



## Lab 5: Wonderful World World World of Iterative Statements in C

**Assigned:** Week of February 17, 2014

**Due:** At the end of the lab session

### I. Learner Objectives:

At the conclusion of this programming assignment, participants should be able to:

- 🐾 Apply "switch" statements
- 🐾 Compose iterative statements ("while", "for", and/or "do-while" statements)

### II. Prerequisites:

Before starting this programming assignment, participants should be able to:

- 🐾 Compose decision statements ("if" conditional statements)
- 🐾 Create and utilize compound conditions
- 🐾 Open and close files
- 🐾 Read, write to, and update files
- 🐾 Manipulate file handles
- 🐾 Apply standard library functions: `fopen ()`, `fclose ()`, `fscanf ()`, and `fprintf ()`
- 🐾 Declare and define functions

### III. Overview & Requirements:

This lab, along with your TA, will help you navigate through applying iterative statements in C. Once again we will take a modular approach to designing solutions to the problem below. As part of the lab you will need to decide which C selection structure and iterative structure is best suited for a particular function. You will have the option to use "if", "switch", "while", "do-while", and/or "for" statements for the below problem.

Labs are held in a "closed" environment such that you may ask your TA questions. Please use your TAs knowledge to your advantage. You are required to move at the pace set forth by your TA. Please help other students in need when you are finished with a task. You may work in pairs if you wish. However, I encourage you to compose your own solution to each problem. Have a great time! Labs are a vital part to your education in CptS 121 so work diligently.

### Tasks:

1. Write a program that completes the following requirements:
  - a. opens a file called "salaries.txt" for reading
  - b. reads in four quarterly dollar salary payments from the file
  - c. sums the quarterly payments
  - d. determines the tax bracket → < \$15,000 = low income; \$15,000 - \$200,000 = medium income;

- > \$200,000 = high income
- e. closes “salaries.txt”
- f. returns ‘l’ for low income, ‘m’ for medium income, and ‘h’ for high income

Use function where appropriate!

2. Read in an unknown number of real values from a file. Prompt the user to enter the name of the file that contains the real numbers to be read. Calculate the average of the real numbers. Output the average of the real numbers to a file called “output.dat”. Some skeleton code is provided for you below.

```
#include <stdio.h>

#define FILE_NAME_SIZE 30

int main (void)
{
    FILE *infile = NULL;
    FILE *outfile = NULL;
    char file_name[FILE_NAME_SIZE];
    /* Declare the rest of the variables that you need for this problem. */

    printf ("Enter the name of the file to read from: ");
    scanf ("%s", file_name);

    /* Fill in the code to open a file. Make sure you check that the file was open successfully. */

    while (!feof (infile))
    {
        /* Read in the real values. */
        /* Keep track of the number of values read and the sum of the values. */
    }

    /* Output average to a file named "output.dat". */
    /* Close your files. */

    return 0;
}
```

For the following problems: If you use a while ( ) loop to solve problem 3, use a for ( ) loop to solve problem 4 or vice versa.

3. Complete programming project 5 in Chapter 5 of the Hanly/Koffman Problem Solving & Program Design in C book. All input should be read from a file and output should be written to a file. Make sure that you design a function `greatest_common_divisor()` which calculates and returns the greatest common divisor of two integer numbers. Also, develop functions to read data from a file and to write data to a file.

Problem Statement:

The greatest common divisor (gcd) of two integers is the product of the integers' common factors. Write a program that inputs two numbers and implements the following approach to finding their gcd. We will use the numbers -252 and 735. Working with the numbers' absolute values, we find the remainder of one divided by the other.

$$252 / 735 = 0 \text{ R}252$$

Now we calculate the remainder of the old divisor divided by the remainder found.

$$735 / 252 = 2 \text{ R}231$$

We repeat this process until the remainder is zero.

$$252 / 231 = 1 \text{ R}21$$

$$231 / 21 = 11 \text{ R}0$$

The last divisor (21) is the gcd.

4. Write a program that reads all numbers from a file and determines the highest and lowest numbers. You must not use arrays to solve this problem! Write functions where appropriate.

#### IV. Submitting Labs:



You are not required to submit your lab solutions. However, you should keep them in a folder that you may continue to access throughout the semester. You should not store your solutions to the local C: drive on the Sloan 353 machines. These files are erased on a daily basis.

#### V. Grading Guidelines:



This lab is worth 10 points. Your lab grade is assigned based on completeness and effort. To receive full credit for the lab you must show up on time and continue to work on the problems until the TA has dismissed you.