2025 Spring: CPSC 240

Assignment 1: Triangles

Preface

This is an introductory program to learn assembly programming. Here you will learn about string IO, floating-point IO, and arithmetic operations on floating point registers. Let's begin the fun.

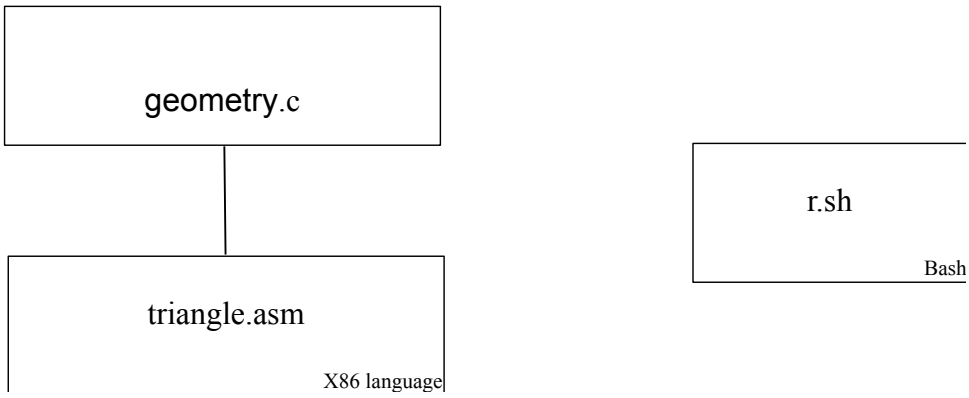
Basic requirements

Make a program satisfying the structure given in the diagram that follows. The application purpose of the program is to compute the length of the third side of a triangle given other information about the triangle.

The program inputs the lengths of two sides of the triangle and the size in degrees of the angle between those two sizes, computes the length of the third size, and outputs that computed length.

The academic purpose of this program is to experience how to input and output float numbers in assembly and how to output a float number with proper formatting. There are no integers in this assignment. Included as part of the academic purpose is to learn the standard format of an assembly language function.

Calling structure



The system structure has three files as shown in the diagram above. Each rectangle represents one file. Inside of each rectangle is the name of the file and the language of the rectangle. The name of the language is usually in smaller font.

The top level file geometry.c begins the execution of the system. Its job is to welcome the user in a friendly manner. Typically the top level file does not know what the file below it is doing.

C language is required for the top level. But that is an easy knock-off of C++.

The file r.sh is written in bash language.

Sample dialog with the program

Welcome to the Triangle program maintained by Juan Diaz.

If errors are discovered please report them to Juan Diaz at juan@columbia.com for a quick fix. At Columbia Software the customer comes first.

Please enter your last name: Finkelstein

Please enter your title (Mr, Ms, Nurse, Engineer, etc): Bus Driver

Please enter the sides of your triangle separated by ws: 3.95 4.61

Please enter the size in degrees of the angle between those sides: 22.7

The length of the third side is 6.070798959 units.

Please enjoy your triangles Bus Driver Finkelstein.

The main function received this number 6.070798959 and plans to keep it until needed.

An integer zero will be returned to the operating system. Bye.

Legend.

Blue: Driver module

Yellow: Control module.

Pink: Input device such as keyboard

Caution: The computed value of the third side shown above is not mathematically correct. The purpose of the dialogue is to show the properly layout that will be produced by your program.

Terminology

The names “driver” and “controller” are generic names for source code files. They are not intended for actual use in a program. “Driver” vaguely refers to the function (usually main) that begins execution first. “Controller” refers to the function (usually in assembly) that is called by driver.

Program requirements

The calling structure diagram must be preserved. That means geometry must call triangle.

Triangle must be structured into 3 segments, which are sometimes called sections.

The text segment must use the block structuring style presented in lectures.

The program must reach the standards of a “Professional Program”.

Be aware that chatgpt does not know how to format a program that will comply with the standards of this course. Any non-conforming program submitted in this course is consider as a product of AI and will receive a zero score. No attempt will be made to the program because its score is zero. The same applies to program created by third party humans.

The blocks in the text segment must have header comments that explain what each block is doing. It is not necessary to place comments on individual instructions (line of code). Comments at the beginning of each block are required.

The class website has many assembly program which you may download and run. You may copy from those programs and put the code in this assignment. Be sure to maintain the block structuring when you insert copied code into your program.

Copying code from the web is allowed, but there is a high risk involved. Most of that code on the web does not meet the professional standard required in this course. Assembly from the web typically needs a lot of upgrading in order to make it comply with the standard of this course. Download at your own risk.

In this program there is no requirement to validate inputs. In this program we assume that the user always input valid numbers. For example, if a negative float number is inputted as the length of a side, then that number is invalid. Checking for invalid inputs will be part of a future assignment.

Comment requirements

Comments that meet the professional standard are required. The professional standard for software will be described in one of the class lectures. It is too extensive to record here.

Due date: February 9, 2025 before 11:59pm.

If you finish this programming assignment by the above date you are making normal progress.

You may submit this assignment early.. If later you make improvements to the program you may submit it again. Only the newest submission will be graded.

You will submit your 3 source files as collection. The whole collection is called “Assignment 1” or maybe you decide to call it “Triangles”.

Attach the 3 individual files to an email and send it to a specialized email address that will be provided after the first class meeting. At the time of this writing that email address is not yet available.

Be sure you do not store your program in a cloud. Do not send links to a program in a cloud. If links are received they are quickly deleted without any attempt to view the alleged program. To be safe don’t upload anything from this course until the semester is finished.

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