CPSC 121 Computer Science I

Gonzaga University

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PA1 Arithmetic (50 points)

Individual, non-collaborative assignment

Learner Objectives

At the conclusion of this programming assignment, participants should be able to:

- Use variables and cout and cin statements
- Use of library includes (**string**, **cmath** and optionally **iomanip**)
- Convert values from one type to another (type casting)
- Compute values using arithmetic operators

Prerequisites

Before starting this programming assignment, participants should be able to:

- Compile and run a C++ program from command line

Overview and Requirements

For this programming assignment, we are going to write a virtual travel agent trip budget program.

The virtual travel agent wants to know a few things about you! Such as:

1. What is your trip destination?
2. Where are you departing from?
3. How many days will you be at your trip destination?
4. How much will each plane tickets cost (and how many tickets)?
5. How much will your rental car cost per day?
6. What is your food budget per day?

The virtual travel agent will then provide a summary of your trip details and cost including the total cost (including the calculated virtual agent fee) and a cost per day.

Program Details

Write a virtual travel agent trip budget program that interacts with the user in the following manner:

1. Greet the user and find out the user's trip destination (**string**). Reply with a greeting, such as "Traveling to <user's destination> is fabulous this time of the year!".
   NOTE: the string library is REQUIRED for the string data type. Don't forget to include this external library!
2. Find out where the user is departing from (**string**). Reply with a positive statement, such as "<location> sounds like a pleasant place to be from!".
3. Find out how many days the user will be staying at their destination (**integer**). Calculate how many hours that is equivalent to. Reply with a value that relates the user's number of hours at their destination to your virtual agent's persona (make something up!), such as "You are visiting <user's destination> for <user's hours at destination>?! I can't believe it! That's also my ATM PIN!"
4. Find out the cost of a plane ticket to the user's destination (**double**) and how many plane tickets they need (**integer**). Reply with a comment that confirms the cost and number, e.g., "Okay, I've got you down for <number of tickets> tickets to <user's destination> at <cost per ticket>! Now we're going places!"
5. Find out how much a rental car will cost per day (**double**) and reply in some manner to the cost such as "Oh wow, <cost of car rental per day> is a steal!"
6. Finally, it will find out how much will be budgeted for daily food costs, e.g., "How much will you be budgeting for daily food costs?"
7. Perform the calculations for total projected costs and include the virtual agent "service fee" which is based on the virtual agent proprietary percentage formula that will decrease inversely proportional to the cost of the trip. ***Hint:*** *you will need to use a cmath library function in order to calculate the virtual agent service fee!*

For calculating:

$$\boldsymbol{Subtotal} = TicketPrice \times TicketQty + RentalCarPrice \times Days + DailyFoodBudget \times Days$$

$$\boldsymbol{VirtualAgentServiceFee} = Subtotal^{3/5}$$

$$\boldsymbol{TotalCost} = Subtotal + VirtualAgentServiceFee$$

$$\boldsymbol{DailyCost} = \frac{TotalCost}{Days}$$

Example Run

Here is an example run of my "Virtual Agent" program:

> Welcome to the Virtual Travel Agent trip budget program!
>
> My name is Zippy, I'm so excited to help you plan out your trip budget! I will be your agent today! Did I mention my name is Zippy? Where might you be traveling to today?
>
> **California**
>
> Traveling to California is fabulous this time of the year! Might I ask where you leaving from please?

Washington

Washington sounds like a pleasant place to be from!

How many days will you be staying in California?

15

You are visiting California for 360 hours?! I can't believe it! That's also my ATM PIN!

How much does one plane ticket cost to California?

600

Thank you! How many plane tickets will you be needing?

3

Okay, I've got you down for 3 tickets to California at $600! Now we're going places!

We're getting close! Just a few more questions... How much will your rental car cost per day?

50

Oh, wow! $50 is a steal!

Okay, last question... How much would you like to budget for food each day?

55

Okay, great! Give me a minute to calculate your trip cost!

(Bonus) Oh gee! Quite the spendy trip!

Thank you for your patience! It looks like your trip from Washington to California will cost you $3505.91 dollars in total or $233.73 per day!

Thank you for using the Virtual Travel Agent trip budget program! My name was Zippy! I don't remember if I mentioned that yet!??

Note: Your output does not have to exactly match mine above. It needs to be correct, but you are free to give your virtual agent his/her own personality. Have fun with it! 😁

Bonus (3 pts)

Prior to the final summary output, also have your virtual agent calculate the Virtual Agent Service Fee percentage of the subtotal. If the fee is greater than or equal to 4% let the user know that they can save money by creating a higher budget, otherwise, give the user a message about how expensive their trip is.

You will need to look ahead in the zyBook and Gaddis textbook for how to use an if statement to do this!

Submitting Assignments

1. Submit your assignment to the Canvas course site. You will be able to upload your single .cpp file to the PA1 assignment found under the Assignments tab. **Best practice dictates you give your source file a meaningful name!** You should upload your solution as <your last name>_PA1.cpp by the due date and time.
2. Your submission should only contain your .cpp file. You may submit your solution as many times as you like. The most recent submission is the one that we will grade.

Note: *By submitting your code to be graded, you are stating that your submission does not violate the CPSC 121 Academic Integrity Policy outlined in the syllabus.*

Grading Guidelines

This assignment is worth 50 points + 3 points bonus. Your assignment will be evaluated based on a successful g++ compilation and adherence to the program requirements. We will grade according to the following criteria:

- 5 pts for interacting with the user regarding their destination.
- 5 pts for interacting with the user regarding their origin.
- 10 pts for interacting with the user regarding the number of days of their trip.
- 5 pts for interacting with the user regarding their rental car cost.
- 15 pts for correct total and daily cost computations.
- 5 pts for giving your virtual agent "personality", have fun!
- 5 pts for adherence to proper programming style and comments established for the class (*Please see the "Coding Standards" document found at the end of the Unit #0 module*)