

158.326 Software Architecture

Tutorial 1

Write a program (using classes) for the following scenario.

A payment kiosk is used by staff and customers to pay for parking tickets.

Parking rules are as follows:

Staff:

1. The parking charges for the first ten hours are \$2.00.
2. Further parking beyond 10 hours will incur a charge of \$2.00 per hour.
3. Parking time cannot exceed 24 hours. If a car is parked for more than 24 hours, it will be towed away.

Customer

1. The parking charges are based per hour. Parking per hour = \$ 2.00
2. Parking time cannot exceed 24 hours. If a car is parked for more than 24 hours, it will be towed away.

The program should display the parking charges for each staff or customer. Charges are calculated based on the number of hours a car has been parked.

You have to make a two-tier design:

Class Design

Identify what classes you are going to use. What will be the fields, properties and methods?

Hints:

1. Useful Math functions: Math.Ceiling, Math.Abs(x), Math.Floor(x), Math.Max(x,y), Math.Min(x,y)
If a person has parked for 3.5 hours, the kiosk will charge him for 4 hours. So, use Math.Ceiling function
 $\text{Math.Ceiling}(3.5) = 4$
2. To display output in currency format – use ToString("C") (refer to [http://msdn.microsoft.com/en-us/library/dwhawy9k\(v=vs.110\).aspx](http://msdn.microsoft.com/en-us/library/dwhawy9k(v=vs.110).aspx))

Reference:

Pro C# 5.0 and .NET4.5 Framework

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Chapter 5 – Understanding Encapsulation

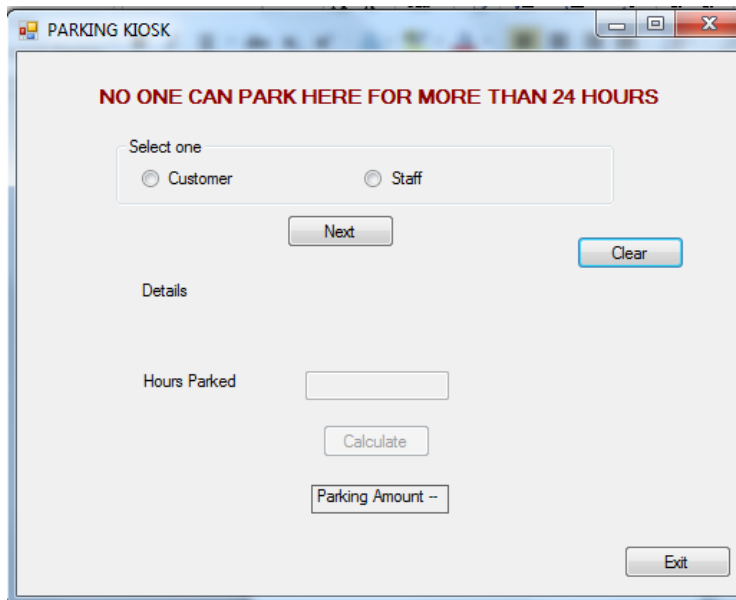
Chapter 6 – Understanding Inheritance and Polymorphism

Chapter 7 – Understanding Structured Exception Handling

HINT:

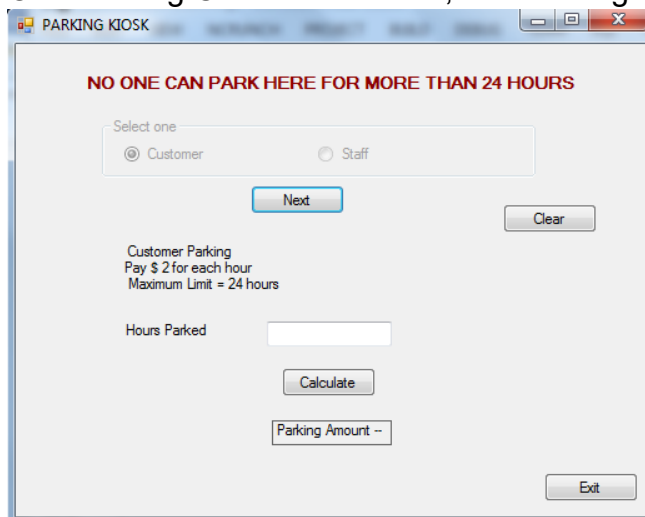


Form Design

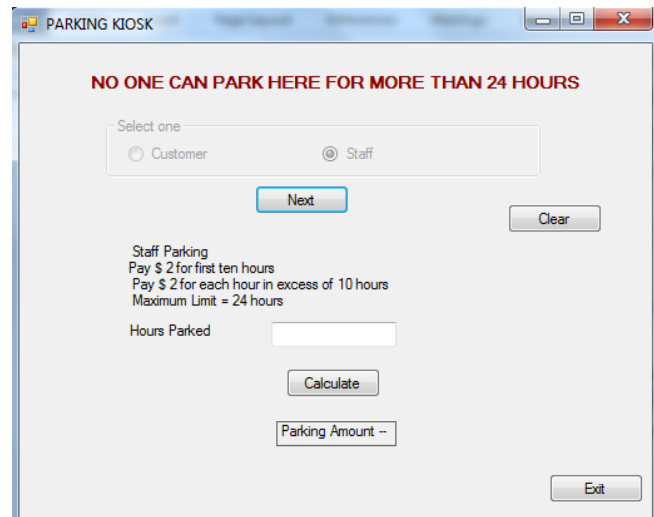


The initial form design for the PARKING KIOSK includes a title bar with standard window controls. The main content area features a red header text: "NO ONE CAN PARK HERE FOR MORE THAN 24 HOURS". Below this is a "Select one" section with two radio buttons: "Customer" and "Staff". To the right of the radio buttons are "Next" and "Clear" buttons. Further down is a "Details" label. Below that is an "Hours Parked" label followed by a text input field. Below the input field is a "Calculate" button. Below the "Calculate" button is a "Parking Amount --" label followed by a text input field. At the bottom right is an "Exit" button.

On selecting Customer or Staff, and clicking the "Next" button:

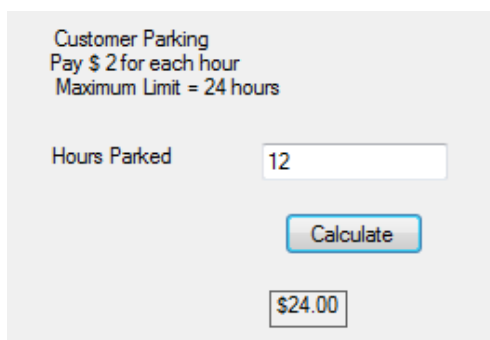


After selecting "Customer" and clicking "Next", the form displays "Customer Parking" details: "Pay \$ 2 for each hour" and "Maximum Limit = 24 hours". The "Hours Parked" input field is now empty. The "Calculate" button is highlighted in blue. The "Parking Amount --" input field shows "--". The "Exit" button remains at the bottom right.



After selecting "Staff" and clicking "Next", the form displays "Staff Parking" details: "Pay \$ 2 for first ten hours", "Pay \$ 2 for each hour in excess of 10 hours", and "Maximum Limit = 24 hours". The "Hours Parked" input field is now empty. The "Calculate" button is highlighted in blue. The "Parking Amount --" input field shows "--". The "Exit" button remains at the bottom right.

The parking amount varies for customer and staff

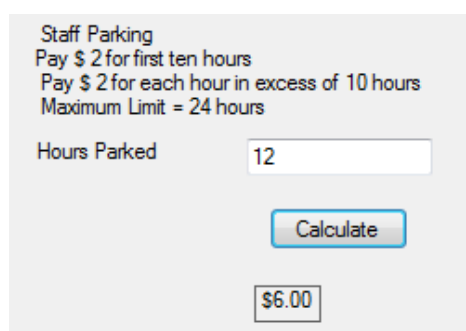


Customer Parking
Pay \$ 2 for each hour
Maximum Limit = 24 hours

Hours Parked: 12

Calculate

Parking Amount: \$24.00



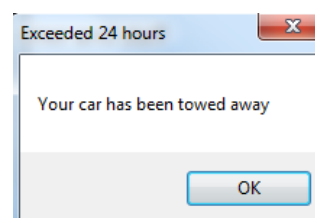
Staff Parking
Pay \$ 2 for first ten hours
Pay \$ 2 for each hour in excess of 10 hours
Maximum Limit = 24 hours

Hours Parked: 12

Calculate

Parking Amount: \$6.00

If parking exceeds 24 hours, an exception is thrown from a class member and caught by the form.



Exceeded 24 hours

Your car has been towed away

OK