

CS33, Spring 2020
Lab 0: Mini Data Lab
Assigned: Monday, March 30, Due: Friday, April 3 11:59PM

1 Introduction

Lab 0 is the warmup version of Lab 1: Data Lab. For this lab, you need to implement a single "programming puzzle" as described in Part B. The purpose of this warm-up assignment is to make sure all students:

1. can access their SEAS account remotely
2. are comfortable using basic Linux commands and programming editors
3. are familiar with Data lab structure and debugging techniques

2 Part A: Setup Your Environment

We will use the shared directory `/w/class.1/cs/cs33/csbin/` on SEASnet machine `lnxsr.v.seas.ucla.edu` to distribute the files needed for each lab. Log in to your account on SEASnet machine and start copying the folder `datalab0-handout` to your local directory using this command:

```
cp -r /w/class.1/cs/cs33/csbin/datalab0-handout .
```

This will make a copy of the handout folder in your current directory. The only file you will be modifying and turning in is `bits.c`. The `README` file contains additional documentation for each file in the folder. While you are expected to implement 8 puzzles in Lab 1, you will implement a single puzzle in Lab 0 just to get familiar with the SEASnet machine and Datalab infrastructure.

You could either code and debug on the SEASnet machine or copy the handout to your personal machine and code and debug locally. For either case, refer to **setupenvironment.pdf** for more information.

3 Part B: Get Familiar with Data Lab structure

As mentioned in Part A, you will only modify and hand in the `bits.c`. Looking at the file `bits.c`, you will notice a C structure `studentID` into which you should insert the requested identifying information about yourself. Do this immediately so that you do not forget.

Your assignment is to implement the function $\text{ezThreeFourths}(x) = (x * 3/4)$ (described in the class) using only *straightline* code (i.e., no loops or conditionals) and a limited number of C arithmetic and logical operators:

`! ~ & ^ | + << >>`

We have included some autograding tools in the handout directory — `btest`, `dlc`, and `driver.pl` — to help you check the correctness of your work.

- **btest:** This program checks the functional correctness of the functions in `bits.c`. To build and use it, type the following two commands:

```
make
```

```
./btest
```

Notice that you must rebuild `btest` each time you modify your `bits.c` file. Check the file `README` for documentation on running the `btest` program.

- **dlc:** This is a modified version of an ANSI C compiler from the MIT CILK group that you can use to check for compliance with the coding rules for each puzzle. The typical usage is:

```
./dlc bits.c
```

The program runs silently unless it detects a problem, such as an illegal operator, too many operators, or non-straightline code in the integer puzzles. Running with the `-e` switch:

```
./dlc -e bits.c
```

causes `dlc` to print counts of the number of operators used by each function. Type `./dlc -help` for a list of command line options.

Note: Depending on how you copied the handout directory into your local directory it is possible that some of the permission flags are reset. You may get an error: **Permission denied**. You can reset the execute permission flag by using the command:

```
chmod +x dlc
```

In general, you can reset the execute permission flag for any file using: `chmod +x <file-name>`

- **driver.pl**: This is a driver program that uses btest and dlc to compute the correctness and performance points for your solution. It takes no arguments:

`./driver.pl`

Your instructors will use driver.pl to evaluate your solution.

4 Handin Instructions

- Make sure it compiles, passes the dlc test, and passes the btest tests on the class machines, i.e. `lnxsrvc.seas.ucla.edu`.
- Make sure you have included your identifying information in your file bits.c.
- Don't include the `<stdio.h>` header file in your bits.c file, as it confuses dlc and results in some non-intuitive error messages. You will still be able to use `printf` in your bits.c file for debugging without including the `<stdio.h>` header, although gcc will print a warning that you can ignore.
- Remove any extraneous print statements.
- Submit your bits.c file to CCLE where indicated under Lab 0.