

Homework #6 Computer Organization

Due: March 30 (Saturday) by 11:59 PM

Write a MIPS assembly language program to solve the following problem.

For a set of integers stored in an `array`, calculate the sum of the positive numbers and the sum of the negative numbers. The program should store these numbers in memory variables: `positiveSum` and `negativeSum`. Numbers should be read from the array one at a time with a zero value (0) being used to signal the end of data (the zero value is acting as a "sentinel" value).

For example, if your array has the values: 10_{10} -5_{10} -30_{10} 15_{10} 20_{10} -1_{10} -26_{10} -18_{10} 0_{10} , then your program should update the `positiveSum` and `negativeSum` variables to 45_{10} and -80_{10} , respectively.

For example, your `.data` section for the array values: 10_{10} -5_{10} -30_{10} 15_{10} 20_{10} -1_{10} -26_{10} -18_{10} 0_{10} , will be:

```
.data
array:          .word 10 -5 -30 15 20 -1 -26 -18 0
positiveSum:    .word 0
negativeSum:    .word 0

.text
.globl main
main:
    # MIPS Assembly language program here

    li $v0, 10    # system call to exit the program
    syscall
```

Before you start writing MIPS assembly language, write a high-level language algorithm. THEN, translate it to MIPS assembly language.

You can download the MIPS simulator at: <http://sourceforge.net/projects/spimsimulator/files/>
Select the latest version of QtSpim for either Windows, MAC or Linux. Alternatively, you can download the MARS (MIPS Assembler and Runtime Simulator) which is a .jar so it does not need to be installed at: <http://courses.missouristate.edu/KenVollmar/mars/>

You should submit your homework via the Internet by following the directions at:

<http://www.cs.uni.edu/~fienup/cs1410s19/homework/submissionDirections.htm>

You need to put the following files in a `hw6` folder and zip the folder to create a `hw6.zip` file. (On Windows you can create a .zip file by right-clicking on the `hw6` folder and selecting `Send to|Compressed (zipped) folder`) Your `hw6.zip` should contain the files:

- the MIPS assembly language program, e.g., `hw6.s` from any text-editor (e.g., WordPad)
- a window capture of the QtSpim simulator **after running** your assembly language program with the array values: 10_{10} -5_{10} -30_{10} 15_{10} 20_{10} -1_{10} -26_{10} -18_{10} 0_{10} . **Make sure the array, `positiveSum` (showing 45_{10}), and `negativeSum` (showing -80_{10}) are visible in the data section of the screen capture.** You can capture this window by (1) right-clicking anywhere in the window to make it the "currently active" window, (2) while holding down the `<Alt>` key, press the `<PrtScn>` key to capture the window into the Window's clipboard, and (3) open some word processor (Word, Open Office, etc.) and paste the image into the document. Add your name to this document before saving it.