CS 202 Homework 0

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January 22, 2021

- Repository Link: `https://github.com/TechSolomon/cs202`
- Git Commits: `https://github.com/TechSolomon/cs202/commits`
- This homework took approximately 4 hours to complete.

1 Design

This first homework assignment was designed utilizing a monorepo with two directories under the hw0 folder – temperature and mileskm. Each subfolder respectively contains a C++ program file sharing the same name as the folder. Every .cpp file starts with the repeated file name, author information, creation date, and explanation for future reference.

Our iostream call is added next from the C++ Standard Library. The main function finally prints either a prompt for temperature or distance conversions. The mileskm program uses an instruction function to guide the user through a switch statement, whereas the temperature program contains two functions for processing command line variables. Additional information about each statement can be found commented throughout the program code.

2 Post Mortem

Upon building each C++ file and referencing notes from class, I ran the programs to find that there were no errors that would cause problems for the project. I also considered limiting the number of characters per line to improve the clarity of the project.

One computer science fundamental – namely don't repeat yourself (DRY) – could be followed in the future with the mileskm.cpp program. After learning more about efficiency and classes along with their interactions inside C++ files, I look forward to refactoring both programs to be more succinct and concise.

3 Answers to Questions

1. Software has various uses across a wide variety of job sectors and subject areas. In science, we can use machine learning to identify and monitor whales from satellite imagery. For medicine, software has been recently used to share the SARS-CoV-2 (COVID-19) genomic sequence to expedite vaccine development. Finally, entertainment and video-on-demand services such as YouTube and Netflix use software to organize, host, and recommend a wide variety of media.

2. A software developer looks like someone who is a collaborator, critical thinker, and problem solver. This person must build well-documented and accessible products and considers skill level and variable use cases for their end-user.

3. My computer is currently running macOS 11.1 and has 16 GB of RAM and availability of up to 1 TB of total storage.

4. My five favorite applications for computer programs include geography, cybersecurity, archival, open-source, and blockchain technology.

   Blockchain technology has numerous applications, such as establishing trust between individuals and making monetary transactions without the requirement of a third party.

Some benefits include that records are immutable, meaning that they cannot be easily changed. Using cryptography to encode transactions, a public ledger (or list) is validated by all parties involved. In addition to security benefits, this list around the world is distributed across a whole variety of hosts.

5. Each hexadecimal (base 16) digit can be represented with four (4) binary digits. On the other hand, each decimal (base 10) digit can be represented as log base 2 of 10 ($\log_2 10$).

4 Program 1

4.1 Sample Output/Screenshot

Listing 1: Sample Program Output

```
1 total arguments, program name is ./temperature
```

4.2 Git Commit Messages

Date	Message
2021-01-22	add: temperature.cpp unit conversions
2021-01-22	add: ftoc/ctof temperature.cpp functions
2021-01-21	add: hw0 (initial files)

4.3 Source Code

4.4 Temperature

```
1 // temperature.cpp
2 // Solomon Himelbloom
3 // 21 January 2021
4 // Temperature conversion program for CS 202.
5
6 #include <iostream>
7 #include <string>
8 using std::cout;
9 using std::endl;
```

```
10 using std::cin;
11 using std::stod;
12 using std::strtod;
13 using std::string;
14
15 // Conversion using the C++ Standard Template Library (stod).
16 double cpp_ftoc(const char* new_str) {
17     double temperature = 0;
18     string str(new_str);
19     temperature = stod(new_str);
20
21     // Fahrenheit --> Celsius
22     temperature = ((5/9) * ((temperature + 40) - 40));
23     return temperature;
24 }
25
26 // Function using a C function (strod) for conversions.
27 double c_ctof(const char* old_str) {
28     double temperature = 0;
29     temperature = strtod(old_str, nullptr);
30
31     // Celsius --> Fahrenheit
32     temperature = ((9/5) * ((temperature + 40) - 40));
33     return temperature;
34 }
35
36 int main(int argc, char ** argv) {
37     cout << argc << " total arguments, program name is " << argv[0] << "\n";
38
39     return 0;
40 }
```

5 Program 2

5.1 Sample Output/Screenshot

Listing 2: Sample Program Output

```
Welcome to unit conversions!


>> [Press 0] Quit the program.
>> [Press 1] For miles --> kilometers.
>> [Press 2] For kilometers --> miles.


Unit conversion selection: 1
Enter the number of miles: 26.2
26.2 miles is equal to 42.1558 kilometers.
```

5.2 Git Commit Messages

Date	Message
2021-01-22	add: code comments for mileskm.cpp
2021-01-22	add: unit conversion via switch (mileskm.cpp)
2021-01-22	add: instructions function in mileskm.cpp
2021-01-22	add: mileskm import file (cs201)
2021-01-22	rm: hw0/gutenberg
2021-01-21	add: hw0 (initial files)

5.3 Source Code

5.4 mileskm

```cpp
// mileskm.cpp
// Solomon Himelbloom
// Created: 11 September 2020
// Modified: 22 January 2021
// Miles to kilometers conversion for CS 202.

#include <iostream>
using std::cout;
using std::endl;
using std::cin;

// Printed output for unit conversion direction.
void instructions() {
    cout << "Welcome to unit conversions!" << endl;
    cout << "{{{{{{{{{{{{{{{{{{{{{{{{{{{{" << endl;
    cout << ">> [Press 0] Quit the program." << endl;
    cout << ">> [Press 1] For miles --> kilometers." << endl;
    cout << ">> [Press 2] For kilometers --> miles." << endl;
    cout << "{{{{{{{{{{{{{{{{{{{{{{{{{{{{{{{{{{{{" << endl;
}

int main() {
    float mile = 0.0;
    float km = 0.0;
    int units = 0;

    instructions();
    cout << "Unit conversion selection: ";
    cin >> units;

    switch (units) {

    case 0:
        cout << "The program has ended." << endl;
        break;

    // Converts from miles to kilometers.
    case 1:
        cout << "Enter the number of miles: ";
        cin >> mile;
```

```
41
42          km = mile * 1.609;
43
44          if (mile == 1) {
45              cout << mile << " mile is equal to " << km << " kilometers." << endl;
46          }
47
48          else if (mile < 0) {
49              cout << "Please enter a positive value of miles and try again." << endl;
50          }
51
52          else {
53              cout << mile << " miles is equal to " << km << " kilometers." << endl;
54          }
55
56          break;
57
58      // Converts from kilometers to miles.
59      case 2:
60          cout << "Enter the number of kilometers: ";
61          cin >> km;
62
63          mile = km / 1.609;
64
65          if (km == 1) {
66              cout << km << " kilometer is equal to " << mile << " miles." << endl;
67          }
68
69          else if (km < 0) {
70              cout << "Please enter a positive value of kilometers and try again." << endl;
71          }
72
73          else {
74              cout << km << " kilometers is equal to " << mile << " miles." << endl;
75          }
76
77          break;
78
79      // Catch errors during user inptut.
80      default:
81          cout << "ERROR: Please try another selection." << endl;
82          break;
83      }
84  }
```