Program3 Report

Section 1. Project description

The project requires multiple tasks to translate Java code into MIPS assembly language. The program accepts ten integers from the user. After the acceptance inputs, the program shows ten integers and displays the four menus to call the method to manipulate these integers. The user input between 1 and 4 to invoke corresponding methods. Methos 1 asks the user to index position and replaces the number, method 2 replaces the maximum integer in the given integer list, and method 3 returns the minimum integer in the given integer list. After processing methods 1, 2 or 3, the method displays the current integer list. And the user input 4 leads the program to invoke method 4 to calculate the total sum and product with ten integers from the array and displays the result.

Section 2. Project specification

Accepting ten integers from the user requires allocating spaces for ten integers with an array and initializing the index to ensure pointer arithmetic. Otherwise, a memory access error occurred. It needs to pay extra attention to allocate enough space for ten integers and index increment with address calculation. Also, the program needs to use the loop and branch condition to control user choice and method calls. Write branch case separately, and jumping correct branch case and loop exit is another primary concept for this assignment.

Section 3. Testing methodology

It is a possible testing method to input random numbers and check my display of integers, and the result of the total sum and total product is accurate. And in the loop section, it gives numbers between 1 and 4 to choose several times the same method to ensure the output is expected integers. Especially the last index needs to confirm whether pointer arithmetic is out of the boundary. My first program method mistakenly calculated offset 1, and the pointer dereferences an integer, the unexpected index next to my desired index. At the same time, if the user inputs a random number and character, it checks how the loop backs to the original menu.

Section 4. Lessons learned

The program is challenging for me because of using an array, branch condition, and loop as a new tool. Even though these concepts are familiar in Java programming, I realize it is hard to control logical conditions. Thankfully, I have studied C++ before and could see how memory allocation and pointer arithmetic happened during run time. After this assignment, I understood the program to handle the register to store data with the operation. However, I want to avoid duplicated codes, such as printing integers from an array. Ideally, I can write a function and invoke it as I need to use it, which allows me to omit redundant code. Then I can organize my code cleaner and raise readability.