CSCI 2500 — Computer Organization
Homework 02 (document version 1.0) — Due September 28, 2021
It's All About Performance!

- This homework is due by the Midnight EDT on the above date via a Submitty gradeable.
- This homework is to be completed **individually**. Do not share your code with anyone else.
- Homework assignments are available approximately ten calendar days before they are due. Plan to start each homework early. You can ask questions during office hours, in the Submitty forum, and during your lab session.

This homework will be a two-parter. The first part will be a C coding problem. The second part of the assignment will be answering some performance questions from the textbook.

1 Coding Problem

Write a program that performs the following:

1. Prompt the user for a title for data. Output the title.

   Ex.

   ```
   Enter a title for the data:
   Number of Novels Authored
   You entered: Number of Novels Authored
   ```

2. Prompt the user for the headers of two columns of a table. Output the column headers.

   Ex.

   ```
   Enter the column 1 header:
   Author name
   You entered: Author name

   Enter the column 2 header:
   Number of novels
   You entered: Number of novels
   ```

3. Prompt the user for data points. Data points must be in this format: string, int. Store the information before the comma into a string variable and the information after the comma into an integer. The user will enter -1 when they have finished entering data points. Output the data points. Store the string components of the data points in an array of strings. Store the integer components of the data points in an array of integers.

   Ex.

```
Enter a data point (-1 to stop input):
Jane Austen, 6
Data string: Jane Austen
Data integer: 6
```

4. Perform error checking for the data point entries. If any of the following errors occurs, output the appropriate error message and prompt again for a valid data point.

   - If entry has no comma

     `Output: Error: No comma in string.`

   - If entry has more than one comma

     `Output: Error: Too many commas in input.`

   - If entry after the comma is not an integer

     `Output: Error: Comma not followed by an integer.`

   Ex.

```
Enter a data point (-1 to stop input):
Ernest Hemingway 9
Error: No comma in string.

Enter a data point (-1 to stop input):
Ernest, Hemingway, 9
Error: Too many commas in input.

Enter a data point (-1 to stop input):
Ernest Hemingway, nine
Error: Comma not followed by an integer.

Enter a data point (-1 to stop input):
Ernest Hemingway, 9
Data string: Ernest Hemingway
Data integer: 9
```

5. Output the information in a formatted table. The title is right justified with a width of 33. Column 1 has a width of 20. Column 2 has a width of 23.

   Ex.

```
        Number of Novels Authored
Author name         |       Number of novels
-------------------------------------------
Jane Austen         |                      6
Charles Dickens     |                     20
Ernest Hemingway    |                      9
Jack Kerouac        |                     22
F. Scott Fitzgerald |                      8
```

```
Mary Shelley        |                   7
Charlotte Bronte    |                   5
Mark Twain          |                  11
Agatha Christie     |                  73
Ian Flemming        |                  14
J.K. Rowling        |                  14
Stephen King        |                  54
Oscar Wilde         |                   1
```

6. Output the information as a formatted histogram. Each name is right justified with a width of 20.

   Ex.

```
         Jane Austen ******
      Charles Dickens ******************
    Ernest Hemingway *********
        Jack Kerouac **********************
 F. Scott Fitzgerald ********
        Mary Shelley *******
    Charlotte Bronte *****
          Mark Twain ***********
     Agatha Christie ************************************************************************
        Ian Flemming **************
        J.K. Rowling **************
        Stephen King ******************************************************
         Oscar Wilde *
```

Submit your program on Submtty as a single C file `hw02.c`.

2 Performance Questions

2.1 Overview

- Answer the questions from Exercises section in Chapter 1 of the textbook. If you are using zyBooks, these problems can be found at https://learn.zybooks.com/zybook/RPICSCI2500KuzminFall2021/chapter/4/section/15.
- **Show all work!**
- You MUST type up your answers. Handwritten solutions will not be accepted or graded, even if they are scanned into a PDF file.
- We recommend using LaTeX (https://www.latex-project.org/). If you have never used LaTeX, you might want follow some tutorial, like this one: https://www.latex-tutorial.com/tutorials/. There is a convenient online LaTeX editor called Overleaf (https://www.overleaf.com/) that has a free plan for students.
- Submit your answers for this part of the homework on Submitty as a single PDF file named `hw2.pdf`.
- This part of the homework will be manually graded by our TAs.

2.2 Problems:

1. **Textbook Problem 1.5 (all sub-parts)**
2. **Textbook Problem 1.7 (all sub-parts)**
3. **Textbook Problem 1.8 (all sub-parts)**
4. **Textbook Problem 1.10 (all sub-parts)**
5. **Textbook Problem 1.13 (1.13.1 and 1.13.2 only)**
6. **Textbook Problem 1.15 (all sub-parts)**

3 Submission and Grading Criteria

For this assignment, you will submit both your code and your answers to the textbook problems into the Submitty gradeable. As a reminder, your code **must** successfully compile and run on Submitty, which uses Ubuntu v20.04. Grading criteria for this assignment are as follows.

1. Code correctness for the coding problem: 40%
2. Textbook problems: 60%