

```

1 using System;
2
3 namespace _01_DATA_TYPES
4 {
5     class Program
6     {
7         // User-defined enum (Value Type)
8         enum Color { Red, Blue, Green }
9
10        // User-defined struct (Value Type)
11        struct Point
12        {
13            public int X;
14            public int Y;
15        }
16
17        // User-defined class (Reference Type)
18        class Person
19        {
20            public string Name;
21            public int Age;
22        }
23
24        static void Main(string[] args)
25        {
26            // -----
27            // Overview of Data Types in C#
28            // -----
29            // C# data types are categorized into:
30            // 1. Value Types - store data directly.
31            // 2. Reference Types - store reference to data.
32
33            #region 01. Value Type:
34            Console.WriteLine("----- VALUE TYPES -----");
35
36            // Integer (32-bit signed)
37            int number = 26;
38            Console.WriteLine($"Integer value: {number}");
39
40            // Nullable Integer (can be null)
41            int? age = null;
42            Console.WriteLine($"Nullable int (age): {age}");
43
44            // Byte (8-bit unsigned)
45            byte smallNumber = 255;
46            Console.WriteLine($"Byte value: {smallNumber}");
47
48            // Long (64-bit signed)
49            long largeNumber = 984983L;
50            Console.WriteLine($"Long value: {largeNumber}");
51
52            // Float (32-bit floating-point)
53            float temperature = 5.5f;
54            Console.WriteLine($"Float value: {temperature}");
55
56            // Double (64-bit floating-point)
57            double pi = 3.14159;
58            Console.WriteLine($"Double value: {pi}");
59
60            // Character
61            char letter = 'A';
62            Console.WriteLine($"Char value: {letter}");
63
64            // Boolean
65            bool isActive = true;
66
67            Console.WriteLine($"Boolean value: {isActive}");
68
69            // Enum
70            Color favoriteColor = Color.Red;
71            Console.WriteLine($"Enum value (Color): {favoriteColor}");
72
73            // Struct
74            Point p;
75            p.X = 5;
76            p.Y = 10;
77            Console.WriteLine($"Struct value: X = {p.X}, Y = {p.Y}");
78            #endregion
79
80            #region 02. Reference Type:
81            Console.WriteLine("\n----- REFERENCE TYPES -----");
82
83            // String (immutable)
84            string firstName = "Thillai";

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84     String lastName = "Tamil";
85     Console.WriteLine($"String values: {firstName} {lastName}");
86
87     // Object
88     object genericData = 42;
89     Console.WriteLine($"Object value: {genericData}");
90
91     // Dynamic
92     dynamic dynamicData = "I am dynamic";
93     Console.WriteLine($"Dynamic value: {dynamicData}");
94
95     // Array
96     int[] numbersArray = { 1, 2, 3, 4 };
97     Console.WriteLine("Array values: " + string.Join(", ", numbersArray));
98
99     // Class
100    Person person = new Person { Name = "Kumar", Age = 30 };
101    Console.WriteLine($"Class (Person): Name = {person.Name}, Age = {person.Age}");
102
103    #endregion
104
105    #region 03. Extras:
106    Console.WriteLine("\n----- TYPE INFO & LIMITS -----");
107
108    Console.WriteLine($"Integer Min Value: {int.MinValue}");
109    Console.WriteLine($"Long Max Value: {long.MaxValue}");
110    Console.WriteLine($"Size of int: {sizeof(int)} bytes");
111    Console.WriteLine($"Default value of string: {(default(string) == null ? "null" : default(string))}");
112
113    Console.WriteLine("\n----- PARSING & CONVERSION -----");
114
115    string input = "123";
116    int parsedInt = int.Parse(input);
117    Console.WriteLine($"Parsed integer: {parsedInt}");
118
119    bool isValid = double.TryParse(input, out double parsedDouble);
120    Console.WriteLine($"Double parsing successful: {isValid}, Result: {parsedDouble}");
121
122    #endregion
123
124    #region 04. Explanation for value and refernece type:
125    Console.WriteLine("\n----- VALUE vs REFERENCE TYPES -----");
126
127    // Value Type Example
128    int a = 10;
129    int b = a;
130    b = 20;
131    Console.WriteLine($"Value Type Example - a: {a}, b: {b}"); // a=10, b=20
132
133    // Reference Type Example
134    int[] refArr1 = { 1, 2, 3 };
135    int[] refArr2 = refArr1;
136    refArr2[0] = 99;
137    Console.WriteLine($"Reference Type Example - refArr1[0]: {refArr1[0]}, refArr2[0]: {refArr2[0]}"); // both=99
138
139    Console.WriteLine("\nValue types store data directly. Assigning them copies the value.");
140    Console.WriteLine("Reference types store a memory reference. Assigning them shares the same object.");
141
142    Console.WriteLine("\n----- END OF PROGRAM -----");
143    #endregion
144    }
145 }
146 }

```