CS 161 Programming Assignment
Function with Strings: "Draw Big X"

by Jesse Black, May 13, 2019

Overview:

This assignment provides practice with C++ strings and with user-defined functions. You will write a program that utilizes a user-defined function to draw a big X on the console terminal.

Assignment:

Write a C++ program that *is properly commented* and does the following:

1. Includes a function prototype for the "draw a row" function named oneRow. (See prototype for oneRow( ) below.) The actual function definition should follow main( ).
2. Displays a message to the user describing what the program will do.
3. Prompts the user for an integer which will control the size of the X. (The size specified by the user determines the number of rows and columns in the big X.)
4. Accepts the size from the user, rejects negative sizes, and quits if the size is zero.
5. Prompts the user for a character with which to draw the X. Accept a string as the response.
6. If the length of the string is 0, uses a character of your choice, otherwise uses only the first character of the user's input as the drawing character. (Note: It will be difficult for the user to enter a zero-length string, but include the test for a zero-length string anyway.)
7. Creates a string of the user-specified size. The string will be used to display one row of the big X. The string should be filled with dots, up to the user-specified size. In other words, if the user entered 5 for the size, the string would be " . . . . . "
8. Uses a `while` loop or a `for` loop to do the following:
   a) initialize the "one row string"
   b) call the oneRow function
   c) display the modified contents of the "one row string" for each row in the X
9. The oneRow function accepts two or three parameters:
   a) The "one row" string, passed by reference, since the function will modify it.
   b) an integer indicating the positions at which to place the mark character. The integer should somewhere in the range of 0 thru almost the user-specified size of the big X.
   c) the mark character. The mark character should be an optional parameter, with a default value of some character you have chosen.

10. The oneRow function should put the mark character into the "one row" string at the position specified by the integer parameter, then put the same character into the "one row" string that many spaces from the right end of the string. Examples:
    a) if the "one row" string is "`. . . . . .`" and the integer is 0, the resulting string should look like this: "`X. . . . .X`", with each X at each end of the string.
    b) if the "one row" string is "`. . . . . .`" and the integer is 1, the resulting string should look like this: "`. X. . .X .`" with each X a little farther from each end of the string.
11. The program (the main function) should end by returning a status code: zero means no error was detected, other values indicate an error was detected.

Additional Requirements:

1. Your program must use this function prototype to pre-define the function:
   `int oneRow( string&, int, char='X' );` // function prototype for one row of the X *(corrected May 14, 2019)*
2. Your program should use a function header similar to this when actually defining the function:
   `int oneRow( string &s, int indent, char c )`
3. Disallow sizes less than 0.
4. If the user enters a size of 0, assume they want to end the program.

Design considerations:

1. Note that the function should receive an integer in the range 0 thru almost the size of the big X.
2. When you test the program, you'll probably want to test with sizes less than 25 characters so that the output fits on your console window.
3. Note that the user-specified mark character should be read as a string, but the function expects a character data type for the mark character. Accepting a string is one way of ignoring any other input on that line, up to and including the newline character.

Deliverables:

1. Please upload your program source code (.cpp file) as usual.
2. Be sure to comment your code as required, use meaningful variable names, and acknowledge any sources of help you may have received.
3. Your header comments should also include the identification of the assignment, a brief description of the program, your name and the date.

Sample Input/Output:

Sample input/output of the Draw Big X program

User input is shown in **red**.

Note that much more output is shown than is required. The extra output is intended to help with debugging the program.

```
This program draws a big X.
How many rows to you want the X to have (minimum 1)? 9
Enter a character with which to draw the X: +
Okay, I'll draw an X of size 9 using +
oneRow called with 9 character string, indent=0, mark=+ +.......+
oneRow called with 9 character string, indent=1, mark=+ .+.....+.
oneRow called with 9 character string, indent=2, mark=+ ..+...+..
oneRow called with 9 character string, indent=3, mark=+ ...+.+...
oneRow called with 9 character string, indent=4, mark=+ ....+....
oneRow called with 9 character string, indent=5, mark=+ ...+.+...
oneRow called with 9 character string, indent=6, mark=+ ..+...+..
oneRow called with 9 character string, indent=7, mark=+ .+.....+.
oneRow called with 9 character string, indent=8, mark=+ +.......+

Process returned 0 (0x0)   execution time : 10.691 s
Press any key to continue.
```

By Jesse Black, updated 2019-11-03

Bullet lists changed to numbered lists on 2019-11-11

Modified 2019-11-13 to refer to the function as oneRow( ) instead of oneLIne( ). Clarified (in requirement 10) what happens in the loop.