with Carry

Objectives:

- A) To understand the use of the carry flag for shifting and addition.
- B) To learn to manipulate numbers that are greater than 8 bits in size.

Program Template:

For this lab, use the following program template for your program.

```
;Your Name
;EECS 388
;Lab Section X
;Lab 3

;Start of program code in memory.
    ORG  $4000

;Problem 1:
    --- Problem 1 code here.

;Problem 2:
    --- Problem 2 code here.

;Problem 3:
    --- Problem 3 code here.

;Software interrupt.
    SWI
```

Note: All three problems should be combined into one program. You will therefore demonstrate all three problems to the GTA with one program execution.

Problem 1:

There are two 8-bit numbers in locations starting at address 4100 (use the monitor to set these numbers). Write a program to arithmetic shift the first one to the right, add the shifted number to the second one, and store the result in location 4110.

Problem 2:

There are two 24-bit numbers stored in consecutive locations starting at address 4120 (use the monitor to set these numbers). Write a program to arithmetic shift the first one to the right, and store it in locations starting at 4130. Then add the shifted first number to the second original number, and store the result in locations starting at 4140.

Problem 3:

Copy the two original 24-bit numbers in problem 2 into consecutive memory locations starting at 4150, and copy the addresses of the original numbers into consecutive locations starting at 4160.

REQUIRED: Demonstrate your program to the GTA using the following procedure:

1. Use block fill to load memory locations 4100 – 416F with zeros.
2. Load your program onto the board using hyperterminal.
3. The GTA will then give you the two 8-bit numbers and the two 24-bit numbers, which you will then enter into memory using the monitor.
4. Execute the program, and display memory locations starting at 4100.

Report Format and Grading:

Following the report format in your syllabus, include the following in your report:

1. Your name, student number, lab project number and title, course number, lab section number, and date.
2. Description of the lab in your own words. What did you learn? If your code did not work in the lab, explain why. (45% of report grade)
3. The source code for your program, containing all three problems. Be sure to include comments in your source code. (45% of report grade)
5. A short evaluation of the lab. What did you like about the lab? What could be improved? (10% of report grade)