COP 2535: Data Structures

Exercise 03, Conversions

1 Instructions

Write a converter from standard US units to metric units, and from metric units to US units. I have included three sample runs below: standard to metric, metric to standard, and with input error.

US standard units include (for length) inches, feet, yards, and miles; (for volume) ounces, cups, pints, quarts, and gallons; and (for weight) ounces, pounds, and tons. Metric units include (for length) millimeters, centimeters, meters, and kilometers; (for volume) milliliters and liters, and (for weight) grams, kilograms, and tonnes. You may convert to convenient units — you do not have to give the user a choice of the units to convert to, as long as they are reasonable.

The purpose of this exercise is to exercise `if`, `if/else`, and `switch/case`. The hardest part of this exercise is finding the conversions. Please don't try anything fancy. Also, you will notice a *lot* of repetition. **Repetition is bad!** Ordinarily, you would not want to copy and paste a lot of code, but you will need to here to save time. You will learn a better way when we cover functions.

Finally, I used the `toupper()` function from `<cctype>` to handle upper/lower case issues. Also, please be sure to exit with an error essage if your user inputs incorrect values for the conversion units.

2 Template

```
/************************************
        Name: Exercise Conversions
        Author:
        Date:
        Purpose: convert between standard and metric
        Input: scale, type,  to, from
        Output: converted value and type
************************************/

#include <iostream>
#include<cctype>

using namespace std;

int main()
{
        char scale, type;
        char from, to;
        double dblfrom, dblto, dblsol;
        string units;

        //initial menu, get scale and type
        cout << "-------------------------------" << endl;
        cout << "  Standard/Metric Converter   " << endl;
        cout << "-------------------------------" << endl << endl;
```

```
        cout << "Enter 'S' to convert Standard->Metric, or 'M' to convert Mtric->Standard: " << endl;
        cin >> scale;
        cout << "Enter 'L' to convert length, 'V' to convert volume, or 'W' to convert weight: " << endl
        cin >> type;

    /*******************************
    * 208 lines omitted.
    * Your code goes here.
    *******************************/

        cout << "The conversion is " << dblsol << " " << units << endl;
        cout << "Goodbye";
        return 0;
}
```

3 Output

Your deliverable is a text file that will look similar to this. You should be able to select your output screen, copy it (with Ctl-C), and insert it into the text entry box (Ctl-V). Here is a run from standard to metric.

```
------------------------------
  Standard/Metric Converter
------------------------------

Enter 'S' to convert Standard->Metric, or 'M' to convert Mtric->Standard:
s
Enter 'L' to convert length, 'V' to convert volume, or 'W' to convert weight:
l
Converting Standard to Metric:
Converting length
Enter 'I' for inches, 'F' for feet, 'Y' for yards, or 'M' for miles: f
Enter amount to convert: 3
Converting 3 f to metric.
The conversion is 91.44 cm
Goodbye
```

Here is a run from metric to standard.

```
------------------------------
  Standard/Metric Converter
------------------------------

Enter 'S' to convert Standard->Metric, or 'M' to convert Mtric->Standard:
m
Enter 'L' to convert length, 'V' to convert volume, or 'W' to convert weight:
v
Converting Metric to Standard:
Converting volume
Enter 'M' for millileters,  or 'L' for liters: m
Enter amount to convert: 32
Converting 32 m to standard.
The conversion is 1.08205 ounces
Goodbye
```

Here is a run with an error.

```
    ------------------------------
  Standard/Metric Converter
------------------------------

Enter 'S' to convert Standard->Metric, or 'M' to convert Mtric->Standard:
s
Enter 'L' to convert length, 'V' to convert volume, or 'W' to convert weight:
w
Converting Standard to Metric:
Converting weight
Enter 'O' for ouncs, 'P' for pounds, 'T' for tons: a
Enter amount to convert: 2
Converting 2 a to metric.
Invalid conversion, exiting
```