Day 1 – C# & OOP Basics (Part 1)

Date: 09-10-2025

Topic: CLR, JIT, Garbage Collector, Managed Code, Variables, Data Types, Operators, Conditional Statements, Loops

1. OVERVIEW OF C#

C# (pronounced *C Sharp*) is an **object-oriented programming language** developed by Microsoft, mainly used for building **.NET applications** — desktop, web, and cloud.

2. CLR (COMMON LANGUAGE RUNTIME)

- CLR is the **heart of the .NET Framework**.
- It provides a runtime environment to execute programs written in .NET languages (like C#, VB.NET, F#).
- It handles:
  - **Memory management**
  - **Exception handling**
  - **Security**
  - **Garbage collection**
  - **Just-In-Time (JIT) compilation**

Example flow:
C# Code → Compiled into **MSIL (Microsoft Intermediate Language)** → Executed by **CLR using JIT compiler**

3. JIT (JUST-IN-TIME COMPILER)

- Converts **Intermediate Language (IL)** into **machine code** just before execution.
- Makes .NET applications **platform-independent** and efficient.
- Types of JIT:
  - **Pre-JIT:** Compiles entire code at once.
  - **Econo-JIT:** Compiles only methods called at runtime.
  - **Normal JIT:** Compiles code on demand and stores it for reuse.

4. GARBAGE COLLECTOR (GC)

- Automatically **frees up memory** that’s no longer in use.

- No need for manual memory management (like in C/C++).
- GC works in **three generations (0, 1, 2)** to optimize performance.
- You can also call it manually (though rarely needed):
- GC.Collect();

5. MANAGED CODE

- Code that runs **under CLR supervision** is called *managed code*.
- CLR manages memory, security, and exceptions for it.
- Code outside CLR (like native C++) is *unmanaged code*.

Example:

```
Console.WriteLine("This is managed code under CLR!");
```

6. VARIABLES & DATA TYPES

Variables: Named storage for data.
Syntax:

```
datatype variableName = value;
```

Example:

```
int age = 25;

string name = "Udaya";

float salary = 25000.5f;
```

Common Data Types:

Type	**Size**	**Example**
int	4 bytes	10
float	4 bytes	12.5f
double	8 bytes	45.67
char	2 bytes	'A'
string	Variable	"Hello"
bool	1 byte	true/false

7. OPERATORS

Operators are used to perform operations on variables.

Types:

- Arithmetic: + - * / %
- Relational: == != > < >= <=
- Logical: && || !
- Assignment: = += -= *= /=
- Increment/Decrement: ++ --

Example:

```
int a = 10, b = 20;

Console.WriteLine(a + b); // 30
```

8. CONDITIONAL STATEMENTS

Used to control flow based on conditions.

if-else

```
int num = 5;

if(num > 0)

   Console.WriteLine("Positive");

else

   Console.WriteLine("Negative");
```

switch

```
int day = 2;

switch(day)

{

   case 1: Console.WriteLine("Monday"); break;

   case 2: Console.WriteLine("Tuesday"); break;

   default: Console.WriteLine("Other day"); break;

}
```

9. LOOPS

Used to execute code repeatedly.

for

```
for(int i = 1; i <= 5; i++)
   Console.WriteLine(i);
```

while

```
int i = 1;
while(i <= 5)
{
   Console.WriteLine(i);
   i++;
}
```

do-while

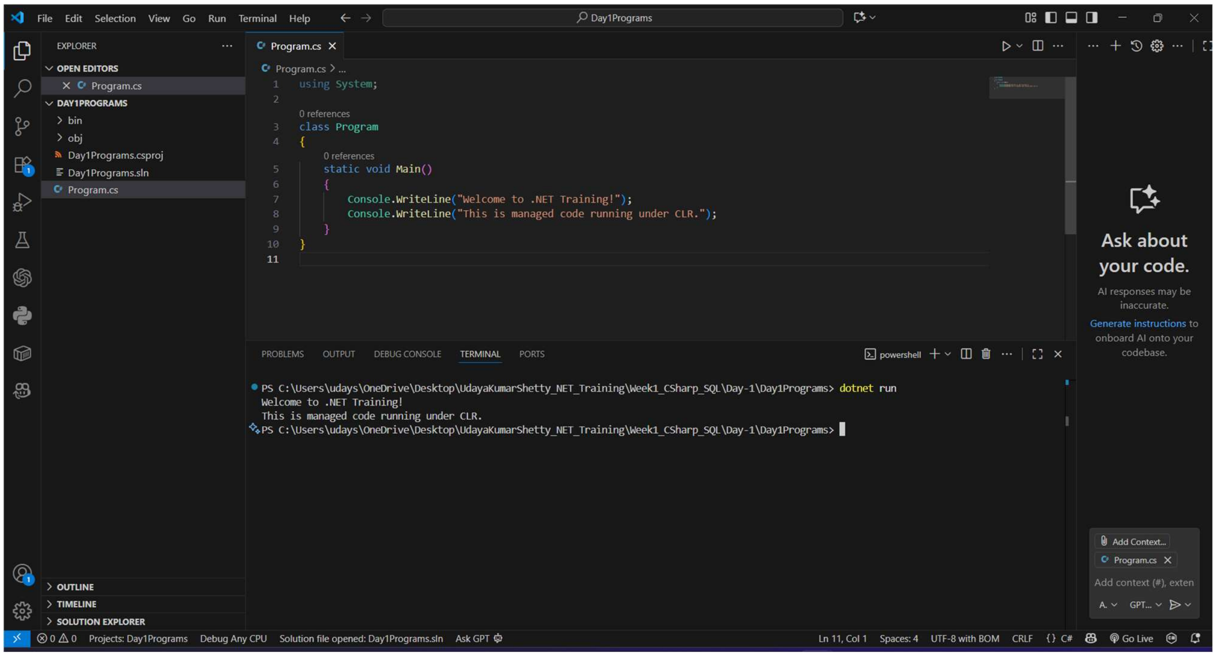
```
int i = 1;
do
{
   Console.WriteLine(i);
   i++;
} while(i <= 5);
```

Summary

Learned: CLR, JIT, GC, Managed Code, Variables, Data Types, Operators, If-Else, Loops
Practiced basic console programs.

Snapshots (Day -1)

Program: Hello World & Managed Code

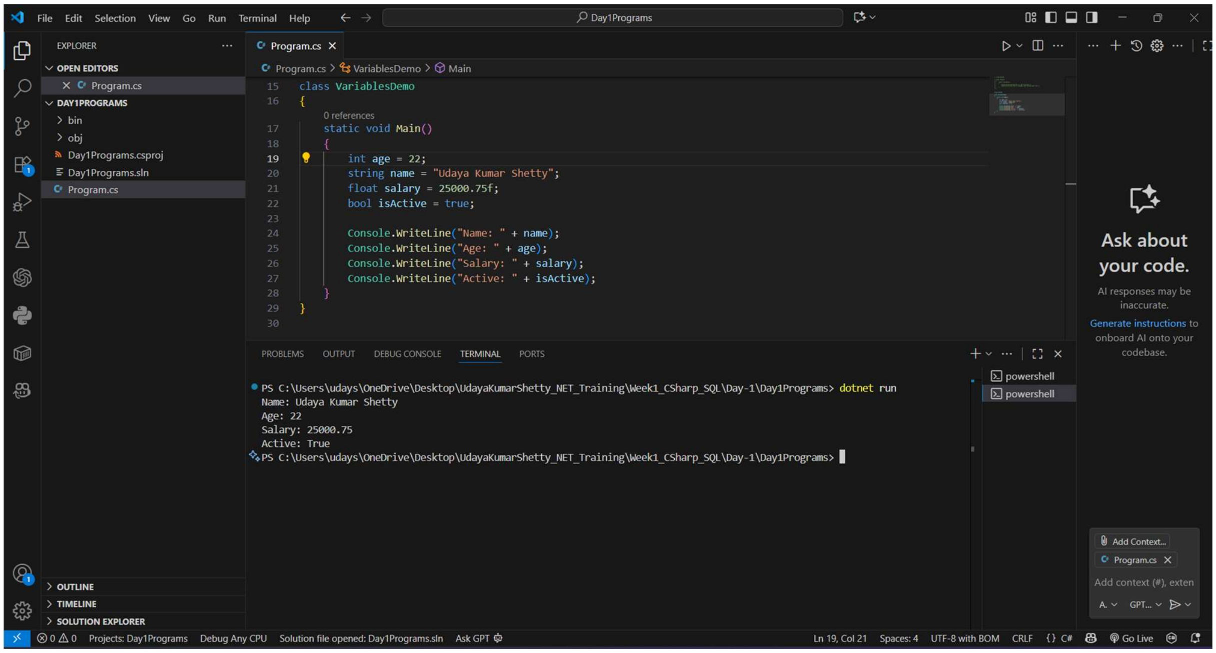


```csharp
using System;

class Program
{
    static void Main()
    {
        Console.WriteLine("Welcome to .NET Training!");
        Console.WriteLine("This is managed code running under CLR.");
    }
}
```

```
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs> dotnet run
Welcome to .NET Training!
This is managed code running under CLR.
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs>
```

Program: Variables and Data Types

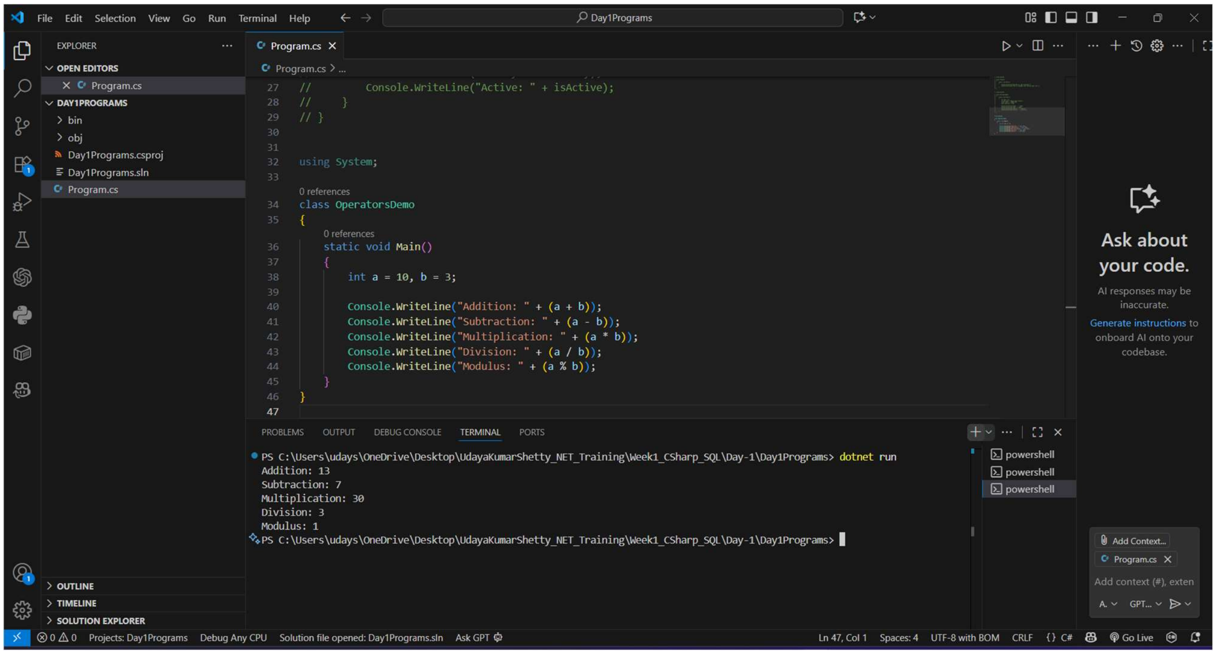


```csharp
class VariablesDemo
{
    static void Main()
    {
        int age = 22;
        string name = "Udaya Kumar Shetty";
        float salary = 25000.75f;
        bool isActive = true;

        Console.WriteLine("Name: " + name);
        Console.WriteLine("Age: " + age);
        Console.WriteLine("Salary: " + salary);
        Console.WriteLine("Active: " + isActive);
    }
}
```

```
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs> dotnet run
Name: Udaya Kumar Shetty
Age: 22
Salary: 25000.75
Active: True
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs>
```

Program: Operators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Day1Programs
EXPLORER
OPEN EDITORS
Program.cs
DAY1PROGRAMS
bin
obj
Day1Programs.csproj
Day1Programs.sln
Program.cs
OUTLINE
TIMELINE
SOLUTION EXPLORER
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
powershell
powershell
powershell
Ask about your code.
AI responses may be inaccurate.
Generate instructions to onboard AI onto your codebase.
Add Context...
Add context (#), exten
Projects: Day1Programs Debug Any CPU Solution file opened: Day1Programs.sln Ask GPT
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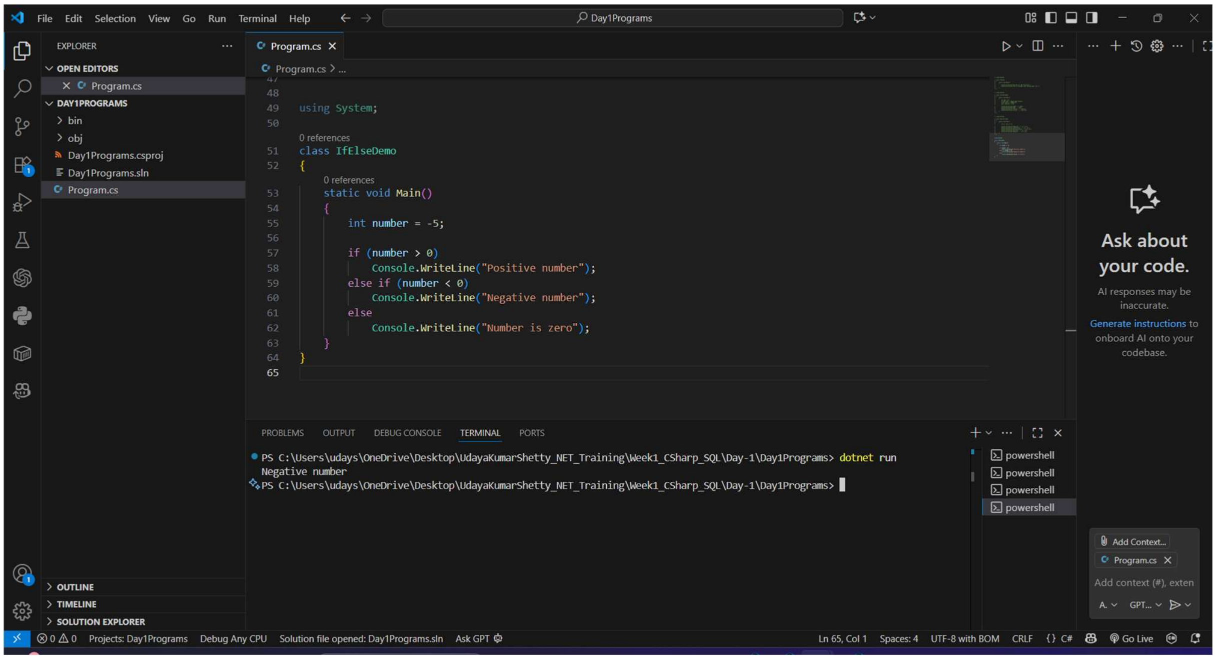
```csharp
//         Console.WriteLine("Active: " + isActive);
//     }
// }


using System;

class OperatorsDemo
{
    static void Main()
    {
        int a = 10, b = 3;

        Console.WriteLine("Addition: " + (a + b));
        Console.WriteLine("Subtraction: " + (a - b));
        Console.WriteLine("Multiplication: " + (a * b));
        Console.WriteLine("Division: " + (a / b));
        Console.WriteLine("Modulus: " + (a % b));
    }
}
```

```
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs> dotnet run
Addition: 13
Subtraction: 7
Multiplication: 30
Division: 3
Modulus: 1
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs>
```

Program: If–Else Example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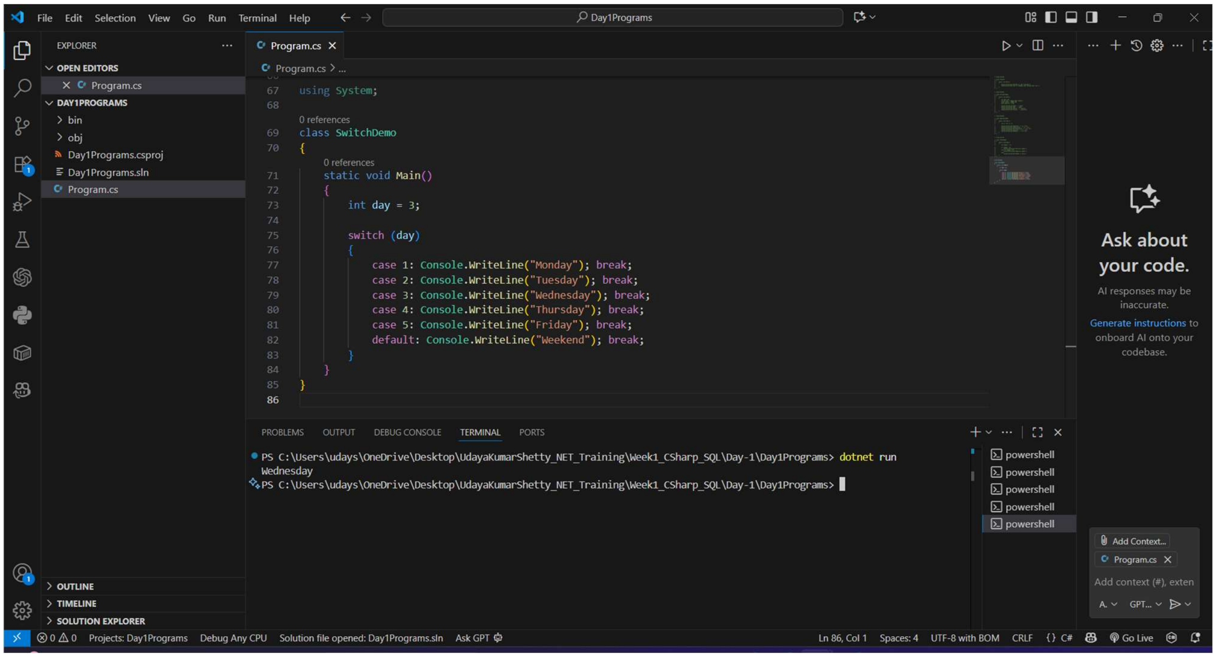
```csharp
using System;

class IfElseDemo
{
    static void Main()
    {
        int number = -5;

        if (number > 0)
            Console.WriteLine("Positive number");
        else if (number < 0)
            Console.WriteLine("Negative number");
        else
            Console.WriteLine("Number is zero");
    }
}
```

```
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs> dotnet run
Negative number
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs>
```

Program: Switch Case Example



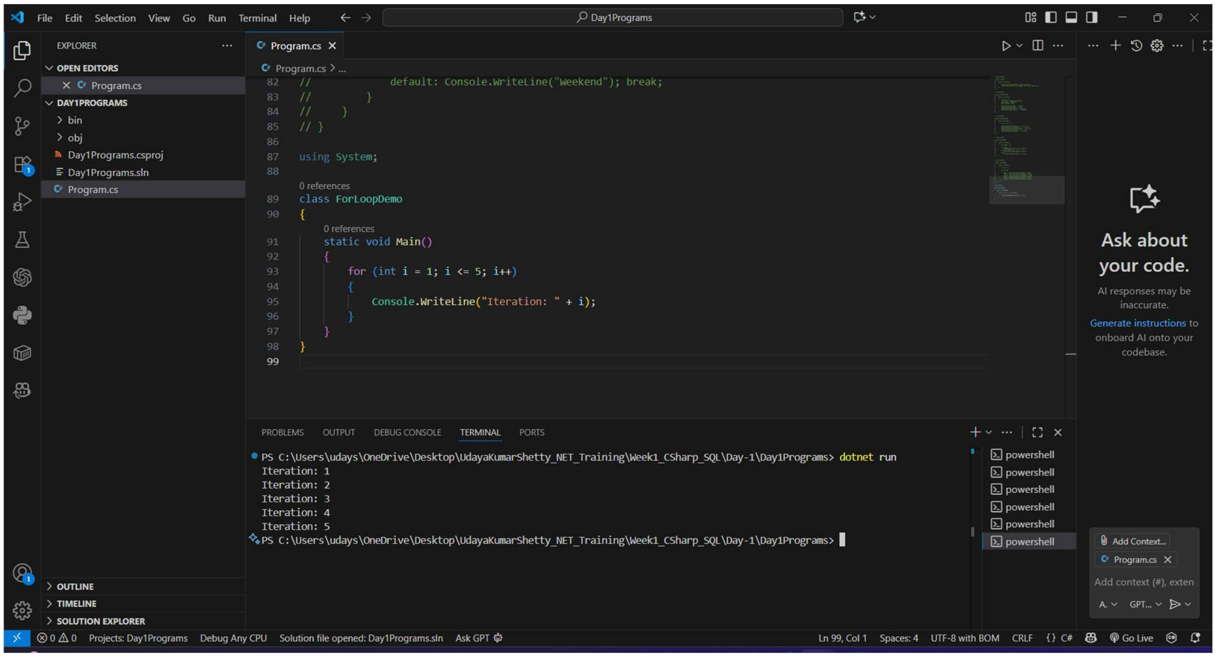
```
using System;

class SwitchDemo
{
    static void Main()
    {
        int day = 3;

        switch (day)
        {
            case 1: Console.WriteLine("Monday"); break;
            case 2: Console.WriteLine("Tuesday"); break;
            case 3: Console.WriteLine("Wednesday"); break;
            case 4: Console.WriteLine("Thursday"); break;
            case 5: Console.WriteLine("Friday"); break;
            default: Console.WriteLine("Weekend"); break;
        }
    }
}
```

```
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs> dotnet run
Wednesday
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs>
```

Program: For Loop



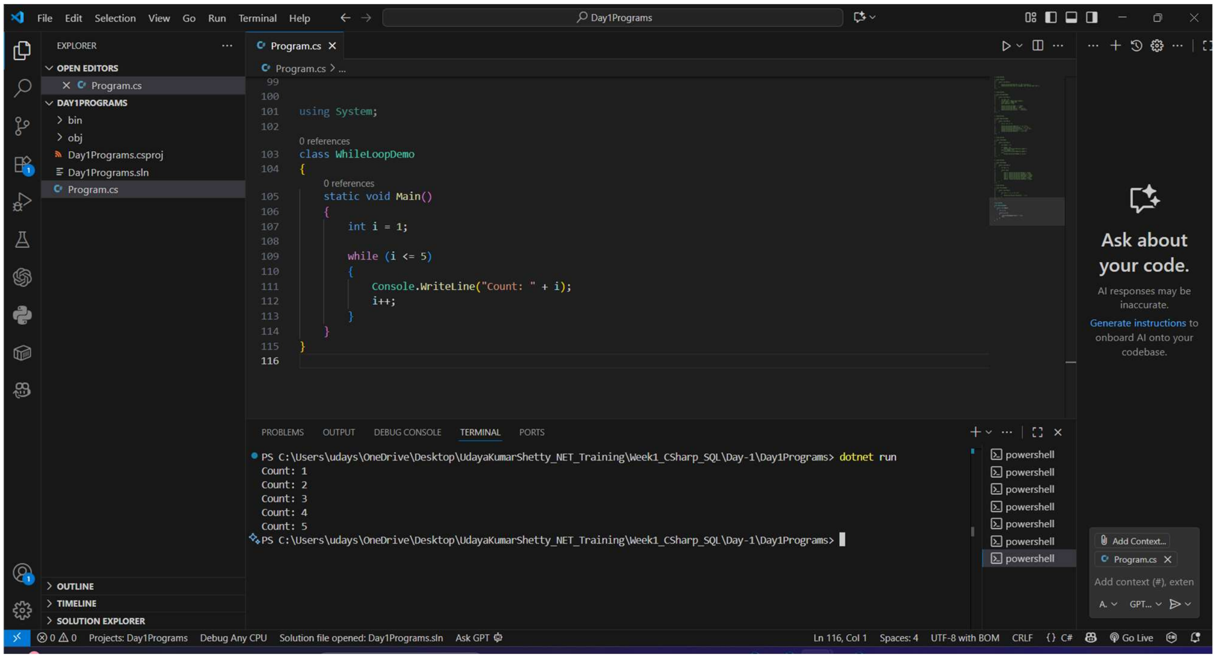
```
//             default: Console.WriteLine("Weekend"); break;
//         }
//     }
// }

using System;

class ForLoopDemo
{
    static void Main()
    {
        for (int i = 1; i <= 5; i++)
        {
            Console.WriteLine("Iteration: " + i);
        }
    }
}
```

```
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs> dotnet run
Iteration: 1
Iteration: 2
Iteration: 3
Iteration: 4
Iteration: 5
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs>
```

Program: While Loop



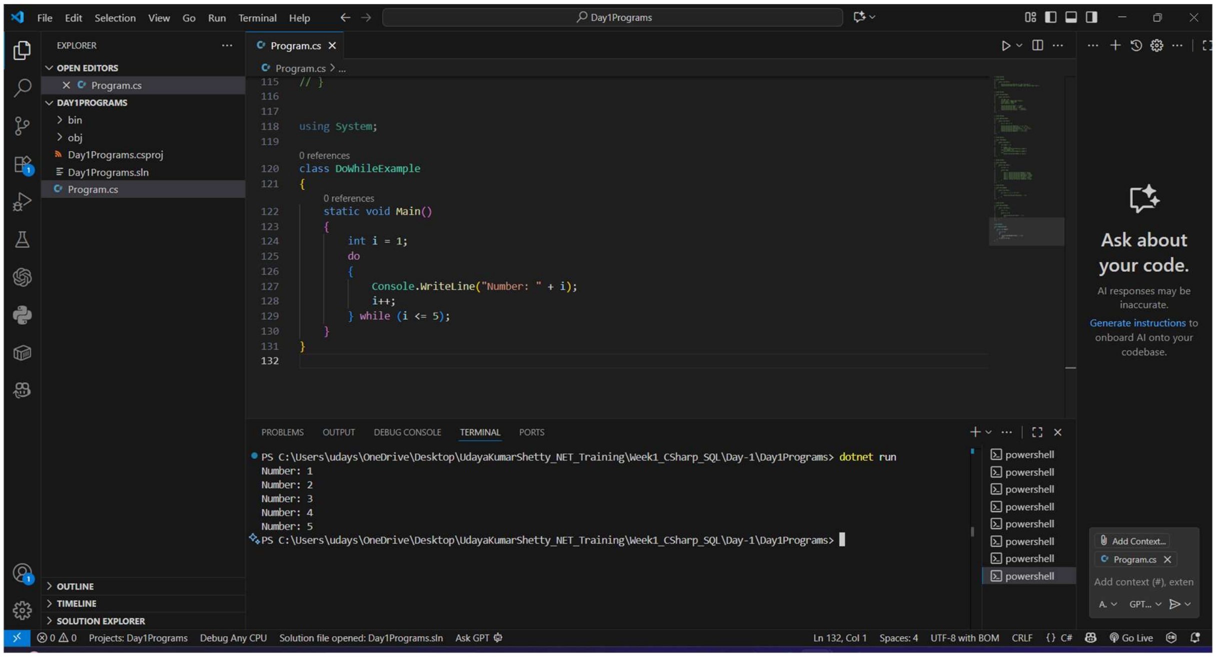
```csharp
using System;

class WhileLoopDemo
{
    static void Main()
    {
        int i = 1;

        while (i <= 5)
        {
            Console.WriteLine("Count: " + i);
            i++;
        }
    }
}
```

```
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs> dotnet run
Count: 1
Count: 2
Count: 3
Count: 4
Count: 5
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs>
```

Program: Do–While Loop



```csharp
// }


using System;

class DoWhileExample
{
    static void Main()
    {
        int i = 1;
        do
        {
            Console.WriteLine("Number: " + i);
            i++;
        } while (i <= 5);
    }
}
```

```
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs> dotnet run
Number: 1
Number: 2
Number: 3
Number: 4
Number: 5
PS C:\Users\udays\OneDrive\Desktop\UdayaKumarShetty_NET_Training\Week1_CSharp_SQL\Day-1\Day1Programs>
```