ECE 2510

Lab 6

Objectives:

• Practice loops
• Practice shift instructions
• Read the lab instructions and submit a prelab prior to attending the lab

Task 1

Write ARM assembly instructions to perform shift right, shift left, rotate right, and rotate left for the following values: 0xFFFFFFFF, 0xC5C5C5C5, 0xA3A3A3A3, 0x2F362F362, 0xD3E7D3E7.

Write the assembly code.
• Notice the NZVC flag changes and record them.
• Take screenshots of the register values after each operation

Task 2

Write a program that shifts each element of an array that consists of 8 64-bit elements to the left once. Use a loop and an arithmetic shift instruction. Consider the following array. 0xFC3FFC3FFC3FFC3F, 0xA2A2A2A2A2A2A2A2, 0xFFFEFFFEFFFEFFFE, 0xC523C523C523C523, 0x36AD36AD36AD36AD, 0xFFFFFFFFFFFFFFFF, 0x041D4235041D4235, 0x2FCC2FCC2FCC2FCC
• Draw a flowchart of your program.
• Write the assembly code.
• Notice the NZVC flag changes and record them.
• Repeat the program shifting the array elements arithmetically 1-bit to the right. Hint: Use a combination of shift and or instructions.

Task 3

Write an ARM program that executes the following equation:
F [i] = s *(z[i]^2 + z[i] +r)
where z is an input array of 32-bit unsigned 10 elements, s = 0.25, and r is an integer constant.

• Draw a flow chart of the program before you start coding.
• Use loops and store the result array f in a memory location different from z.
• Provide screenshots of the memory addresses of the arrays stored.
Hint: pay attention to the array sizes

Task 4

Write an ARM assembly code equivalent to the following C code. The variables should be stored in the stack. Count the number of cycles your program takes by hand, then simulate your program and screenshot the final value of the variables in memory. Find the number of cycles for your program in E-cycles. Pay attention to the size of each variable.

Char A,B,C;

Int D;

A = 2;
B = 6;
C= -10;
D= (A + B)*C

Submissions

Task 1

- ASM code
- Screenshots taken of the NVCZ flags

Task 2

- ASM code
- Screenshots
- NZVC flags screenshots

Task 3

- ASM code
- Flowchart
- Memory screenshots

Task 4

- ASM code
- Screenshot of cycles taken