Lab 2 for CSE121, Spring'23

Due Date: 04/19/23

This lab is worth 20 Points. Project check-off takes place during the TA section. The overall objective of this lab is to use GDB and interface with the humidity/temperature sensor.

It is VERY important to submit the report.pdf. If this file is missing, you lose ½ of the points.

Lab2.1: print value with GDB (10 points)

The class google drive has a "lab2_image.elf" file. You should upload it to the ESP32 board and run GDB with it.

Some things that you will need to "figure out".

- How can you upload an image from someone else (you do not have the source code, so you can not compile from the source). There are many ways to do this.
- How can I use gdb against a binary/image
- The code was compiled without debug info, so you have to look at the assembly. If you forgot the RISC-V function call convention. This explains it https://riscv.org/wp-content/uploads/2015/01/riscv-calling.pdf

What you have to do is to demonstrate that you run gdb (check-off in the lab) to obtain what the values passed the "compute" function (there are 3 values).

When the binary runs, it prints something like this (XXX value may change depending on your board):

…
Minimum free heap size: 286984 bytes
result of compute is XXX
result of compute is XXX
result of compute is XXX
…

The GDB is a bit "unstable". You may need to plug/unplug the board if you see openocd errors like this:
```
Error: Connect failed. Consider setting up a gdb-attach
```
Or this:
```
```

Error: failed read at 0x11, status=2
Error: extra data from bitq interface
```

To help you a bit, I used this gdbinit: (others are possible too)
```
target remote :3333
set remote hardware-watchpoint-limit 2
mon reset halt
flushregs
b compute
c
```

You do not need many gdb commands. For this lab, this guide (https://web.cecs.pdx.edu/~apt/cs491/gdb.pdf) is more than enough for debugging assembly with gdb.

The answer should be written in the report.pdf. It should be something like: (the values are wrong). Explain from what value and how you got the answer (justify the answer, do not just write the correct value)

Lab2.1
  Compute 1st argument is 502
  Compute 2nd argument is 303
  Compute 3rd argument is 404
```

Lab2.2: humidity and temperature (10 points)

In class lectures 2 and 3, we played (but not finished) reading the humidity sensor for the SHTC3. In this lab, you have to finish it.

The requirement is that it reads the temperature and humidity. It prints in C/F and % once every 2 seconds. Something like this (round to nearest)

```
Temperature is 20C (or 68F) with a 40% humidity
Temperature is 22C (or 72F) with a 42% humidity
Temperature is 20C (or 68F) with a 44% humidity
…
```

What/How to submit

Same instructions as lab1. Upload the zip with the code and report.pdf to Canvas.