

CSE31 : Lab #5 – MARS/MIPS

We will start using MARS to do our simulation of MIPS programs. It is easier and faster to work in a simulator where there is multitude of debugging options. It is similar to working within gdb to help write your programs. If you don't have it already then download the latest version of MARS MIPS simulator.

Overview

Assembly programs are in files with `.s` extensions. The program must contain a label `"main:"` (similar to the main function in C programs) and end with a `"addi $v0,$0,10"` followed by a `"syscall"`. Unlike normal functions which use `"jr $ra"` to return main is special and must transfer control back to the operating system when it is done rather than just returning.

(Exercise) Start with MARS

Load *fib.s* into MARS and assemble the code. Note that Fibonacci number calculation is as follows :

```
fib[0] = 0;  
fib[1] = 1;  
fib[n] = fib[n-1] + fib[n-2];
```

Q1. What do the `.data`, `.word`, `.text` directives mean (i.e., what do you put in each section)?

Q2. How do you set a breakpoint in MARS? Set breakpoint on line 15, give the command in your answer.

Q3. After your program stops because of a breakpoint, how do you continue to execute your code? How do you step through your code?

Q4. How can you find out the contents of a register? How do you modify the value of a register?

Q5. At what address is `n` stored in memory? Calculate the 13th fib number by modifying this memory location.

Q6. line 18 and 20 use `syscall` instruction. What is it and how do you use it?

(Exercise) Create `sum.s`

Write a piece of MIPS code that, given values in `$s0` and `$s1`, put into the `$t*` registers the following:




```
$t0 = $s0
$t1 = $s1
$t2 = $t0 + $t1
$t3 = $t1 + $t2
...
$t7 = $t5 + $t6
```

In other words, for each register from `$t2` to `$t7`, it stores the sum of the previous two `$t*` register values. The `$s0` and `$s1` registers contain the initial values.

Don't **set** the value of `$s0` and `$s1` in your code. Instead, learn how to set it manually with MARS. Save your code into `sum.s`.

What to hand in

When you are done with this lab assignment, you are ready to submit your work. Make sure you have done the following ***before*** you press Submit:

-  Answers for each line of `fib.s` using **Q1-Q6**.
 -  Attach created `sum.s`
 -  List of collaborators
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