CSE31 : Lab #8 – Floating Point

Overview

These exercises will examine how computers store integer and floating point values. Relevant material is in P&H 3.3-3.5, 3.8 and 3.10 .

Recall that the single precision floating point number is stored as:
SEEE EEEE EIII IIII IIII IIII IIII IIII

where: S is the sign bit, 0 for positive, 1 for negative E is the exponent, bias 127 I is the significant, with an implicit 1

For example, the floating point representation of 1.0 would be 0x3F800000.

(Exercise) Create carry.s

Find the shortest sequence of MIPS instructions to determine if there is a carry out from the addition of two registers(integer), say $t3 and $t4. Place a 0 or 1 in register $t2 if the carry out is 0 or 1, respectively. (This can be done in just two instructions). Verify that your code works for the following values:

Operand	Operand	Carry out?
0x7fffffff	0x80000000	no
0xffffffff	0	no
0xffffffff	1	yes

(Exercise) Floating Points

Using fp.s given in the assignment page which allows you to experiment with adding floating point values. It leaves the output in $f12 and also $s0, so you can check and examine the hex representation of the floating point value by printing out $s0.

Q1. Find a positive floating point value x, for which x+1.0 = x. Verify your result using fp.s and tell us the hex representation of x.

Q2. Find the **smallest** positive floating point value x for which x+1.0 = x. State the hex representation of x.

Q3. Determine a set of positive floating point numbers such that adding these numbers in a different order can yield a different value. You can do this using only three numbers. (Hint: Experiment with adding up different amounts of the x value you determined in Q2, and the value 1.0).

Q4. Based on your answer for Q3, do floating points obey associative rule like integers?

(Exercise) Create fp3.s

Based on fp.s, write a program to add three values in different orders to show the resulting sum.

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 to Q1-Q4.
- Attach carry.s and fp3.s
- List of collaborators
