UNIVERSITY OF THE PUNJAB
Session: BS (SE) Fall 2021 Morning
Course: Web Technologies
Lab 02, Time Duration: 1.5hr, Total Marks: 40

Lab Contents:

Optional Arguments, named arguments, ***out*** and ***ref*** keywords, argument passing by ***val*** and by ***ref***, *static*, *readonly*, *const* keyword, Tuples, Value type, Reference type, ***var*** dynamic keyword, Some file-handling tasks

Objective:

To practice C# syntax associated with above concepts.

CodeCraft: The Adventure in Programming Land

Welcome to CodeCraft, a thrilling adventure in Programming Land! In this interactive lab manual, you will embark on a journey to master various programming concepts while exploring the wonders of a virtual world.

Game Introduction:

You find yourself in the bustling town of Syntaxville, where the inhabitants are friendly coders eager to share their knowledge. As a novice programmer, your mission is to navigate through different challenges and quests to become a master of coding.

Quest 1: The Optional Arguments Village (5 marks)

Objective: Help the villagers in Syntaxville by implementing optional arguments in their daily tasks.

Challenge: Create a class ShoppingCart. Create a public method CalculateTotalPrice in it. CalculateTotalPrice will accept 2 parameters. A double type list of itemPrices, and an optional argument with default discount = 0. Calculate the sum of all item prices and apply discount on the sum.

Quest 2: The Ref and Out Keyword Dungeon (5 marks)

Objective: Brave the depths of the Ref and Out Keyword Dungeon to rescue the lost artifacts of Syntaxville.
Challenge: Create a class MathHelper. Create 2 methods in it. One with name SwapIntegers, a method to swap the values of two integers using the ref keyword. Then, write another method DivideWithRemainder, take 4 arguments,

1. dividend
2. divisor
3. quotient
4. remainder

use the out keyword to return the quotient and remainder of dividing two numbers.

Quest 3: The Argument Passing Mountain (4 marks)

Objective: Scale the Argument Passing Mountain and understand the difference between passing by value and by reference.
Challenge: Write a program to demonstrate the effects of passing parameters by value and by reference on the original variables. The name of method should be PassByValueAndReference. It will take 2 arguments. 1st argument by value and 2nd by reference.

Quest 4: The Static Sanctuary (10 marks)

Objective: Visit the Static Sanctuary and harness the power of static members.
Challenge: Create a class to keep track of the number of players in a multiplayer game using a static member. Name the class as MultiplayerGame. Add a private static member playerCount and initialize it with 0. Ensure that the count is updated whenever a new player joins. Create methods AddPlayer to increment the Count, RemovePlayer to decrement the count but make sure that it don't get negative, and a GetPlayerCount to return the current count of player!

Quest 5: The Const Citadel (5 marks)

Objective: Conquer the Const Citadel and uphold the immutable values of Syntaxville.
Challenge: Define a class to represent the properties of a geometric shape. Name it as GeometricShape. Use const fields to represent the value of Pi (3.14159) and ensure it remains constant throughout the program. Create 2 methods.
1. CalculateArea: It will take radius as argument. Calculate Area. Area = πR^2
2. CalculateCircumference: Take radius as argument. Circumference = $2\pi R$

Quest 6: The Tuples Tundra (2 marks)

Objective: Brave the icy winds of the Tuples Tundra and uncover the hidden treasures of tuples.
Challenge: Write a method to calculate the area and perimeter of a rectangle and return the values as a tuple. Name the method as CalculateRectangeProperties. Take 2 arguments, length and width.
Area = length*width
Perimeter = 2*(Area)

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Quest 7: The Var and Dynamic Valley (4 marks)

Objective: Explore the Var and Dynamic Valley to harness the flexibility of type inference and dynamic typing.
Challenge: Declare variables using the var keyword for type inference and then use the dynamic keyword to handle different data types dynamically. Declare 2 variables using var keyword in Main program. Display their types. Declare 1 variable using dynamic keyword. Provide multiple inputs to dynamic variable and display their types.

Navigate your TAs with your journey through all milestones. Use Main Program to demonstrate the working. (5 marks)

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Learning Resources:

- ★ Named and Optional Arguments – Microsoft Learn
- ★ ref keyword usage C# - Microsoft Learn
- ★ out keyword usage C# -Microsoft Learn
- ★ static keyword usage C# - Microsoft Learn
- ★ readonly keyword usage C# - Microsoft Learn
- ★ const keyword usage C# - Microsoft Learn
- ★ Implicitly typed local variables using var keyword - Microsoft Learn
- ★ Method parameters passing – Microsoft Learn
- ★ Tuples types C# - Microsoft Learn
- ★ Value types C# - Microsoft Learn
- ★ Reference types C# - Microsoft Learn
- ★ Read-write text files [StreamReader & StreamWriter] C# - Microsoft Learn