CS1073 - Assignment #9 - Fall 2020

Submission Deadline: Friday, November 20th before 12:00 NOON (Atlantic Daylight Time Zone) in the Assignment 9 dropbox in Desire2Learn. (Read the submission instructions at the end of this document carefully).

The purpose of this assignment is to allow you to gain practice with GUIs and event-driven programming. It also gives you a chance to review some of the earlier course topics (e.g. inheritance, decision statements, etc.)

This assignment is to be done individually. If you have questions, direct them to a tutor/assistant during a help session in the "Faculty of Computer Science Student Success Centre" team or to your course instructor.

As always, begin by creating a new folder to hold your work for this assignment.

I. Creating a Graphical GPA Calculator:

a) The University of New Brunswick uses a letter grade system. At the end of each course, each student is given a letter grade that represents his/her performance in that course. Each letter grade corresponds to equivalent grade points. These equivalences are shown in the following table (from the UNB Undergraduate Calendar):

Letter Grade	Grade Points
A+	4.3
A	4.0
A-	3.7
B+	3.3
B	3.0
B-	2.7
C+	2.3
C	2.0
D	1.0
F	0.0
WF	0.0

UNB also follows a credit hour system. This means that each course has a certain number of credit hours associated with it. For example, CS1073 is a 4 credit hour course. Courses with a higher credit hour value have a larger impact on a student's Grade Point Average (GPA) than those with fewer credit hours.

To calculate the total points earned in a single course, we simply take the grade point value and multiply it by the number of credit hours. That means that if a student receives a grade of B in CS1073, he/she earns 12.0 points (3.0 grade points * 4.0 credit hours).

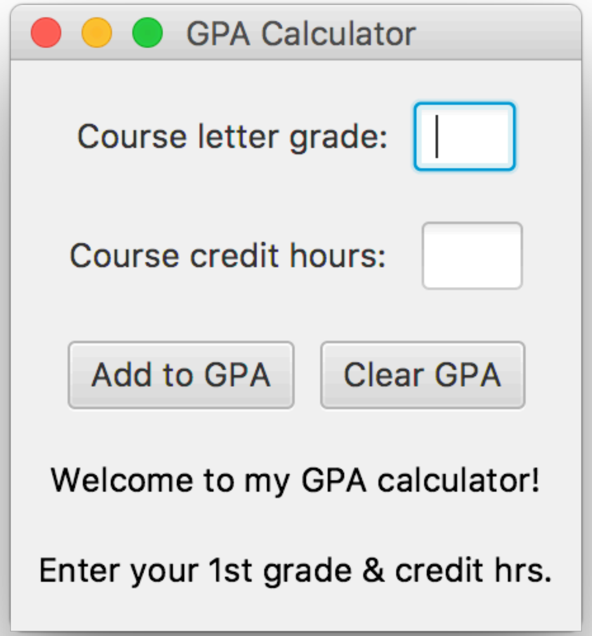
To calculate a student's Cumulative GPA, we add up all the points that he/she has earned in all completed courses, and we divide by the sum of all the credit hours for those courses. Consider the following example:

```
Fall 2020 term for John Doe:
CHEM 1001 (3 ch) B-  ==>   8.1 pts
CHEM 1006 (2 ch) A   ==>   8.0 pts
CS 1073   (4 ch) A+  ==>  17.2 pts
CS 1203   (3 ch) B+  ==>   9.9 pts
ENGL 1145 (3 ch) A   ==>  12.0 pts
MATH 1053 (3 ch) A-  ==>  11.1 pts

John's GPA:
(8.1 + 8.0 + 17.2 + 9.9 + 12.0 + 11.1)
/ (3 + 2 + 4 + 3 + 3 + 3)
= 3.68333…
```

Create a graphical GPA calculator application (using JavaFX) that allows users to enter the letter grade and the number of credit hours for a course, and then request his/her GPA. The GUI should display the resulting points for that course and also display the student's cumulative GPA. The user should then be able to enter the results for another course, and ask the application to recalculate the cumulative GPA. At any time, the user should be able to clear the cumulative GPA, and start new calculations.

Please follow these sample screen shots (see next 3 pages):



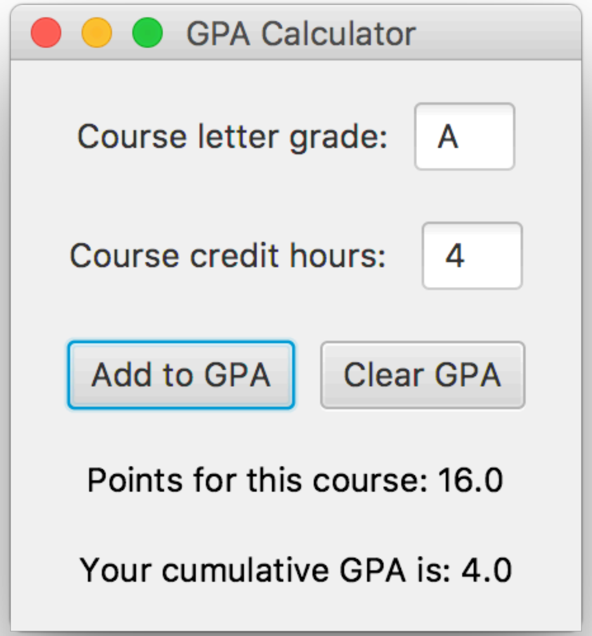
Course letter grade:

Course credit hours:

Welcome to my GPA calculator!

Enter your 1st grade & credit hrs.

(GUI appearance when first loaded - no user interaction yet).



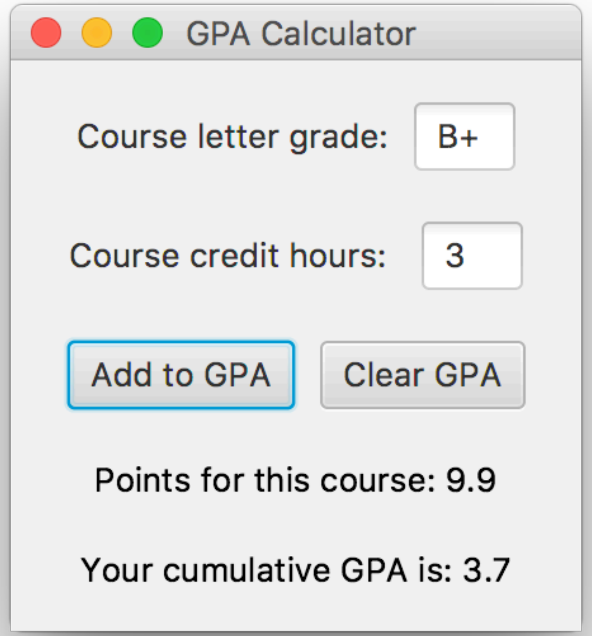
Course letter grade: A

Course credit hours: 4

Points for this course: 16.0

Your cumulative GPA is: 4.0

(User enters data for the first course and presses the "Add to GPA" button).



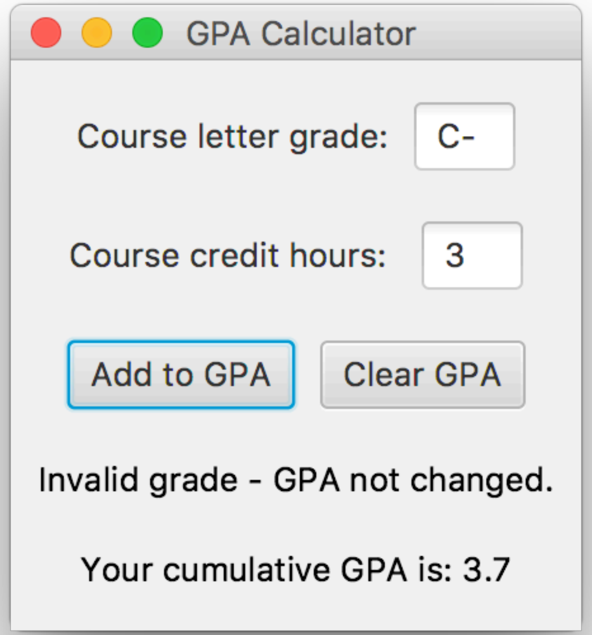
Course letter grade: B+

Course credit hours: 3

Points for this course: 9.9

Your cumulative GPA is: 3.7

(User enters data for another course and presses the "Add to GPA" button).



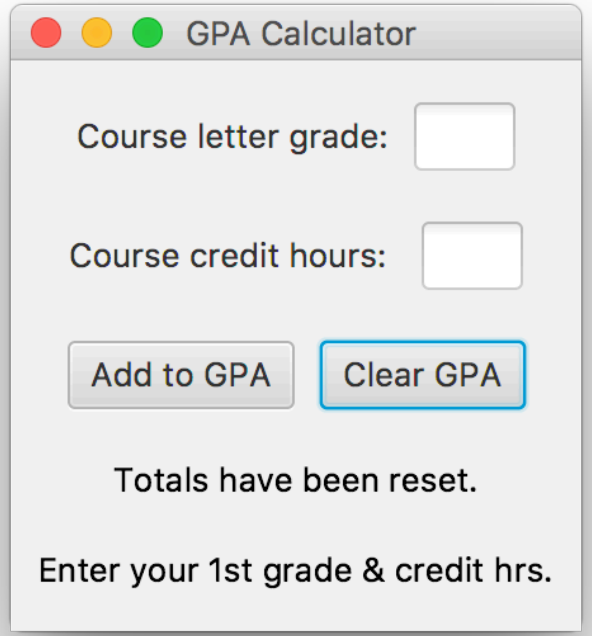
Course letter grade: C-

Course credit hours: 3

Invalid grade - GPA not changed.

Your cumulative GPA is: 3.7

(User enters data for another course, but with an invalid grade, and presses the "Add to GPA" button).



Totals have been reset.

Enter your 1st grade & credit hrs.

(User presses the "Clear GPA" button)

Note: When displaying the resulting points and cumulative GPA, these values should be displayed with exactly one decimal digit (hint: use the NumberFormat class).

For this question, you may simply use a FlowPane to arrange the components. Choose a reasonable starting width and height for the Scene so that everything is visible (i.e. nothing is cut off) when the GUI is first displayed.

You do not need to write full javadoc comments for this question, but please include a javadoc comment for the class; as usual, this should include an @author tag.

b) Test your program with the sample data listed above (on page 2) for John Doe. Test your program with an invalid grade entry as well. Also, test the "Clear GPA" button. Once you are sure that the application is working correctly, run it again and capture 4 screenshots: one screenshot before any calculations have been performed, one after entering all of John Doe's information, one after an invalid grade entry, and one after pressing the "Clear GPA" button. Give your output files clear filenames so the markers will be able to easily locate the sample output for this question in your archive, and label your output clearly in the report as well.

II. A Booking Application for a Vacation Resort:

Paradise Palms is a resort on a tropical island in the Caribbean. When guests book a one-week stay at this resort, they have a choice between a tourist package and an elite package; they must select one of these two packages. The tourist package is often appealing to people who don't plan to spend all of their time at the resort. They will be doing lots of sightseeing and excursions, so they are not as concerned with having the best amenities and "perks" at the resort; they'd rather save some money and use it for their activities outside the resort. The elite package is appealing to those who plan to make lots of use of the resort facilities. They don't mind spending a bit extra to get the most out of their resort experience.

To book a one-week stay at the resort, a guest must provide their name and the number of spa visits they would like to schedule during their stay. (That will allow the resort staff to work out a spa schedule in advance of the guest's arrival.) Unlimited meals at the resort's buffet are included with every booking. However, if a guest wishes to eat some meals at one of the resort's à la carte restaurants, that must be arranged in advance of their stay. So, when booking, the guest must indicate the number of à la carte meals they wish to have during the week.

The base price for a tourist package is $1475.00 and for an elite package the base price is $2250.00. À la carte meals cost $35.00 each; however, for elite guests their first three meals at à la carte restaurants are complimentary (they are only charged for meals after the three free ones). For guests who choose the tourist package, the first spa visit costs $125.00 and each subsequent spa visit costs $100.00. Elite guests pay only $75.00 for each spa visit.

This resort has five buildings that contain guest rooms. Building 1 has the largest rooms, each with a private balcony and an ocean view; it is also the building that is closest to the beach. All elite guests are placed into Building 1. Guests who choose the tourist package are each randomly assigned to Building 2, 3, 4 or 5 at the time of booking.

a) Create three classes, ResortBooking, TouristPackageBooking and ElitePackageBooking using the description above. Every booking must include the name of the guest, the number of à la carte meals, and the number of spa visits. All booking types must have a method to calculate the total price of the booking based on the information given by the guest, and all booking types must have a method to retrieve the number of the building where they will be staying. Write full javadoc comments for these three classes.

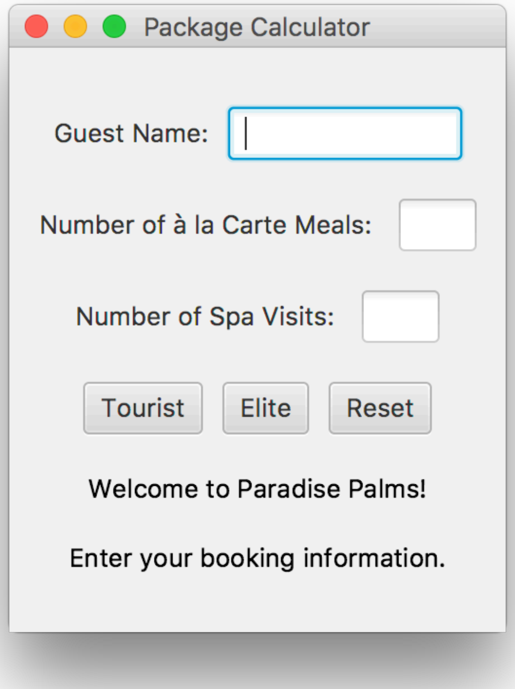
Continued on the next page…

b) In order to ensure your classes are working properly before creating the GUI for them, you may want to test the classes using a text-based driver. Make sure that the price of each type of booking package is calculated properly and that the building assignment is valid. (Note: This text-based test driver will not be submitted as part of your assignment and will not be marked, but it is highly recommended.)

c) Next, create a GUI front-end (in JavaFX) to get the following information from the guest: name, number of à la carte meals, and number of spa visits. Guests will then click on the appropriate button (Tourist or Elite) to indicate which type of package they want to purchase. You will then display their building number and the total price of the package in the GUI.

Note: For this question, you may simply use a FlowPane to arrange the components. Choose a reasonable starting width and height for the Scene so that everything is visible (i.e. nothing is cut off) when the GUI is first displayed.

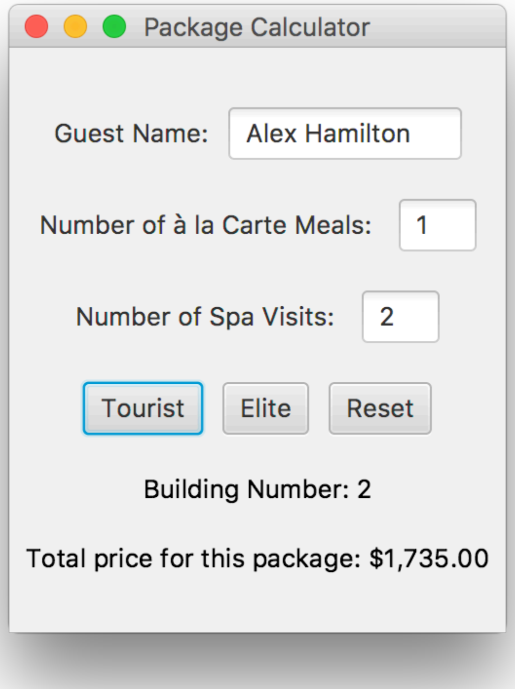
Please follow these sample screen shots (see below & next 2 pages):



Welcome to Paradise Palms!

Enter your booking information.

(GUI appearance when first loaded - no user interaction yet).



Guest Name: Alex Hamilton

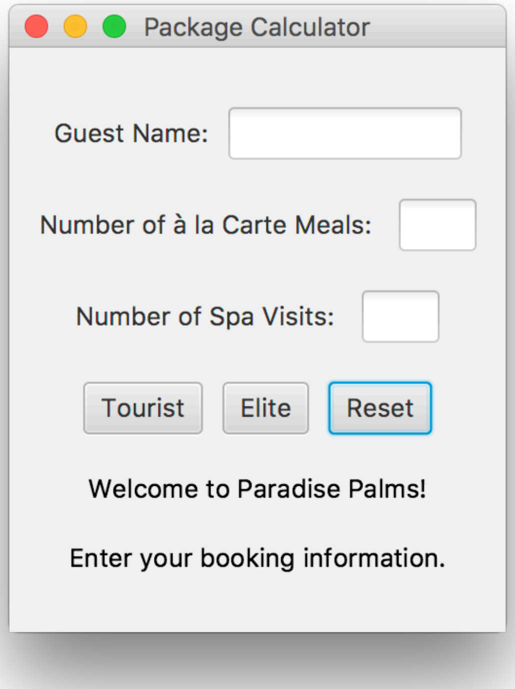
Number of à la Carte Meals: 1

Number of Spa Visits: 2

Building Number: 2

Total price for this package: $1,735.00

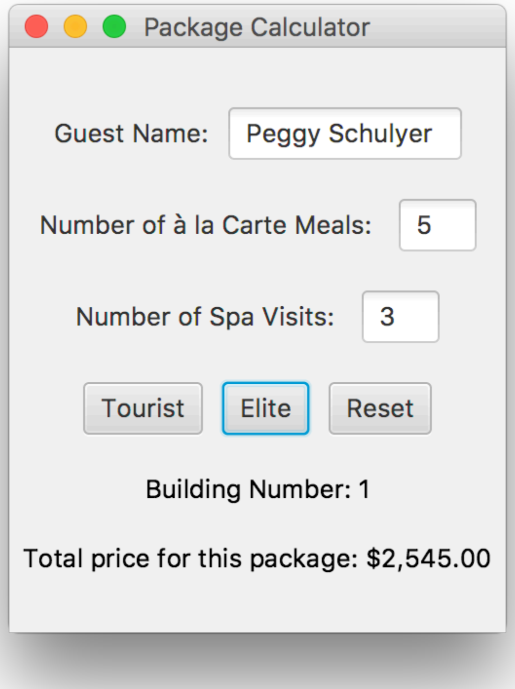
(User enters guest booking data and presses the "Tourist" package button).



Welcome to Paradise Palms!

Enter your booking information.

(User presses the "Reset" button)



Guest Name: Peggy Schulyer

Number of à la Carte Meals: 5

Number of Spa Visits: 3

Building Number: 1

Total price for this package: $2,545.00

(User enters guest booking data and presses the "Elite" package button).

You do not need to write full javadoc comments for your GUI, but please include a javadoc comment for the class; as usual, this should include an @author tag.

Test your GUI thoroughly and, when you are sure that it is working correctly, capture at least 4 sample screenshots (showing different test cases). Give your output files clear filenames so the markers will be able to easily locate the sample output for this question in your archive, and label your output clearly in the report as well.

Note regarding Question 2: In a real-world booking application, we would ask the customer to indicate the dates for which they wish to book their stay, and we would need to check room availability for those dates. However, we are NOT asking you to do that in this question. (That is outside of the scope of this assignment.) Your solution for Question 2 should only support the functionality that is described above. Do not add other fields/checks that were not requested.

Submission instructions are on the next page…

Your electronic assignment submission (submitted via Desire2Learn) will consist of two files:

i. a written report. This should begin with a title page; just as we described in Assignment #1, your title page should include: the course (CS 1073), your section (FR01A, FR02A, FR03A or FR04A), the assignment number, your full name, and your UNB student number. That should be followed by four sections, with each part clearly identified with a section heading. Include:

   a. the source code for Question I (the JavaFX GUI),

   b. the sample output for Question I,

   c. the source code for Question II part a (the 3 classes),

   d. the source code for Question II part c (the JavaFX GUI front-end),

   e. the sample output for Question II.

   This written report should be prepared using a word processor; we recommend using Microsoft Word (i.e. create a .docx file for your report). Copy & paste your java source code & required output into the report document. Add appropriate headings for each part. Fix up the formatting where necessary, adjusting line breaks & page breaks to ensure that your document is easy to read. Use a monospaced font for your code to maintain proper indentation.) Once the report is complete and you've checked it all over, save the .docx file for your own records, and then **save a second copy in pdf format for submission**. (Note: Be sure to open that file in a pdf viewer to verify that the pdf was generated correctly.) The **SINGLE pdf file** containing your report will be submitted to the appropriate assignment drop box on Desire2Learn. (It is important that you submit a pdf file and NOT the original Word document. This pdf will allow the marker to write comments directly on your work to give you better feedback.)

   Note: Please name this report as follows: **YourName_As9_Report.pdf**

ii. an archive file **(.zip)** that contains your Java source code and output for this assignment. Make sure that your archive includes all .java files (in case the marker wishes to compile & run your code to test it). You should not include the report document or the .class files in your archive. This archive should be submitted as a **single file** to the appropriate drop box on Desire2Learn.

   Note: Please name this archive file as follows:
   YourName_As9_Archive.zip

End of Assignment 9

Maintained by Natalie Webber