

CSCI 340 - Operating Systems I

Assignment 1, Total Points 100

1 Objectives

You will be developing a C program that will allow you to gain experience in the following areas:

- **Unix Development:** This includes writing, compiling, executing, and debugging C programs.
- **Basic Programming Concepts:** This includes variable declaration, data types, arrays, pointers, operators, expressions, selection statements, looping statements, functions, and header files.
- **File Input/Output (IO):** This includes reading data from an ASCII text file, and displaying information to the console.
- **Structures:** This includes using the definition of a *struct* data type.

2 Provided Files

The four files listed below are provided to you:

- **vectors.txt:** Each line in this text file is a vector. Specifically, a vector is defined by a:
 1. magnitude, r , where $r \in \mathbb{R}$
 2. direction, θ , measured in degrees, where $\theta \in \mathbb{R}$

The format of the file is very simple, each line contains two decimal numbers separated by a comma. The first value is the vector magnitude, and the second value is the vector direction. **Please note:** If $\theta > 360$ or $\theta < -360$ then your code must properly convert this angle to be in the range $(-360, 360)$.

This text file currently defines 10 vectors, **but I may change during testing.**

- **utils.h:** Header file that defines a vector *struct* used in this assignment, and the function prototypes to be completed by you. **Please note:** You **may not** add new function definitions to this header file.
- **utils.c:** The file containing the **implementations** of the functions listed in *utils.h*. Having a different file for the implementation separates interface (the include file) from the implementation (the .c file).
- **hw1.c:** Source code file that includes a “stubbed out” version of the main function, and defines the libraries and constants used in this assignment. **Please note:** You **may not** remove, modify, or add (i.e. `#include`) additional libraries. The ones that are provided, are the only libraries needed for this assignment.

Please read the comments carefully and follow their instructions. The *hw1.c*, *utils.h* and *utils.c* files contain many comments that provide:

1. basic definitions
2. specific calculations
3. variable restrictions
4. basic step-by-step instructions

3 Todo

Using the *utils.h* file, you must provide working implementations within the corresponding *utils.c* file for the following function prototypes:

1. `int read(char* file_name, v_struct* p_vec_array, int n)`
2. `double x_component(v_struct* p_vector)`
3. `double y_component(v_struct* p_vector)`

For each function prototype listed above, numerous comments are provided in the header file to guide you in this assignment. Please read them carefully, they either provide basic step-by-step instructions, or basic calculations.

In the `hw1.c` file, you must fully implement the main function, i.e., `int main(int argc, char** argv)`. Please read the comments carefully, they provide the steps to be coded by you in the main method, and how the vector information is to be displayed in the console.

4 Collaboration and Plagiarism

This is an **individual assignment**, i.e. **no collaboration is permitted**. Plagiarism will not be tolerated. Submitted solutions that are very similar (determined by the instructor) will be given a grade of zero. Please do your own work, and everything will be OK.

5 Submission

Create a compressed tarball, i.e. `tar.gz`, that only contains the completed `hw1.c`, `utils.h` and `utils.c` files. The name of the compressed tarball must be your last name. For example, `leclerc.tar.gz` would be the correct name for me. Only assignments submitted in the correct format will be accepted (**no exceptions**). Submit the compressed tarball on Oaks in the Assignment/Dropbox folder for this assignment. You may resubmit the compressed tarball as many times as you like; Dropbox will only keep the newest submission.

Late assignments will not be accepted. Exceptions will only be made for extenuating circumstances, i.e. death in the family, health related problems, etc. The due date is listed on Oaks. Do not email the assignment after the due date, it will not be accepted.

I'm happy to answer questions about the assignment, but I cannot tell you how to code the solution. Additionally, code debugging is your job. You may use the debugger (gdb) or print statements to help understand why your solution is not working correctly.

6 Grading Rubric

For this assignment the grading rubric is provided in the table shown below.

Program Compiles	10 points
Program Runs with no errors	10 points
<code>read()</code> function implementation	30 points
<code>x_component()</code> function implementation	10 points
<code>y_component()</code> function implementation	10 points
<code>main()</code> function implementation	30 points