CS161 Project 1

100 pts Due: September 28, 11:59 PM

Problem Statement

Design and implement a Graphical User Interface (GUI) application that computes auto loan payments. The developed GUI allows a user to compute monthly loan payments interactively with given base vehicle price, down payment, option costs, and sales tax.

Project Requirements

Graphical User Interface: Reference the figure below and construct a GUI as similar to Figure 1.

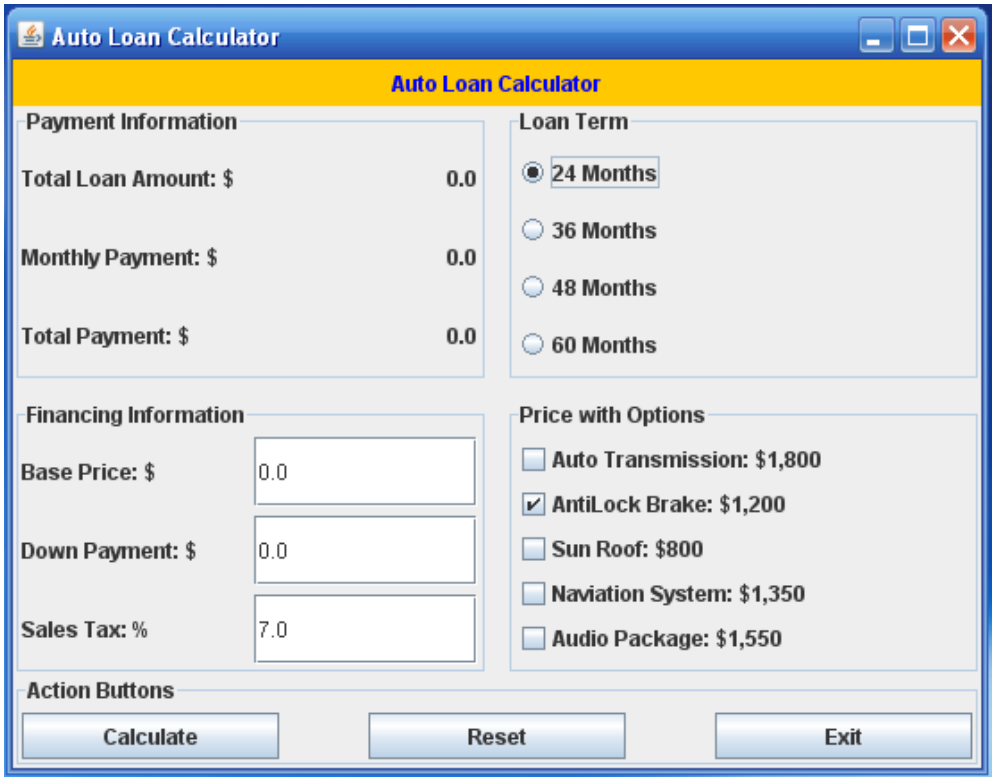


Figure 1. Initial GUI before a user's interaction.

Implementation Requirements

Initial GUI construction

1. Your **application should consist of at least ten classes** including six different JPanel subclasses that contain various GUI components, the CombinedPanels class which contains all of the JPanel subclasses, the LoanCalculateGUI class constructing the GUI,

the AutoInfoLoan class having data fields and methods for computing auto loan, and a driver class (Project1Driver).

The way this fits together is as follows:

- Your Driver instantiates the LoanCalculateGUI
- LoanCalculateGUI makes the CombinedPanels object.
- CombinedPanels makes instances of ALL the other panels you use, as well as the AutoInfoLoan object
- It is suggested your JPanel subclasses be for the six major areas shown on the GUI – top, bottom, and the four corners of the center
- If we think of the code in terms of Model-View-Controller (for those familiar with it), AutoInfoLoan is a like a model, the panels are like a view, and CombinedPanels/LoanCalculateGUI act as the controller

2. Six red color ellipses on Figure 2 represent JPanel subclass objects, numbering refers to the step that is involved to complete this task.

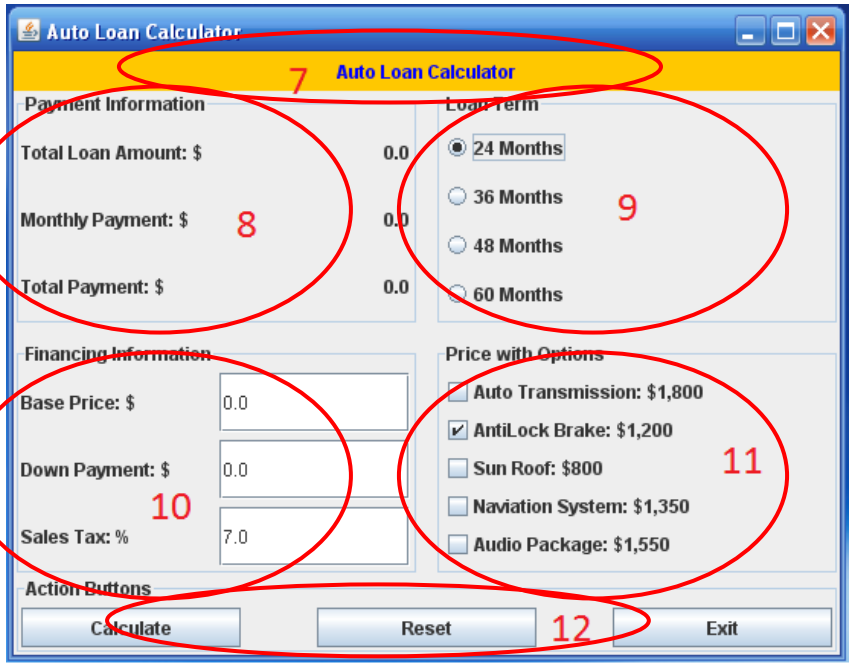


Figure 2. The GUI consists of six JPanels.

3. CombinedPanels class uses your JPanel subclasses to construct the GUI as shown above
4. AutoInfoLoan class has all data fields and methods for computing values associated with the auto loan (total loan amount, monthly payment, total payment including interest and sales tax). You will need to make use of it for calculations

5. Set the default values of GUI components as below:
   - Default sale tax: 7%
   - Default loan term: 24 months
   - Default option: Antilock brake

6. All event listener classes should be inner classes of GUI components. You can place them inside of their respective JPanel subclasses or place them all in CombinedPanels (both of which have positive and negatives in terms of difficult).

7. The JPanel subclass located at the top of JFrame holds the center aligned application title, "Auto Loan Calculator" with blue foreground color on the orange background.

8. The JPanel subclass "Payment Information" located at the upper left side includes 6 JLabel components that will be used for output. 3 JLabels display the title of payment information and the other 3 JLabels will show the corresponding values.

9. The JPanel subclass located at the upper right side has 4 JRadioButton components that will be operated with radio button functionality to choose a loan term.

10. The JPanel subclass located at the lower left side includes 3 JLabels and 3 JTextFields which are used to enter base vehicle price, down payment, and sales tax.

11. The JPanel subclass located at the lower right side includes 5 JCheckBox that allow multiple item selections.

12. The bottom side of application has a JPanel subclass that includes 3 JButtons labeled "Calculate", "Reset", and "Exit".

Event Handling

1. When a JRadioButton is clicked, make these changes in your AutoInfoLoan object:
   - If "24 Months" is selected, set the interest rate to 4.5%.
   - If "36 Months" is selected, set the interest rate to 5.5%.
   - If "48 Months" is selected, set the interest rate to 6.5%.
   - If "60 Months" is selected, set the interest rate to 7.0%.

2. When JCheckBox(s) are clicked:

   Update the associated data field in your AutoInfoLoan object to the total cost of the selected options. The option prices are as follow:

   - Auto Transmission: $1,800
   - Antilock Brakes: $1,200
   - Sun Roof: $800

- Navigation System: $1,350
- Audio Package: $1,550

3. When the "Reset" is clicked:

- Set values of JLabels on "Payment Information" JPanel to 0.0.
- Set the Loan Term to 24 months.
- Set values of "Base Price" and "Down Payment" JTextFields to 0.0.
- Set the value of "Sales Tax" JTextField to 7.0.
- Only select the "Antilock Brake" JCheckBox.
- Make sure AutoInfoLoan is also set to defaults

4. When the "Exit" Button is pressed, exit the application.

5. When the "Calculate" Button is pressed:

- Read values from "Base Price", "Down Payment", and "Sales Tax" and update the corresponding data fields in the AutoInfoLoan object

- Compute the sales tax amount based on the following formula:

```
Sales_Tax_Amount = (Base_Price – Down_Payment +
                          Option_Costs) * Sales_Tax_Rate
```

You should properly convert the percentile sales tax to the double type value.

- Compute the "Total Loan Amount" based on the following formula:

```
Loan_Amount = Base_Price – Down_Payment +
                 Option_Costs + Sales_Tax_Amount
```

- Compute the "Monthly Payment" based on the following formula:

```
Monthly_Payment = Total_Loan_Amount * rate /
      (1 – (Math.pow(1 / (1 + rate),
                                  Loan_Term_In_Month)));
```

where **`rate = interest_rate / 12. interest_rate`** **is the loan interest rate that is converted to the corresponding double value, not percentile**.

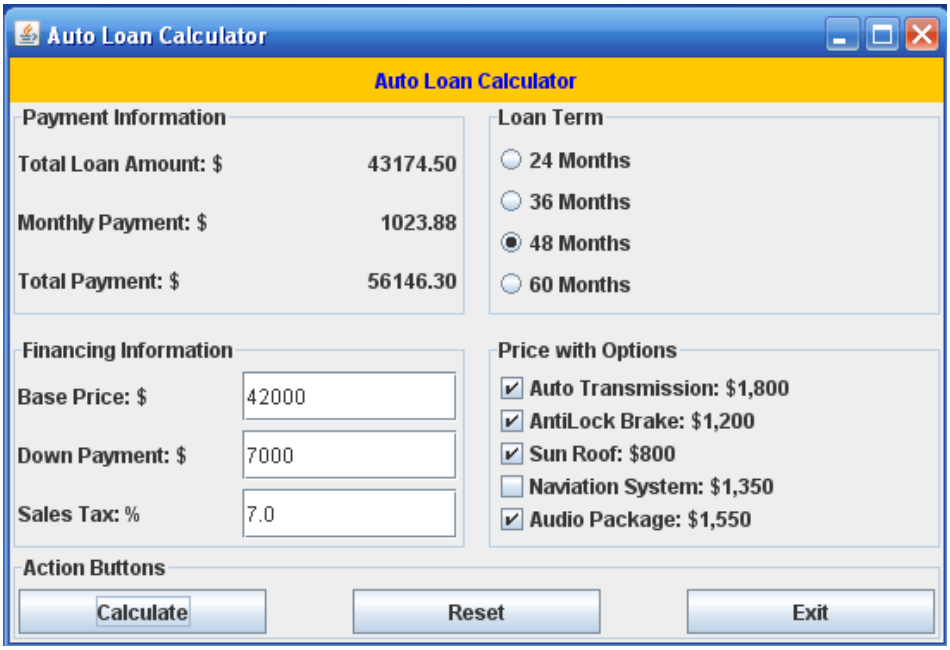
- Compute the "Total Payment" based on the following formula:

```
Total_Payment = Monthly_Payment *
                    Loan_Term_In_Month + Down_payment
```

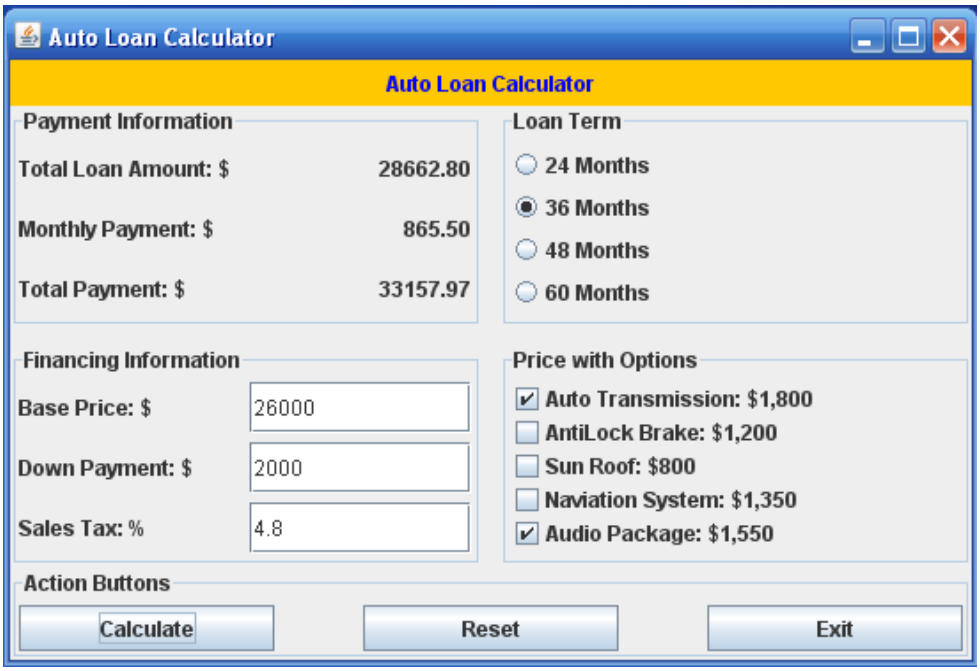
- Display computed "Total Loan Amount", "Monthly Payment", and "Total Payment" on the corresponding JLabels of the "Payment Information" JPanel. **All dollar amounts must be rounded to two decimal places.**
- Reference figures below to implement the "Calculate" Button event handling.

Testing

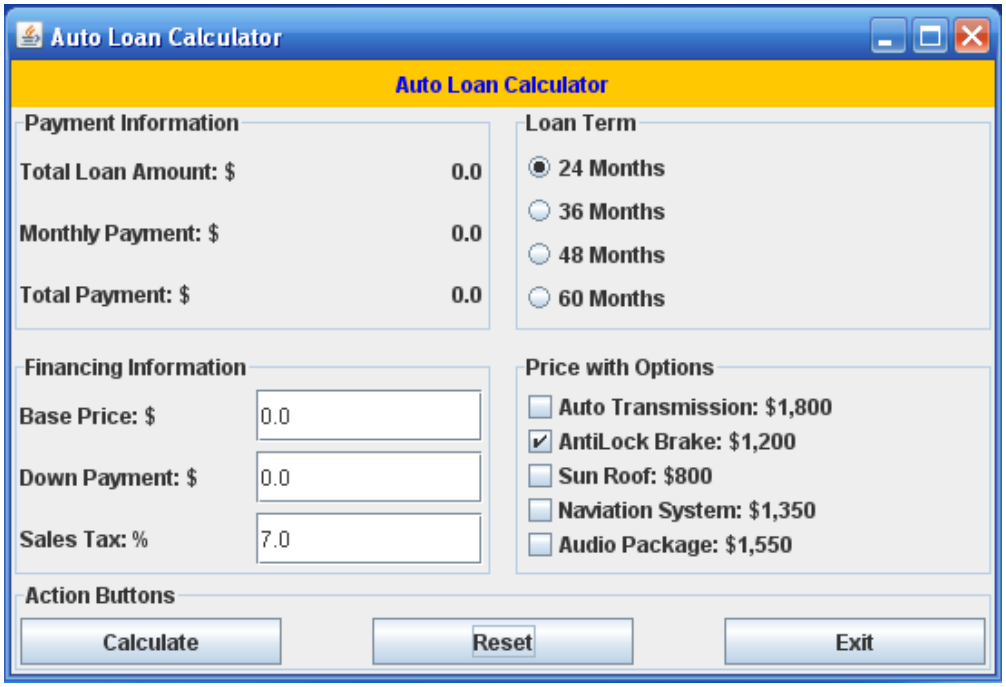
When the user enters "Base Price" of 42,000, "Down Payment" of 7,000, "Sales Tax" of 7%, 48 months Loan Term, and option selection of "Auto Transmission, AntiLock Brake, Sun Roof, and Audio Package", the GUI will show (after calculation):



When the user enters "Base Price" of 26,000, "Down Payment" of 2,000, "Sales Tax" of 4.8%, 36 months Loan Term, and option selection of "Auto Transmission and Audio Package ", the GUI will show (after calculation):



After then, the user clicks on the "Reset" button.



Notes

- Assume the user always enters valid input values.
- The computed prices can be slightly different depending on the way of handling floating point values. Please ignore value differences smaller than a dollar.
- That being said, remember to format to 2 decimal places. It helps limit floating point errors.

Hand-In

Submit all your code in a zip file (or your equivalent, like a rar or a tar) on Blackboard.

Evaluation

Correctness (80 points). These points will be allocated as follows:

10 points for error-free compilation of the Java source files;
28 points for correct construction of the GUI; and
42 points for correct performance of the application and correct results.

Design (10 points). These points will be allocated based on data fields, methods, classes, and algorithms used to complete the design of the required classes.

Documentation and Style (10 points): There are a few style guidelines for the projects.

Please put your name and the project at the top of all code files, such as:

/*Max Fowler
CS161 Project 1*/

In general, your code should have a professional appearance and should have comments. For help with formatting, Eclipse auto formatting is sufficient. Comments must clearly written with correct grammar and spelling (to the best of your ability, no text style shorthand).