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# C# Programming Language Essential

## Tahaluf Training Center 2022

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1. Installing Visual Studio
2. Creating a New Project
3. Overview of C# language
4. How to Write a Comment
5. Reading and Writing Statements
6. Overview of Data Types
7. Declaring Variables and Constants
8. Type Conversion
9. Boxing and Unboxing

# Installing Visual Studio

# Overview of Visual Studio

Visual Studio is an Integrated Development Environment (IDE). It is used as a common environment for developing projects in C#, .NET, C++, and other frameworks and languages. It is characterized by containing an ecosystem that helps the developer in editing and correcting errors quickly, which facilitates the work on it.

# Why Visual Studio

1. Visual Studio contains several features that contribute to maintaining the quality and cleanliness of the code.
2. Visual Studio is one of the fastest, newest, and smartest environments.
3. It is distinguished by its quality and distinctive standards.
4. It is easy to use and has smart features.

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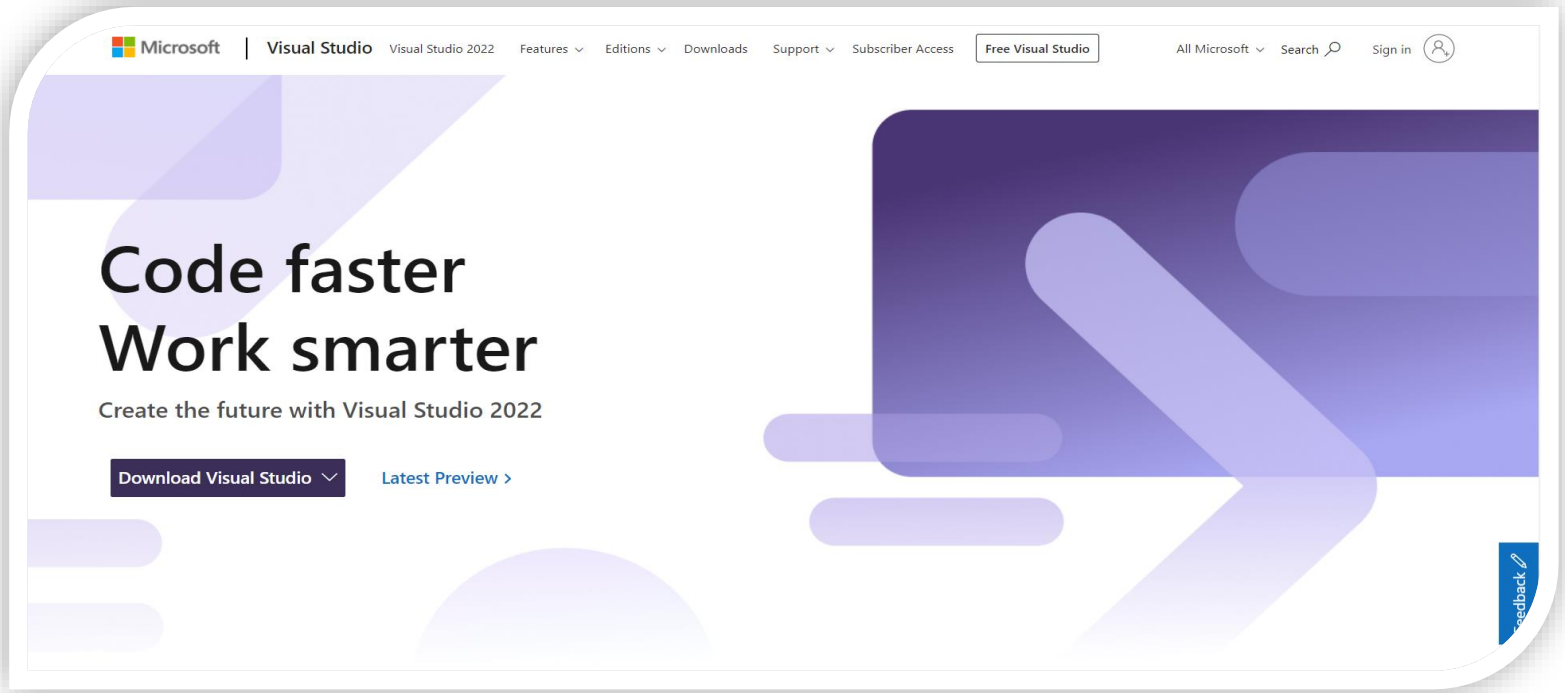
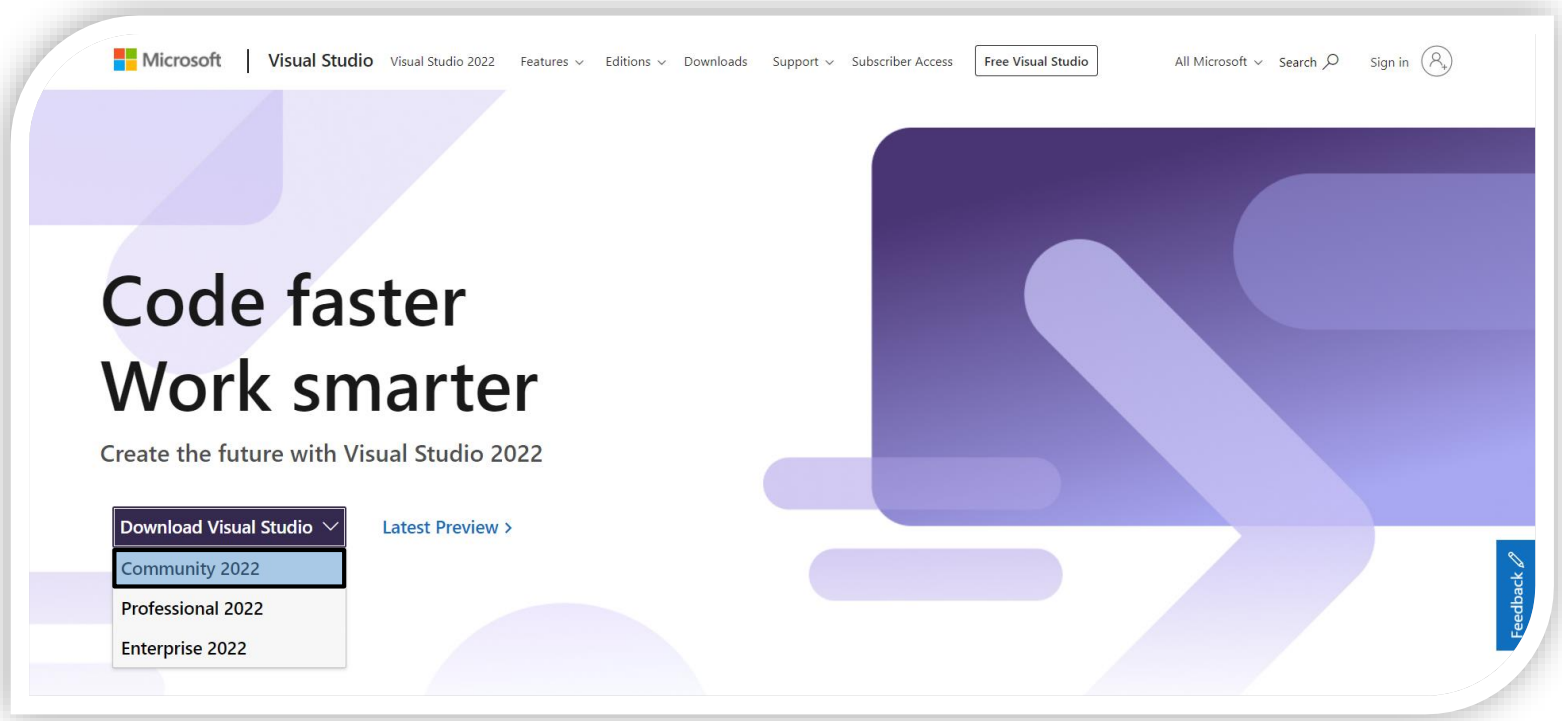
# Install Visual Studio 2022

1. Click on this Link → https://visualstudio.microsoft.com/vs/



# Install Visual Studio 2022

2. Click on Download Visual Studio and Choose Community 2022



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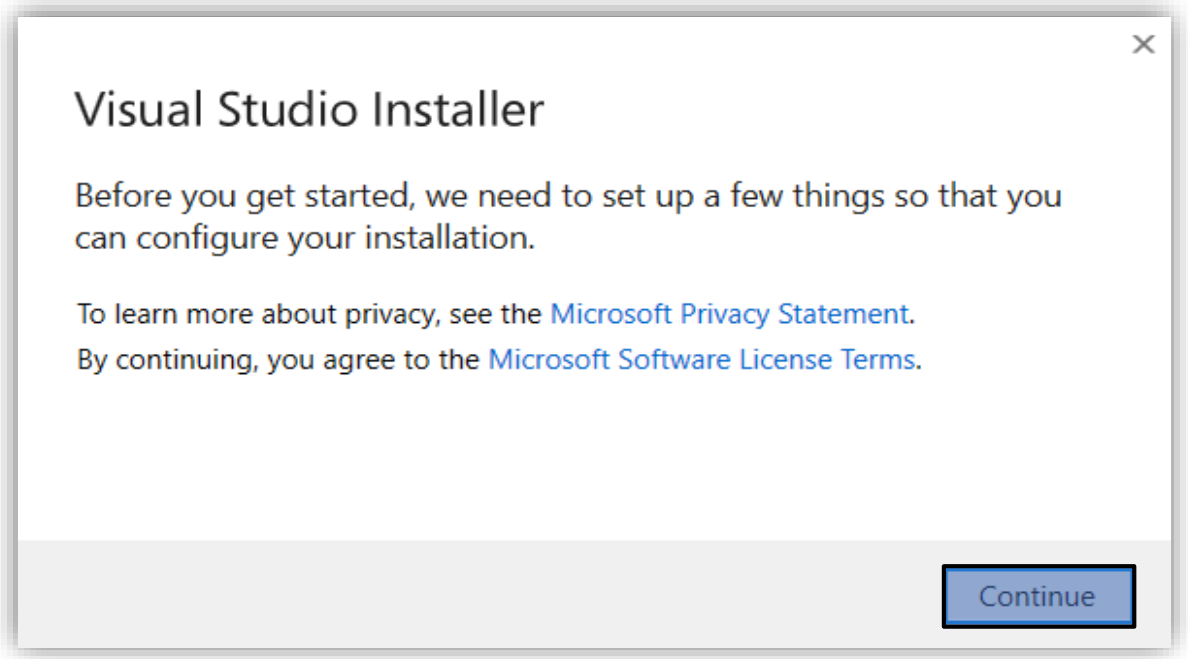
# Install Visual Studio 2022

3. Click on VisualStudioSetup.exe to setup the software
4. Click on Continue to start the installation



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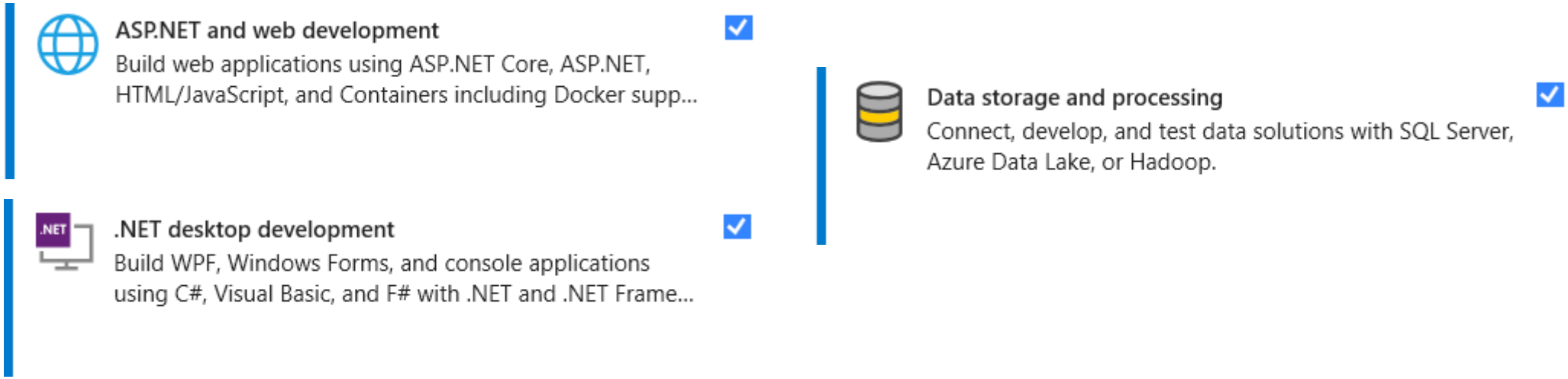
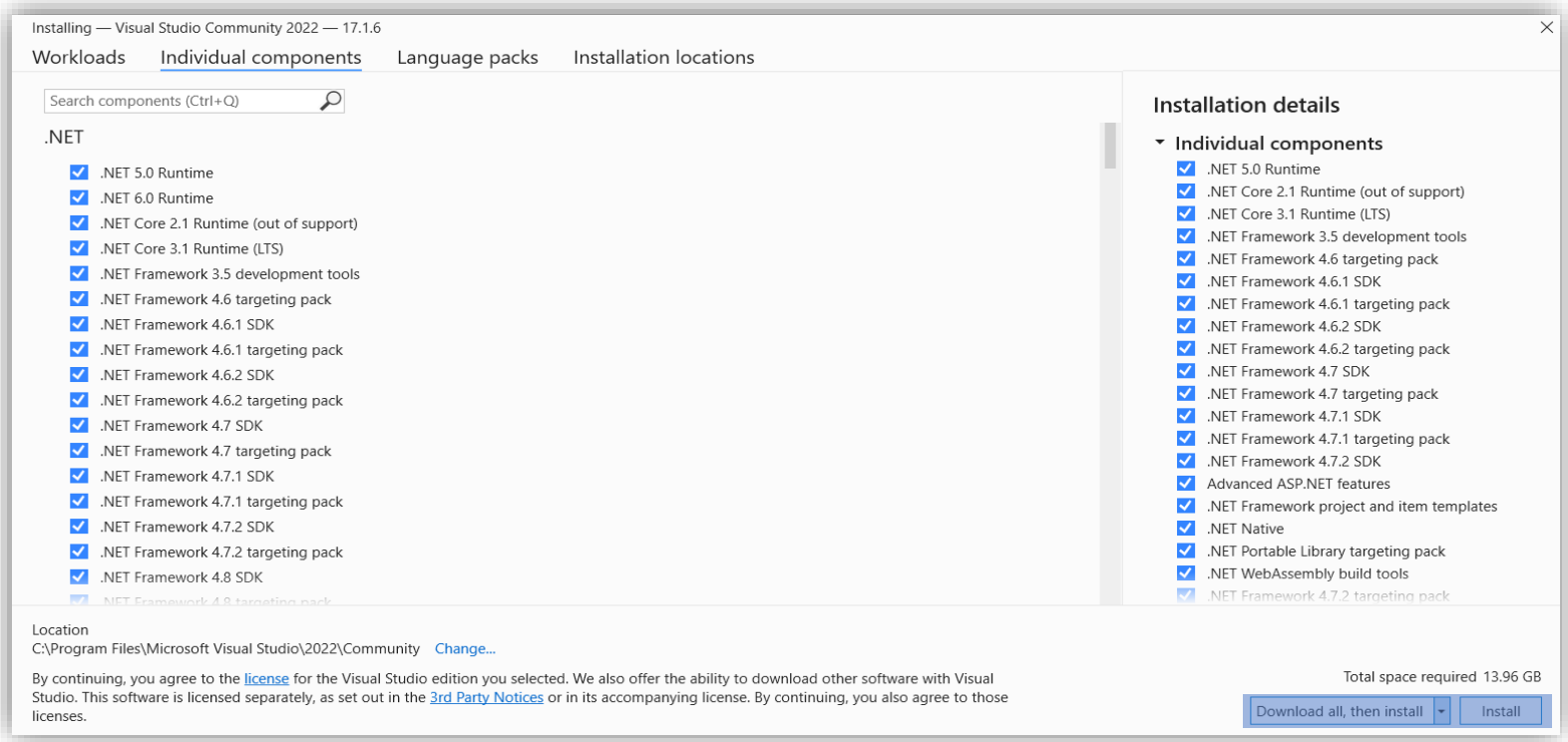
# Install Visual Studio 2022

5. Install the following Workloads



# Install Visual Studio 2022

6. Install the all .NET Individual Components and Click on Download all, then install and install



# Creating a New Project

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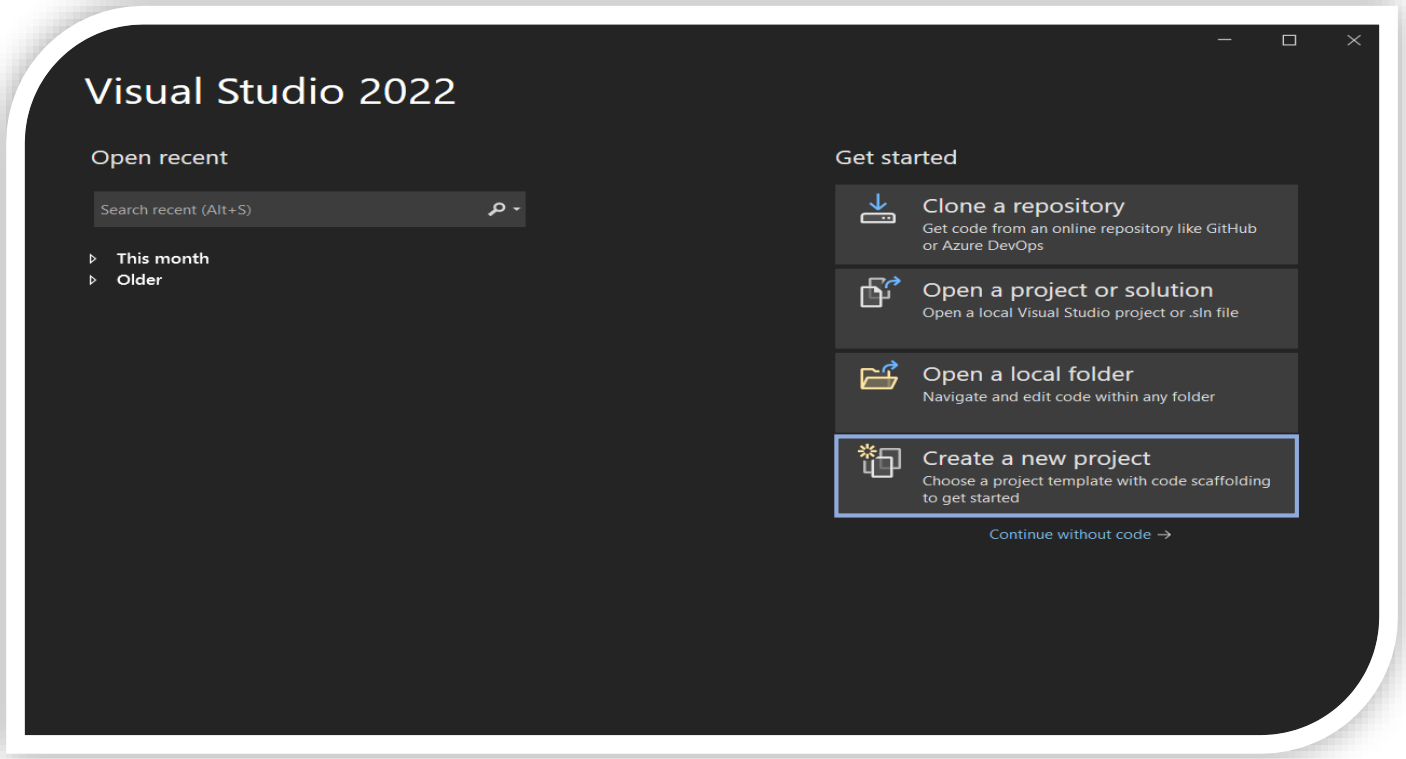
# Creating a New Project

1. Click on Create a new project



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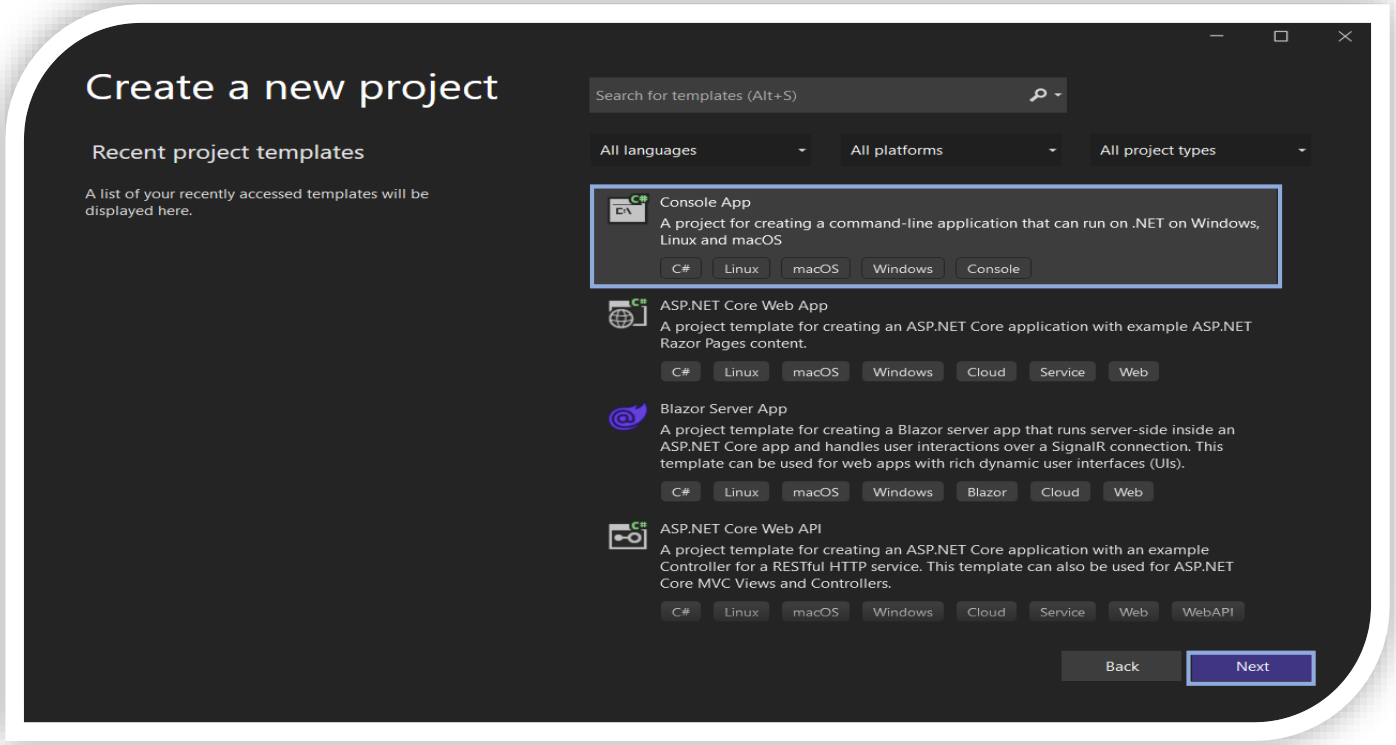
# Creating a New Project

2. Choose Console App and Click on Next



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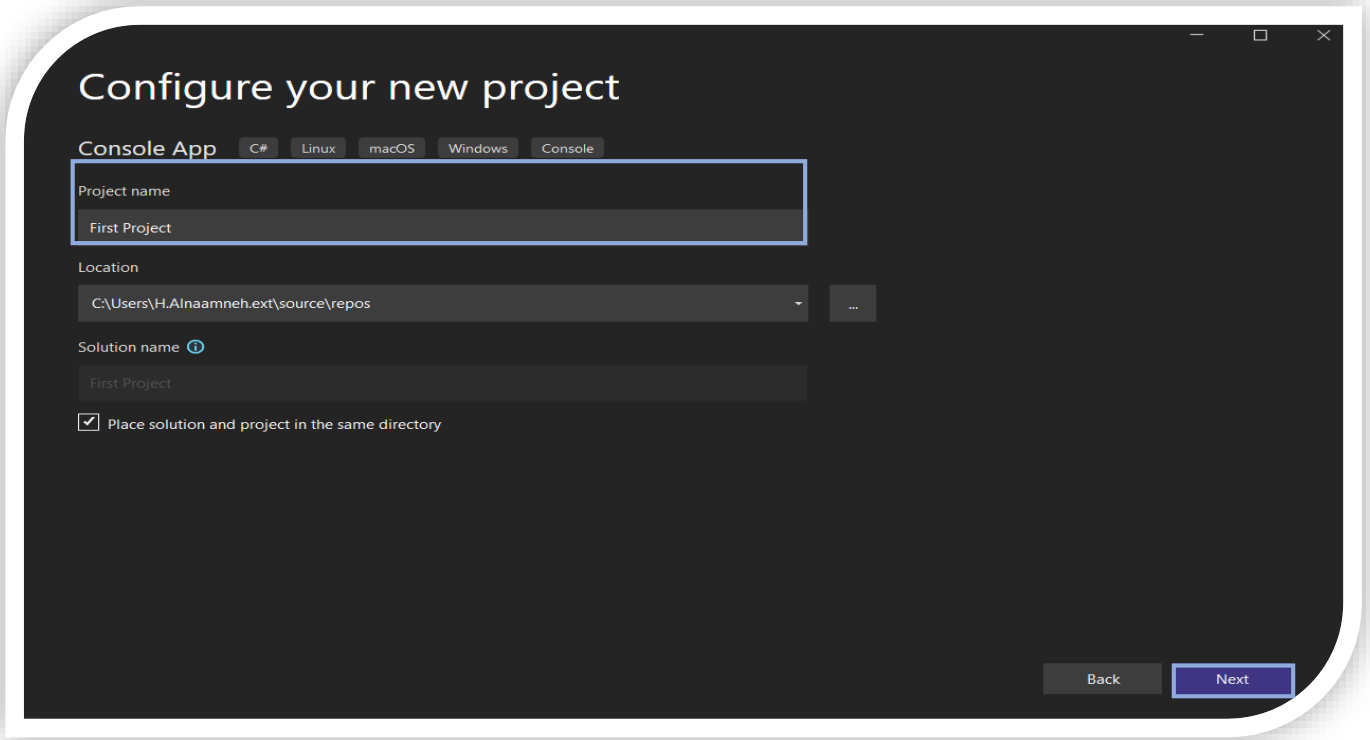
# Creating a New Project

3. Choose Console App and Click on Next



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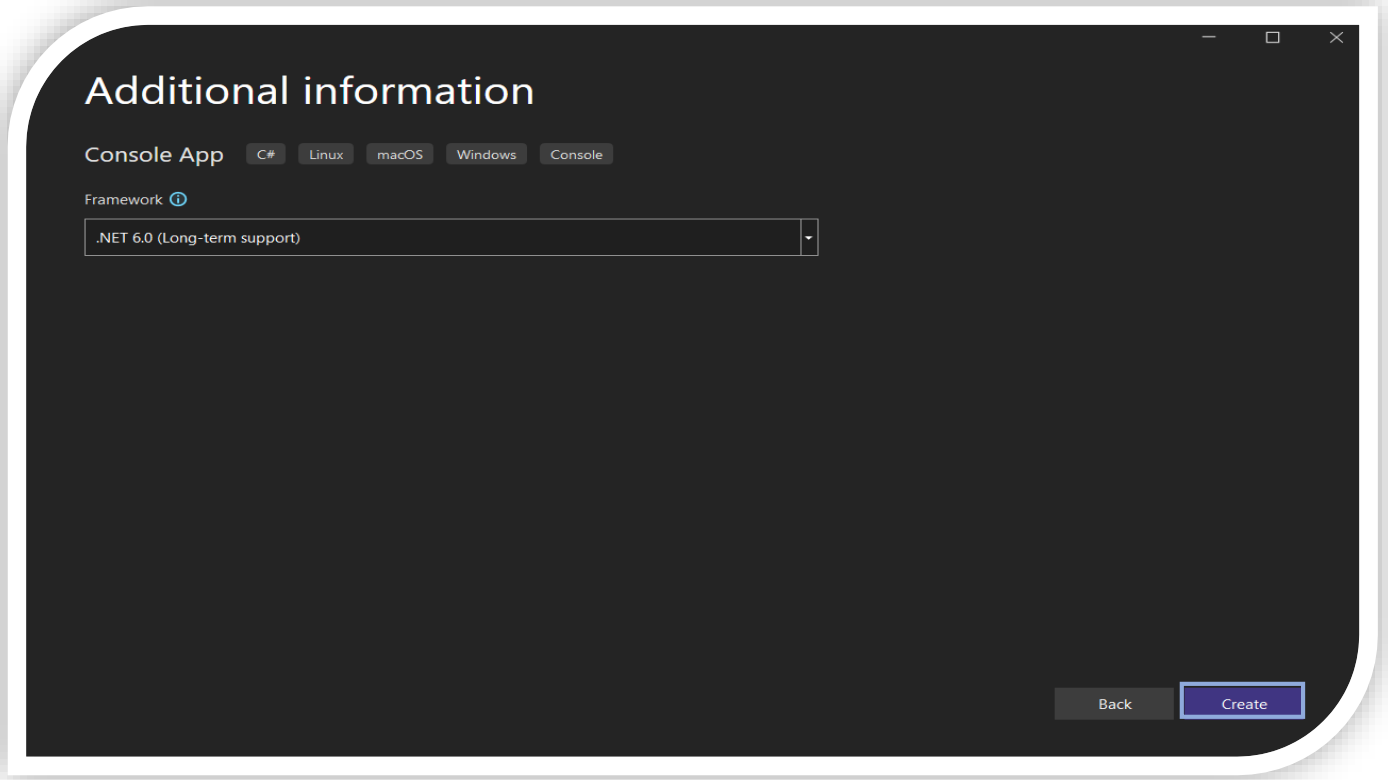
# Creating a New Project

4. Click on Create



# Overview of C# Programming Language

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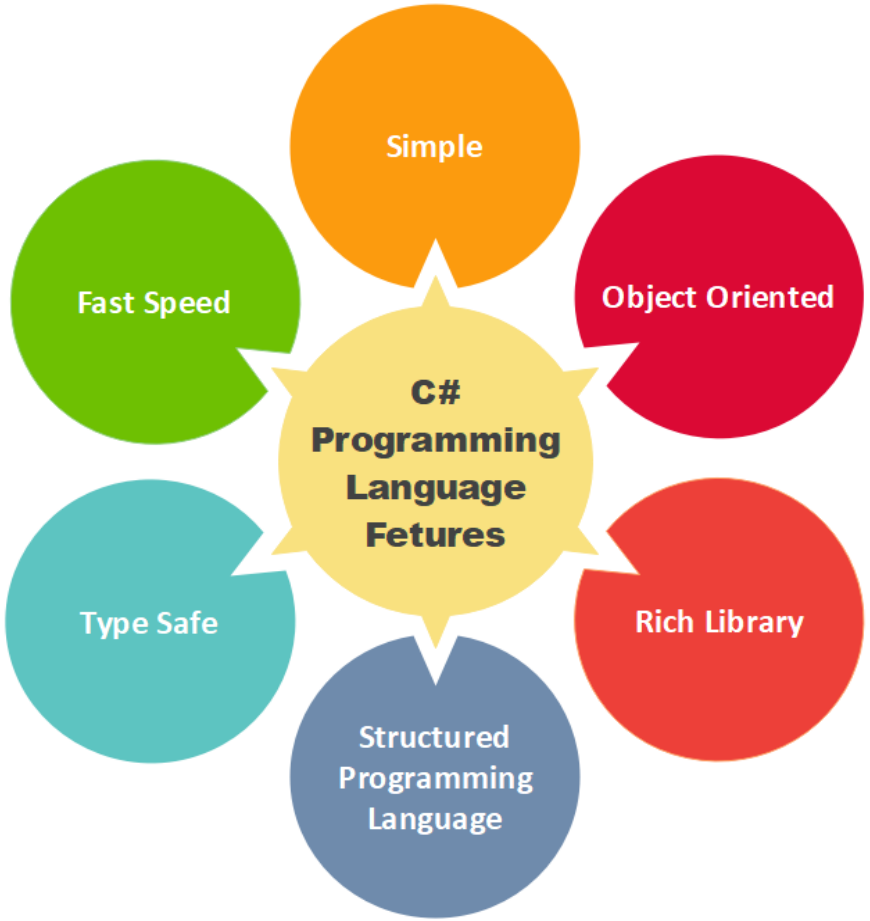
# Overview of C# Programming Language

C# is a safe, modern, object-oriented programming language. Many applications of various kinds can be created by developers, and they are strong and secure. Its roots go back to the C language family.



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# How to Write a Comment

# Overview of Comments

Comments are used to document the functionality of the program and the lines of code written in it, so it is one of the important commands used in C#. It can be used anywhere in the program without affecting on any code, because the compiler will ignore it.

# How to Write a Comment

There are many types that are used in writing a comment, they are:

1. **Single Line Comments:** To code a one-line comment, write two slashes, then write the comment. This technique is used to add a comment on one line only.

   **General Form:** `// Used to write a single comment`

# How to Write a Comment

There are many types that are used in writing a comment, they are:

2. **Multiple Line Comments:** To code a comment with more than one line, it writes a slash and a star, the comment is written, then ends with a star and a slash.

   **General Form:** `/* Used to write multiple line comments */`

# How to Write a Comment

There are many types that are used in writing a comment, they are:

3. **XML Tags Comments:** To code the XML elements that are used to define the documentation of the output, write three slashes before commenting.

   **General Form:** `/// Used to XML tags comments`

# How to Write a Comment

Commenting can be used easily by selecting the lines of code to be commented and using **Ctrl + C** shortcut or click on this icon  from tools bar.

# Reading and Writing Statements

# Overview of Writing Methods

There are two methods that are used to print the results and data on the console. They are:

1. **Write():** Write on the line and the cursor remains on the same line.

2. **WriteLine():** Write on the line and the cursor moves to the next line.

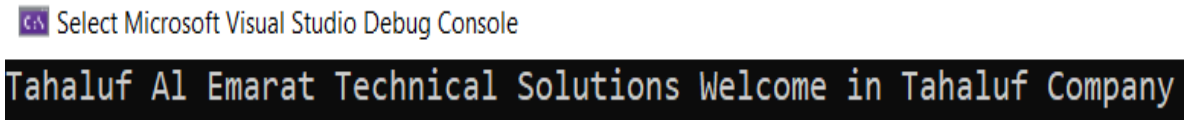
# Overview of Writing Methods

## Write Example:

```
Console.Write("Tahaluf Al Emarat Technical Solutions");

Console.Write(" Welcome in Tahaluf Company");
```

## The Result:



# Overview of Writing Methods

## WriteLine Example:

```
Console.WriteLine("Tahaluf Al Emarat Technical Solutions");

Console.WriteLine("Welcome in Tahaluf Company");
```

## The Result:

```
Microsoft Visual Studio Debug Console
Tahaluf Al Emarat Technical Solutions
Welcome in Tahaluf Company
```

# Overview of Reading Methods

There are two methods that are used to take input from the keyboard. They are:

1. **Read():** Read one character from the keyboard as an ASCII Code.
2. **ReadLine():** Read all characters from the keyboard.

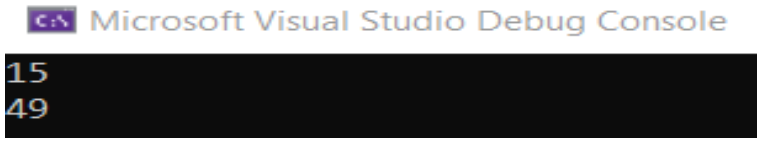
# Overview of Reading Methods

## Read Example:

```
int value = Console.Read();

Console.WriteLine(value);
```

## The Result:



# Overview of Reading Methods

## ReadLine Example:

```
Console.WriteLine("Enter the value:");

int value = Convert.ToInt32(Console.ReadLine());

Console.WriteLine(value);
```

## The Result:

Microsoft Visual Studio Debug Console

```
Enter the value:
10
10
```

# Exercises

1. Write a program to print the word “Welcome at Tahaluf Al Emarat Technical Solutions training”, then enter your name, age, and university and print it separately on the screen.

# Overview of Data Types

# Overview of Data Types

Data types are a component of the main programming language that a compiler uses to declare a certain value inside a variable. There are many data types that are defined in C# such as Integer, Float, Boolean, Decimal, etc.

# Main Data Types

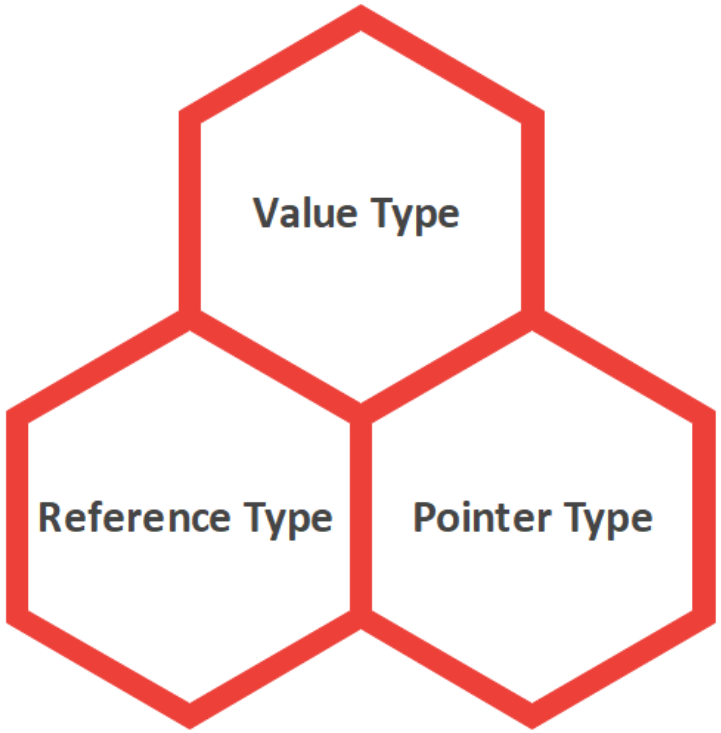
| Data Type | Meaning |
|---|---|
| string | Collection of characters |
| char | Single character |
| object | A basic type used to define all types of data |
| bool | Boolean value, It returns True or False |
| int | Integral numeric types |
| double | Fractional values |
| float | Floating-point value |

# Declaring Variables and Constants

# Classification of Data Types

Data types are classified according to how they are stored in memory.

It contains the following types of data:



# Value Type

Value type is a data type in which the value of a variable is stored directly in memory. Value types use the Stack memory type to store the values of different variables.

**General Form:** `type VariableName = value;`

# Value Type Example

```
int decimelNumber = 100;

string fullName = "Tahaluf Al Emarat Technical Solutions";

double doubleNumber = 2018.02;

char gender = 'F';

bool isActive = true;
```

## The Result:

```
Microsoft Visual Studio Debug Console
100
Tahaluf Al Emarat Technical Solutions
2018.02
F
True
```

# Exercises

2. Write a program that takes four numbers as input and print them in reverse form.

3. Write a program to print two numbers after swapping.

## Exercises

4. Write a program that takes an input number and print it four times in one row (separated by spaces), then four times with no separation.

# How to declare Constants

Defining a constant is a way to define a variable by providing a single address in memory to set and store the value. The constant can only be set in one way and its value cannot be changed.

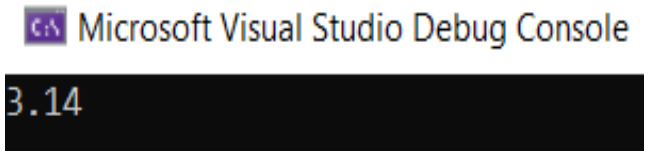
**General Form:** `const type variableName = value;`

## Constant Example

```
const double pi = 3.14;

Console.WriteLine(pi);
```

## The Result:




## Constant Example

```
const double pi = 3.14;

pi = 22.5;

Console.WriteLine(pi);
```

## The Result:

CS0131 The left-hand side of an assignment must be a variable, property or indexer

# Reference Type

Reference Type is a data type in which variables are stored inside objects. More than one variable can refer to the same object, which affect on the output of operations that depend on that object.

There are three built-in reference type:

1. Object Type
2. Dynamic Type
3. String Type

# Reference Type

Object type is one of the basic classes of all data types. An object can refer to any type such as reference types, value types, or specific types.

**General Form:** `object objectName;`

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# Reference Type

## Object Type Example

```
object message = "Hello World";

Console.WriteLine(message);
```

## The Result:

```
Microsoft Visual Studio Debug Console
Hello World
```

# Reference Type

A dynamic type is a data type in which a value is stored in a dynamic variable. The variable type is checked when the program is run.

**General Form:** `dynamic variableName = value;`

# Reference Type

## Dynamic Type Example

```
dynamic variable1 = "Tahaluf Al Emarat Technical Solutions";

dynamic variable2 = 2018;

dynamic variable3= 10.55;

dynamic variable4 = false;
```

# Reference Type

## Dynamic Type Example

```
Console.WriteLine(variable1.GetType().ToString());

Console.WriteLine(variable2.GetType().ToString());

Console.WriteLine(variable3.GetType().ToString());

Console.WriteLine(variable4.GetType().ToString());
```

# Reference Type

## Dynamic Type Example

## The Result:

```
Microsoft Visual Studio Debug Console
System.String
System.Int32
System.Double
System.Boolean
```

## Reference Type

String type is a data type that is derived from the System.String class. It can set any value as a variable.

**General Form:** `String variableName = “value”;`

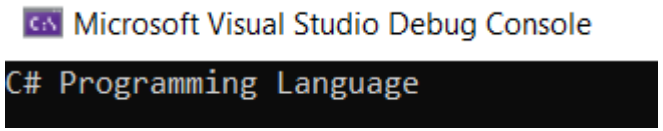
## Reference Type

## String Type Example

```
String str = "C# Programming Language";

Console.WriteLine(str);
```

## The Result:



# Exercises

5. What is the difference between String and string?

# Pointer Type

Pointer type is a data type in which a variable is stored in a different memory address. It cannot refer to a reference type or structure.

**General Form:** `type *variable_name;`

# Pointer Type Example

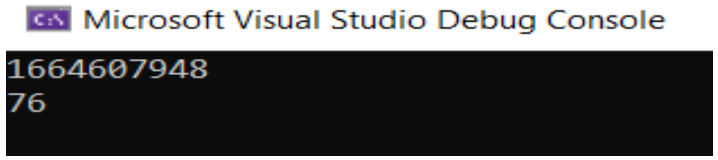
```
unsafe
{
    int value = 76;

    int* ptr = &value;

    Console.WriteLine((int)ptr);

    Console.WriteLine(*ptr);
}
```

## The Result:



## Exercises

6. Write a program to input two numbers from the keyboard, then print them using Call by Reference.

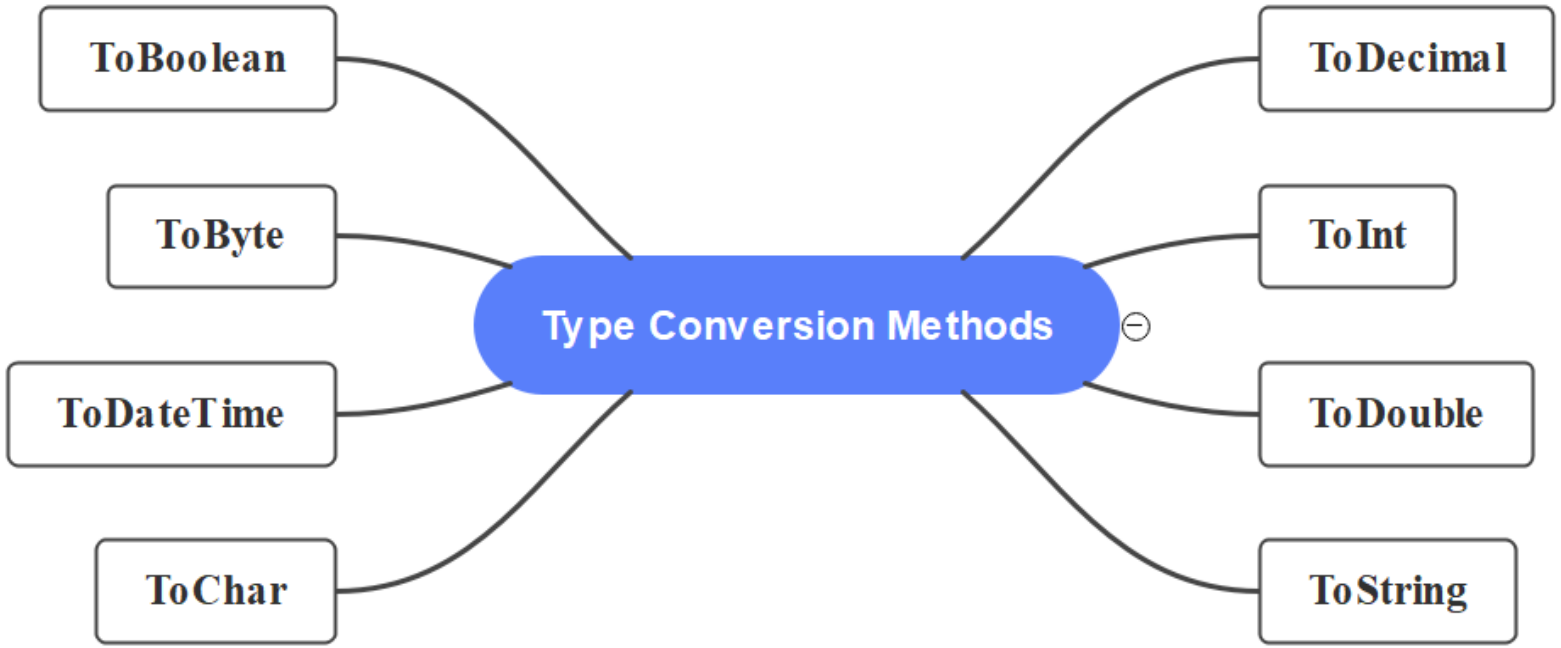
# Type Conversion

# Type Conversion

Type conversion is a method used to convert data from one type to another. It is also known by another name which is the casting type. It has two types:

1. Implicit Type Conversion
2. Explicit Type Conversion

# Type Conversion Methods



# Implicit Type Conversion

Implicit type conversion is a method used to convert small variables to larger variables or convert classes from derive to base.

**General Form:** char -> int -> long -> float -> double

# Implicit Type Conversion Example

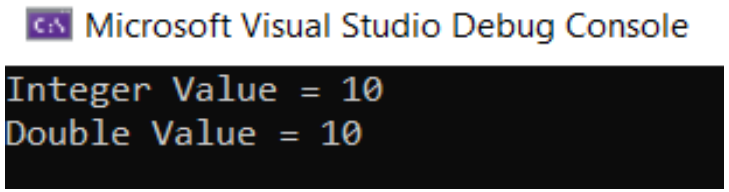
```
int value1 = 10;

Console.WriteLine("Integer Value = "+ value1);

double value2 = value1;

Console.WriteLine("Double Value = " + value2);
```

## The Result:



# Explicit Type Conversion

Explicit conversion is the process of converting data to the compiler with the possibility of losing part of the data. It is used to convert small variables to larger variables.

**General Form:** double -> float -> long -> int -> char

# Explicit Type Conversion Example

```
double value1 = 155.59687;

Console.WriteLine("Double Value = "+ value1);

int value2 = (int) value1;

Console.WriteLine("Integar Value = " + value2);
```

**The Result:**

```
Select Microsoft Visual Studio Debug Console
Double Value = 155.59687
Integar Value = 155
```

# Explicit Type Conversion Example (Other)

```
double value1 = 155.59687;

Console.WriteLine("Double Value = "+ value1);

int value2 = Convert.ToInt32(value1);

Console.WriteLine("Integar Value = " + value2);
```

**The Result:**

```
Microsoft Visual Studio Debug Console
Double Value = 155.59687
Integar Value = 156
```

# Exercises

7. Write a program to insert an int value and a string value and print the result as an int.
8. Write a program to convert a string value to an int value using the Parse() method.

# Boxing and Unboxing

# Boxing

Boxing is a method for converting value types into objects that are implemented using value types.

It is implicit conversion.

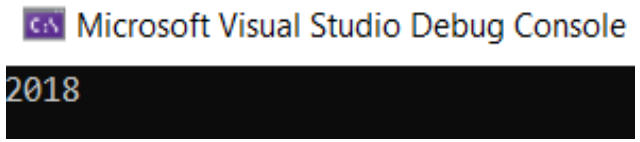
# Boxing Example

```
int value = 2018;

object o = value;

Console.WriteLine(o);
```

## The Result:




# Unboxing

Unboxing is the process of converting an object or reference type into a value type. It is similar to the process of extracting the value from inside a reference and setting it as a value type.

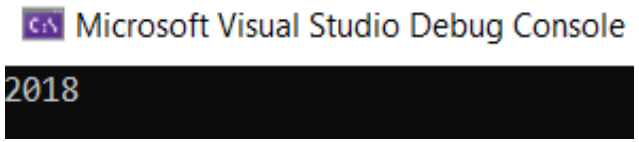
# Unboxing Example

```
object o = 2018;

int value = (int) o;

Console.WriteLine(value);
```

## The Result:



# Exercises

9. Write a program to convert **‘B’** character to ASCII value.

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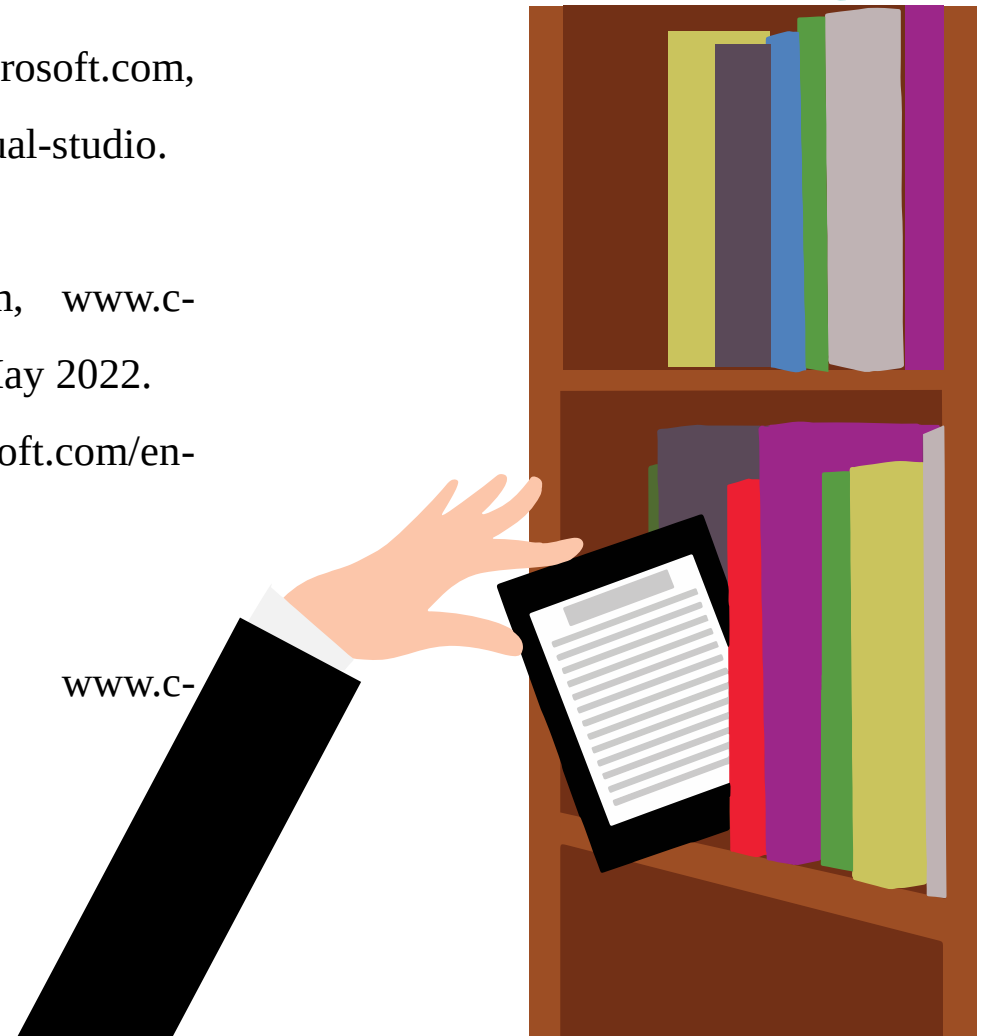

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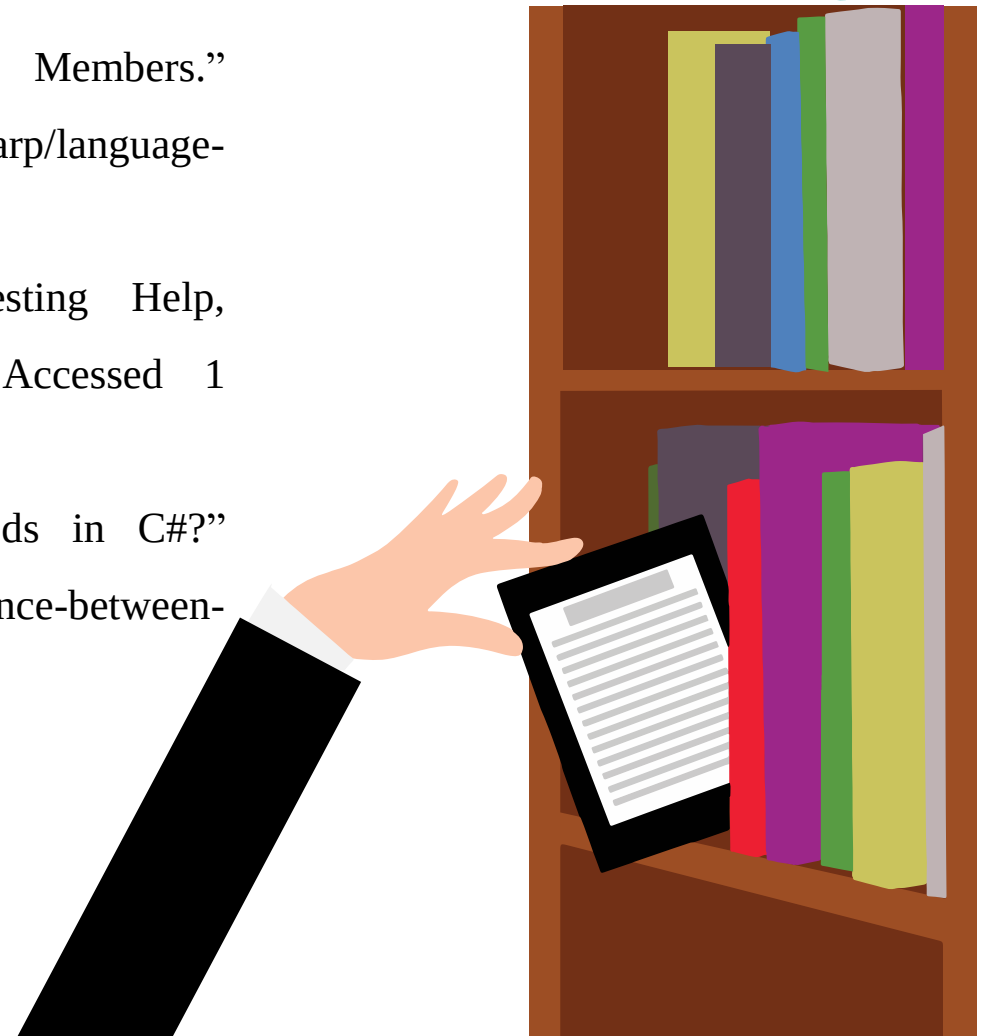

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