**Lab 1 Report**

**COMP3350**

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The purpose of this lab was to swap the position of 2 arbitrary elements in an array. Using the template provided I made modifications for readability and functionality. The following is a breakdown of my code and thought process.

**Code Breakdown:**

Establish Variables. I created an array and 2 integers (word). I also assigned their values. The words n, and m, are arbitrary and can be changed.

.data

A: .word 7, 42, 0, 27, 16, 8, 4, 15, 31, 45 Explanation:

n: .word 3 name: .word value

m: .word 6

Setup Main. This is just setup so the following code runs in main.

.text

.globl main

main:

Load Variables into registers. This just makes it so operations can be performed on the variables. $a0, $a1, and $a2 are all register addresses.

la $a0, A la(load address), this is necessary because

lw $a1, n there are multiple elements to be stored

lw $a2, m lw(load word) loads into register

Calculate offset for N. This takes the binary of word n and shifts its 1’s left 2 spaces. And then it takes this new offset and adds it to the address of the array to find a specific element in the array. ($a1 = n)

sll $t1, $a1, 2 sll(shift left logical)

add $t1, $a0, $t1 adds a0 and t1 together and stores in t1

Calculate offset for M. This does the same thing for m. It just finds the address of the input in the array. ($a2 = m)

sll $t2, $a2, 2 sll(result, target, shift amount)

add $t2, $a0, $t2

Load the actual number of addresses in array. This converts and stores the address back into the actual number in it. For purposes of swapping them.

lw $t4, 0($t1) lw(load word), 0(temp1) = 3

lw $t5, 0($t2) lw(load word), 0,(temp2) = 6

Swap the elements. This literally takes the actual number we just set and swaps with the previous positions where the address was stored.

sw $t4, 0($t2) sw(swap) from, 0(to)

sw $t5, 0($t1)

Result. The result of all this code is that the array will now read:

Original: 7, 42, 0, 27, 16, 8, 4, 15, 31, 45

Final: 7, 42, 0, 4, 16, 8, 27, 15, 31, 45

Screenshots Below

**Screenshots Showing results:**

**Before Run: Notice the array values in the data segment**

**A screenshot of a computer

Description automatically generated**

**After Run: Notice the array values in the data segment changed**

**A screenshot of a computer

Description automatically generated**

**Registers after run:**

**A screenshot of a computer

Description automatically generatedA screenshot of a computer

Description automatically generated**