Chapter 4 Programming Project

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IDE used: X Visual Studio   Replit

URL to GitHub repository: https://github.com/pistachiosparkle/AA-CS-Class

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Project 1. Days in a Month

Write a program that asks the user to enter the month (letting the user enter an integer in the range of 1 through 12) and the year. The program should then display the number of days in that month. Use the following criteria to identify leap years:

1. Determine whether the year is divisible by 100. If it is, then it is a leap year if and only if it is divisible by 400. For example, 2000 is a leap year but 2100 is not.
2. If the year is not divisible by 100, then it is a leap year if and only if it is divisible by 4. For example, 2008 is a leap year but 2009 is not.

Here is a sample run of the program:

```
Enter a month (1-12): 2 Enter
Enter a year: 2008 Enter
29 days
```

Input Validation: Make sure the month is between 1 and 12.

Branch Name in GitHub repository: https://github.com/pistachiosparkle/AA-CS-Class/blob/Project-4/Ch4Q1.cpp

Design Details (algorithm, structure chart, flowchart, and/or pseudocode):

Enter month, validate the number is within range, enter year, calculate if it's a leap year, define how many days are in each month, output result

Reflection:

1. What did you find most challenging with this program? Figuring out how to determine if a year was a leap year almost melted my brain.

2. What problems did you encounter and how did you solve them? Syntax errors as always, and figuring out how to compute if it's a leap year (I had to ask Chat for that one).

3. What did you learn from writing this program? Using switch for the first time, it was nice to be able to create groups with similar characteristics instead of defining each month individually.

Program 2. Shipping Charges

Instructions:
The Fast Freight Shipping Company charges the following rates:

Weight of Package (in Kilograms)	Rate per 500 Miles Shipped
2 kg or less	$1.10
Over 2 kg but not more than 6 kg	$2.20
Over 6 kg but not more than 10 kg	$3.70
Over 10 kg but not more than 20 kg	$4.80

Write a program that asks for the weight of the package and the distance it is to be shipped, then displays the charges.

Input Validation: Do not accept values of 0 or less for the weight of the package. Do not accept weights of more than 20 kg (this is the maximum weight the company will ship). Do not accept distances of less than 10 miles or more than 3,000 miles. These are the company's minimum and maximum shipping distances.

Branch Name in GitHub repository: https://github.com/pistachiosparkle/AA-CS-Class/blob/Project-4/Ch4Q2.cpp

Design Details (algorithm, structure chart, flowchart, and/or pseudocode):

Get the user to enter the weight and distance and validate they are in range, use if else to determine the rate for each category, calculate the shipping cost, display

Reflection:

1. What did you find most challenging with this program? I froze at first because the whole thing just seemed overwhelming at first glance. It made me start to appreciate the purpose of a flowchart or notes.

2. What problems did you encounter and how did you solve them? I could not figure out how to correctly calculate the shipping cost, so I had to use Chat. However I don't remember seeing static_cast discussed so I need to go back to the material and figure out if I missed it or if this was something we haven't covered.

3. What did you learn from writing this program? If else statements can handle complex decision making in a streamlined way.

Project 3. Geometry Calculator

Instructions:

Write a program that displays the following menu:

```
Geometry Calculator
    1. Calculate the Area of a Circle
    2. Calculate the Area of a Rectangle
    3. Calculate the Area of a Triangle
    4. Quit
    Enter your choice (1-4):
```

If the user enters 1, the program should ask for the radius of the circle then display its area. Use the following formula: *area* = πr^2. Use 3.14159 for 3.14159π and the radius of the circle for *r*. If the user enters 2, the program should ask for the length and width of the rectangle, then display the rectangle's area. Use the following formula: `area = length * width`. If the user enters 3, the program should ask for the length of the triangle's base and its height, then display its area. Use the following formula: `area = base * height * .5`. If the user enters 4, the program should end.

Input Validation: Display an error message if the user enters a number outside the range of 1 through 4 when selecting an item from the menu. Do not accept negative values for the circle's radius, the rectangle's length or width, or the triangle's base or height.

Branch Name in GitHub repository: https://github.com/pistachiosparkle/AA-CS-Class/blob/Project-4/Ch4Q3.cpp

Design Details (algorithm, structure chart, flowchart, and/or pseudocode):

Display the menu, user enters choice, use switch to make a case for each menu option to make the proper calculations (or to exit the program in the case of 4) and validate that the values are positive. Each case must include output

Reflection:

1. What did you find most challenging with this program? This just got pretty long but I feel like it wasn't necessarily as hard as the previous, it was mainly the same steps over and over for each case

2. What problems did you encounter and how did you solve them? syntax errors, double checked with chat

3. What did you learn from writing this program?

   Doing a project with a menu was very fun for me for some reason. This type of program felt more organized because each case is neatly grouped in its own section and the project overall felt easier to visualize.