# Exercise 2.18

- For these problems, the table holds some C code. You will be asked to evaluate these C code statements in MIPS assembly code.

| | |
|---|---|
| **a.** | for(i=0; i<a; i++)<br>a += b; |
| b. | for(i=0; i<a; i++)<br>for(j=0; j<b; j++)<br>D[4*j] = i + j; |

- 2.18.1 [5] <2.7> For the table above, draw a control-flow graph of the C code.
- 2.18.2 [5] <2.7> For the table above, translate the C code to MIPS assembly code. Use a minimum number of instructions. Assume that the values of a, b, i, and j are in registers $s0, $s1, $t0, and $t1, respectively. Also, assume that register $s2 holds the base address of the array D.
- 2.18.3 [5] <2.7> How many MIPS instructions does it take to implement the C code? If the variables a and b are initialized to 10 and 1 and all elements of D are initially 0, what is the total number of MIPS instructions that is executed to complete the loop?

# Exercise 2.18 (cont.)

- For these problems, the table holds MIPS assembly code fragments. You will be asked to evaluate each of the code fragments, familiarizing you with the different MIPS branch instructions.

| | |
|---|---|
| **a.** | addi $t1, $0, 50<br>LOOP: lw $s1, 0($s0)<br>add $s2, $s2, $s1<br>lw $s1, 4($s0)<br>add $s2, $s2, $s1<br>addi $s0, $s0, 8<br>subi $t1, $t1, 1<br>bne $t1, $0, LOOP |
| b. | addi $t1, $0, $0<br>LOOP: lw $s1, 0($s0)<br>add $s2, $s2, $s1<br>addi $s0, $s0, 4<br>addi $t1, $t1, 1<br>slti $t2, $t1, 100<br>bne $t2, $s0, LOOP |

2.18.4 [5] <2.7> What is the total number of MIPS instructions executed?

2.18.5 [5] <2.7> Translate the loops above into C. Assume that the C-level integer i is held in register $t1, $s2 holds the C-level integer called result, and $s0 holds the base address of the integer MemArray.

2.18.6 [5] <2.7> Rewrite the loop to reduce the number of MIPS instructions executed.

# Exercise 2.18 (cont.)

- Home work: The Class is divided into groups (Given Student list). Upper half do the part 1 (2.18.1-2.18.3) and Lower half do the part 2 (2.18.4-2.18-6).
- Sent by Email with file attched: "Name-Student code" as file name.
- Deadline: til Midnight Tuesday (22nd March 2016)