Hacettepe University
Department of Computer Engineering

BiL235 Programming Lab.
Assignment 1

Subject : Object Oriented Programming / C#
Platform : .NET Framework (version 4.0)
Due Date : October 26th, 2011
Advisors : Dr. Erkut Erdem, R. A. Yalın Yalıç

INTRODUCTION

C# (pronounced C Sharp) is a multi-paradigm programming language that encompasses functional, imperative, generic, object-oriented (class-based), and component-oriented programming disciplines [1]. It was developed by Microsoft as part of the .NET initiative. C# is intended to be a simple, modern, general-purpose, object-oriented programming language. It has an object-oriented syntax based on C++ and is heavily influenced by Java.

AIM

This experiment is mainly aimed on learning a new programming language, understanding the differences between Java, using operator overloading and some basic methods of stack [2].

PROBLEM

In this experiment you are expected to design and develop a program which calculates mathematical expressions. Expressions are given as a string and consist of integers with special operators: “&” and “%”. These special operators have equivalent binary operators that shown in the table-1. Also parenthesis signs are used to separate expressions and determine precedence. Requirements and rules of the system are listed below;

- You have to use stack class of C# in Systems.Collectios as a container of elements in expression.
- Since our aim is OOP, consider numbers as an object, not an integer type. So, our base class, let’s say *parameter*, will have attribute (value), and have methods (get, set, &, %).
- Other classes like String and Integer will derived from base class.

Operator	For operands of	
	Normal Type Integer	Special Type Integer
&	+	-
%	*	/

Table-1: Operators and their behaviors

- We have also a class called specialType. For numbers of specialType, the operators "&" and "%" behave opposite to their normal behaviors (see the related column in Table-1). You must use operator overloading in this part.
- Normally “%” operator has high precedence than “&“ operator. In the program it is under the control of user to use precedence or not. If using precedence is not selected, calculate expression in order. (parenthesis signs are always high precedence than others, in ordered calculation too)

INPUT

When you run your program, it will ask for input string which contains precedence and specialType information and mathematical expression. To determine precedence and specialType objects, use parameters: “p” means precedence, “o” means ordered. “n” means integer with normal type, “s” means integer with special type.

Example input/output sequence is shown below:

```
Type your expression (e for exit): p n 2&4%2
Result: 10
Type your expression (e for exit): o n 2&4%2
Result: 12
Type your expression (e for exit): p s 2&4%2
Result: 0
Type your expression (e for exit): o s 2&4%2
Result: -1
Type your expression (e for exit): p n ((10&2)%4)&(3&1)
Result: 52
Type your expression (e for exit): p s ((10&2)%4)&(3&1)
Result: 0
Type your expression (e for exit): o n (10&1&(2&(3&(4%2))))%2
Result: 48
Type your expression (e for exit): o s (10&1&(2&(3&(4%2))))%2
Result: 4
Type your expression (e for exit): e
```

DESIGN RULES

- You have to use inheritance for parameter (string, integer, specialType, …) implementation. You may use polymorphism if it's available.
- Also you have to use stack class in System.Collections, so you should learn about last-in-first-out (LIFO) structure and basic methods like push, pop, etc.
- You have to handle all exceptions and error checking (like division by zero or missing parameters in input string).

Last Remarks

- Use Microsoft Visual Studio 2010 (Express Edition is also enough for this homework) as development environment [3].
- You have to submit a zip file which includes the Visual Studio 2010 project directory and the report in a directory **named as your student number**. Also your project name must be your student number. Content of the zip file is:

  + report
  | - report.pdf
  + source
  | - source.zip

- Content of "source.zip" file is:

  - studentID.sln
  + studentID
  | - studentID.csproj
  | - studentID.csproj.user
  | - *.cs (one or more source code files)
  | + Properties
  | - AssemblyInfo.cs

- Your **REPORT** must be written according to the instructions in the file "ftp://ftp.cs.hacettepe.edu.tr/pub/dersler/genel/FormatForLabReports.doc"
- You will use online submission system to submit your experiments. (https://submit.cs.hacettepe.edu.tr/) Submission time for **deadline is 23:59**. No other submission methods (such as e-mail) will be accepted.
- Do not submit any file via e-mail related with this assignment.
- Regardless of the length, use understandable names to your variables, classes and functions.
- Write readable source code block.
- Save all your work until the assignment is graded.

- The assignment must be original, **INDIVIDUAL** work. Duplicate or very similar assignments are both going to be **punished**. General discussion of the problem is allowed, but **DO NOT SHARE** answers, algorithms or source codes.
- You can ask your questions through course's news group and you are supposed to be aware of everything discussed in the newsgroup: **news://news.cs.hacettepe.edu.tr/dersler.235**
- Respect the office hours of your advisor (on Monday between 9:30-11:30 and on Tuesday 13:30-15:30).

References

1. http://en.wikipedia.org/wiki/C_Sharp_(programming_language)
2. http://en.wikipedia.org/wiki/Stack_%28data_structure%29
3. Visual C# 2010 Express Edition: http://www.microsoft.com/visualstudio/en-us/products/2010-editions/visual-csharp-express
4. MSDNAA Online Software System: http://msdn60.e-academy.com/uni_hacettepe_ce_ankara
5. C# Programming Guide: http://msdn.microsoft.com/en-us/library/67ef8sbd.aspx