

CS150-01 Assignment 6  
Cheating Checker

**Date Assigned:** Wednesday, November 2, 2005

**Date Due:** Monday, November 14, 2005

**Points:** 65

### 1 Problem statement

This assignment involves writing a program that can aid in identifying students that have cheated on programming assignments by copying someone else's program and making only cosmetic changes to it. In order to perform this task, you will need to write a program that can analyze any C++ program. The analyzed program will be given an identification number to identify the program. This number should be constructed in such a manner that minor cosmetic changes to a program will result in a program that produces a number quite close to the number of the original program. Numbers from programs written by honest students should be quite different.

Use the following formula to produce the identification number:

$$\begin{aligned} \text{number} = & 5 * (\text{number of identifiers}) + \\ & 2 * (\text{number of integers}) + \\ & (\text{number of characters in all string literals}) + \\ & 4 * (\text{number of other symbols}) \end{aligned}$$

For this assignment, you will need to identify the number of identifiers, integers, characters in string literals, and other symbols where:

1. identifier - a letter followed by zero or more letters or digits (e.g. int, x, main, cout)
2. integer - a digit followed by zero or more digits
3. literal - a character string enclosed in quote (") marks (e.g. "hi there")
4. other - any character other than those mentioned above, which are not:
  - (a) part of a comment or
  - (b) whitespace

Your program must output the number of identifiers, integers, literals, comments, others, and the identification number.

You must use functions in this program. You must have at least five functions, one for each of the possibilities listed above (identifier, integer, literal, comment, and other). You will want to read the data file a character at a time. After identifying the character, call the appropriate function to find the end of the string of characters you are processing (i.e. the end of the identifier, the end of the integer, etc.).

Some things to note:

1. Any symbol must begin and end on the same line.
2. Do not count the quote marks as characters in the literal string.
3. A comment is denoted by `//`. All comment characters are skipped over and not counted in calculating the final number. The `//` comment is terminated by the end of line character.
4. Do not count whitespace as anything unless it is within quotes.
5. There is a C++ standard library called `<cctype>` that has useful character functions such as `isdigit`, `isalpha`, and `isspace`. You can find details on page 1020 in your book.
6. By placing the declaration for your file variable (`ifstream myFile;`) above the main, all functions will be able to see and use that variable (i.e. it will be global). No other variables are to be used as globals.
7. I will place a file called `06test.dat` in the CS150-01 Public folder on Turing next week. I will be using this file to test your program.

This program is more difficult than previous assignments. Don't waste a week or you might not be able to finish!

Also, when writing this program you should build and test as you code. For example, after you have written the function to find identifiers, test it on a sample file, then move on.

## **2 You need to do the following for this assignment**

(a) **Problem Analysis:** Identify the input to your program, the output from your program, and any internal data in your program. You should also identify the data type and indicate whether it should be a variable or a constant.

(b) **Algorithm:** Write out the steps that you'll need to do complete the program. Be as detailed as possible. It will help you write the program. When writing the steps of the algorithm, don't write any C++ code.

(c) **Test Results:** These are solutions to the problem using some method other than your computer program. They are often done by hand, but could include experimental or other results. These results should be explicitly compared to those from the program to demonstrate that the program works. The number of specific cases done should be sufficient to prove beyond a reasonable doubt that the program works.

(d) **Program Implementation:**

- (1) Write the C++ code then build and run it in Visual Studio .NET. Name your project 06CheckerPUNetId, e.g. .06Checkerryandj.
- (2) Build and debug your program in small incremental steps.
- (3) Make sure to follow the coding standards to the letter.
- (4) Test the code as much as you can for different values to make sure it works.
- (5) Remember, code that does not build or run loses 70% of the points.

### **3 What to turn in**

1. Turn in a hard copy of your code on the instructor's desk by the time class starts on the day in which the assignment is due. You must make sure that your code follows the coding standards in order for you to receive full credit.
2. Place your completed project folder in the CS150-01 Drop folder by 1pm on Monday, November 14, 2005. Make sure you review the late policy. Your project **MUST** be created in Visual Studio .NET, and you **MUST** submit the complete Visual Studio .NET project folder otherwise you will receive a zero on this assignment.

Start early!!!!