

158.326 Software Architecture – Semester 2

Tutorial 1 – use Microsoft Visual Studio 2019

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
`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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ISBN: 978-1-4302-4234-5

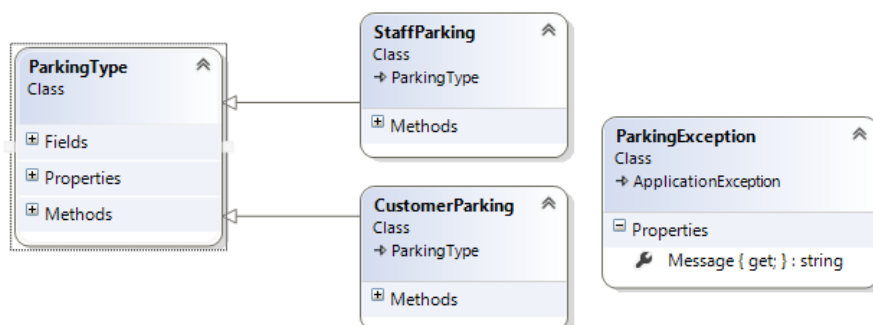
Edition: 6th, Publisher: Apress, E-book

Chapter 5 – Understanding Encapsulation

Chapter 6 – Understanding Inheritance and Polymorphism

Chapter 7 – Understanding Structured Exception Handling

HINT:



Form Design

The initial form is titled "PARKING KIOSK" and features a red warning message: "NO ONE CAN PARK HERE FOR MORE THAN 24 HOURS". Below this, there is a "Select one" section with two radio buttons: "Customer" and "Staff". A "Next" button is positioned below the radio buttons, and a "Clear" button is to its right. Further down, there is a "Details" section, followed by an "Hours Parked" input field, a "Calculate" button, and a "Parking Amount --" output field. An "Exit" button is located at the bottom right of the form.

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

This screenshot shows the form after the "Customer" radio button is selected and the "Next" button is clicked. The "Next" button is now highlighted in blue. The "Details" section has updated to show "Customer Parking" with the rules: "Pay \$ 2 for each hour" and "Maximum Limit = 24 hours". The "Hours Parked" input field is empty, and the "Calculate" button is visible below it.

This screenshot shows the form after the "Staff" radio button is selected and the "Next" button is clicked. The "Next" button is highlighted in blue. The "Details" section has updated to show "Staff Parking" with the rules: "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 empty, and the "Calculate" button is visible below it.

The parking amount varies for customer and staff

This screenshot shows the "Customer Parking" form with "12" entered in the "Hours Parked" input field. The "Calculate" button is highlighted in blue, and the "Parking Amount" field displays "\$24.00".

This screenshot shows the "Staff Parking" form with "12" entered in the "Hours Parked" input field. The "Calculate" button is highlighted in blue, and the "Parking Amount" field displays "\$6.00".

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

An error dialog box titled "Exceeded 24 hours" is displayed. The message inside reads "Your car has been towed away". There is an "OK" button at the bottom of the dialog.