INTRODUCTION TO VB.NET

VB.NET is a simple, multi-paradigm object-oriented programming language designed to create a wide range of Windows, Web, and mobile applications built on the **.NET Framework**. Our **VB.NET Tutorial** covers all the basic and advanced concepts of **VB.NET** such as **features, strings, arrays, program flow control, file** and **exception handling, events, forms, buttons** and more.

What is VB.NET?

The VB.NET stands for Visual Basic. Network Enabled Technologies. It is a simple, high-level, object-oriented programming language developed by Microsoft in 2002. It is a successor of Visual Basic 6.0, that is implemented on the Microsoft .NET framework. Furthermore, it supports the OOPs concept, such as abstraction, encapsulation, inheritance, and polymorphism. Therefore, everything in the VB.NET language is an object, including all primitive data types (Integer, String, char, long, short, Boolean, etc.), user-defined data types, events, and all objects that inherit from its base class. It is not a case sensitive language, whereas, C++, Java, and C# are case sensitive language.

Applications built using the VB.NET language are very reliable and scalable, relying on the .NET Framework to access all libraries that help to execute a VB.NET program. With this language, you can develop a fully object-oriented application that is similar to an application created through another language such as C++, Java, or C#. In addition, applications or programs of VB.NET are not only running on the window operating system but can also run on Linux or Mac OS.

The VB.NET language is designed in such a way that any new beginner or novice and the advanced programmer can quickly develop a simple, secure, robust, high performance of web, windows, console, and mobile application running on .NET Framework.

VB.NET Features

As we know, it is a high-level programming language with many features to develop a secure and robust application. These are the following features that make it the most popular programming language.

- It is an object-oriented programming language that follows various oops concepts such as abstraction, encapsulation, inheritance, and many more. It means that everything in VB.NET programming will be treated as an object.
- This language is used to design user interfaces for window, mobile, and web-based applications.
- It supports a rapid application development tool kit. In which a developer does not need to write all the codes as it can get various code automatically from its libraries. For example, when we create a form in Visual basic.net, it automatically calls events of various form in that class.
- It is not a case sensitive language like other languages such as C++, java, etc.
- It supports Boolean condition for decision making in programming.

- It also supports the multithreading concept, in which you can do multiple tasks at the same time.
- It provides simple events management in .NET application.
- A Window Form enables us to inherit all existing functionality of form that can be used to create a new form. So, in this way, it reduced the code complexity.
- It uses an external object as a **reference** that can be used in a VB.NET application.
- Automatic initialized a garbage collection.
- It follows a structured and extensible programming language for error detection and recovery.
- Conditional compilation and easy to use generic classes.
- It is useful to develop web, window, and mobile applications.

Advantages of VB.NET

- The VB.NET executes a program in such a way that runs under CLR (Common Language Runtime), creating a robust, stable, and secure application.
- It is a pure object-oriented programming language based on objects and classes. However, these features are not available in the previous version of Visual Basic 6. That's why Microsoft launched VB.NET language.
- Using the Visual Studio IDE, you can develop a small program that works faster, with a large desktop and web application.
- The .NET Framework is a software framework that has a large collection of libraries, which helps in developing more robust applications.
- It uses drop and drag elements to create web forms in .NET applications.
- However, a Visual Basic .NET allows to connect one application to another application that created in the same language to run on the .NET framework.
- A VB.NET can automatically structure your code.
- The Visual Basic .NET language is also used to transfer data between different layers of the .NET architecture such that data is passed as simple text strings.
- It uses a new concept of error handling in the Visual Basic .NET Framework. The new structure is the try, catch, and finally method used to handle exceptions as a unit. In addition, it allows appropriate action to be taken at the place where it encountered an error. In this way, it discourages the use of the ON ERROR GOTO statement in .NET programming.

Disadvantages of VB.NET

1. The VB.NET programming language is unable to handle pointers directly. Because in this language, it requires a lot of programming, and it is not easy to manage every

address by a pointer. Furthermore, additional coding takes extra CPU cycles, that increases the processing time. It shows the slowness of the VB.NET application.

2. The VB.NET programming is easy to learn, that increases a large competition between the programmers to apply the same employment or project in VB.NET. Thus, it reduces a secure job in the programming field as a VB.NET developer.
3. It uses an Intermediate Language (IL) compilation that can be easily decompiled (reverse engineered), but there is nothing that can prevent an application from disintegrating.
4. Just-In-Time (JIT) compiler: It is the process through which a computer can interpret IL (intermediate language) compilation and is also required to run your application. It means that the target computer needs a JIT compiler to interpret a source program in IL, and this interpretation requires an additional CPU cycle that degrades the performance of an application.
5. It contains a large collection of libraries for the JIT compiler that helps to interpret an application. These large libraries hold a vast space in our system that takes more computing time.

Introduction to .NET Framework

The **.NET Framework** is a software development platform that was introduced by Microsoft in the late 1990 under the NGWS. On 13 February 2002, Microsoft launched the first version of the .NET Framework, referred to as the **.NET Framework 1.0**.

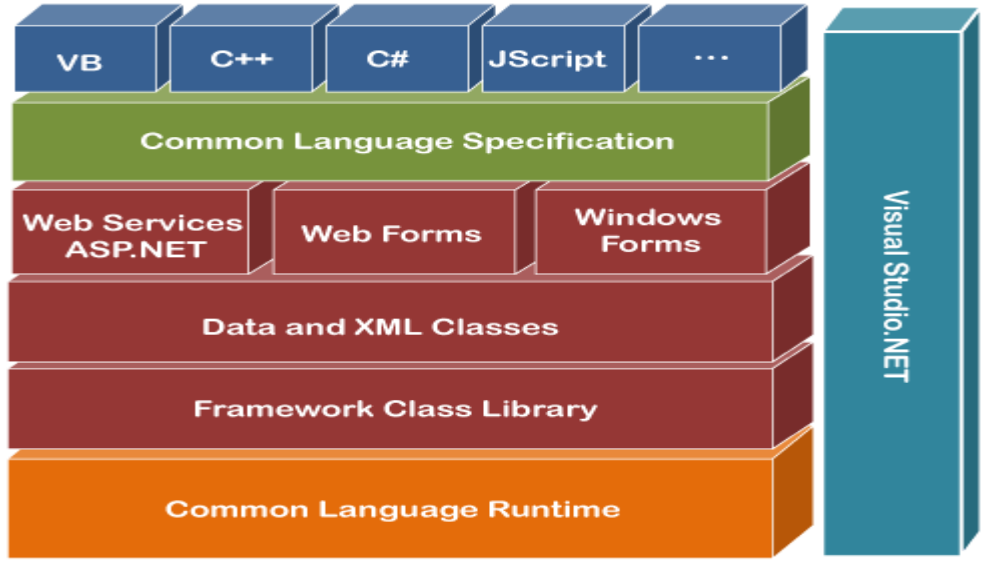
In this section, we will understand the **.NET Framework, characteristics**, **components,** and its **versions**.

What is .NET Framework

It is a virtual machine that provide a common platform to run an application that was built using the different language such as C#, VB.NET, Visual Basic, etc. It is also used to create a form based, console-based, mobile and web-based application or services that are available in Microsoft environment. Furthermore, the .NET framework is a pure object oriented, that similar to the Java language. But it is not a platform independent as the Java. So, its application runs only to the windows platform.

The main objective of this framework is to develop an application that can run on the windows platform. The current version of the .Net framework is 4.8.

Note: The .NET Framework is not only a language, but it is also a software and language neutral platform.



Components of .NET Framework

There are following components of .NET Framework:

1. CLR (Common Language Runtime)
2. CTS (Common Type System)
3. BCL (Base Class Library)
4. CLS (Common Language Specification)
5. FCL (Framework Class Library)
6. .NET Assemblies
7. XML Web Services
8. Window Services

CLR (common language runtime)

It is an important part of a .NET framework that works like a virtual component of the .NET Framework to executes the different languages program like c#, Visual Basic, etc. A CLR also helps to convert a source code into the byte code, and this byte code is known as CIL (Common Intermediate Language) or MSIL (Microsoft Intermediate Language). After converting into a byte code, a CLR uses a JIT compiler at run time that helps to convert a CIL or MSIL code into the machine or native code.

CTS (Common Type System)

It specifies a standard that represent what type of data and value can be defined and managed in computer memory at runtime. A CTS ensures that programming data defined in various languages should beinteract with each other to share information. For example, in C# we define data type as int, while in VB.NET we define integer as a data type.

BCL (Base Class Library)

The base class library has a rich collection of libraries features and functions that help to implement many programming languages in the .NET Framework, such as C #, F #, Visual C ++, and more. Furthermore, BCL divides into two parts:

1. **User defined class library**
    - **Assemblies -** It is the collection of small parts of deployment an application's part. It contains either the DLL (Dynamic Link Library) or exe (Executable) file.
        1. In LL, it uses code reusability, whereas in exe it contains only output file/ or application.
        2. DLL file can't be open, whereas exe file can be open.
        3. DLL file can't be run individually, whereas in exe, it can run individually.
        4. In DLL file, there is no main method, whereas exe file has main method.
2. **Predefined class library**
    - **Namespace -** It is the collection of predefined class and method that present in .Net. In other languages such as, C we used header files, in java we used package similarly we used "using system" in .NET, where using is a keyword and system is a namespace.

CLS (Common language Specification)

It is a subset of common type system (CTS) that defines a set of rules and regulations which should be followed by every language that comes under the .net framework. In other words, a CLS language should be cross-language integration or interoperability. For example, in C# and VB.NET language, the C# language terminate each statement with semicolon, whereas in VB.NET it is not end with semicolon, and when these statements execute in .NET Framework, it provides a common platform to interact and share information with each other.

Microsoft .NET Assemblies

A .NET assembly is the main building block of the .NET Framework. It is a small unit of code that contains a logical compiled code in the Common Language infrastructure (CLI), which is used for deployment, security and versioning. It defines in two parts (process) DLL and library (exe) assemblies. When the .NET program is compiled, it generates a metadata with Microsoft Intermediate Language, which is stored in a file called Assembly.

FCL (Framework Class Library)

It provides the various system functionality in the .NET Framework, that includes classes, interfaces and data types, etc. to create multiple functions and different types of application such as desktop, web, mobile application, etc. In other words, it can be defined as, it provides a base on which various applications, controls and components are built in .NET Framework.

Key Components of FCL

1. Object type
2. Implementation of data structure
3. Base data types
4. Garbage collection
5. Security and database connectivity
6. Creating common platform for window and web-based application

Characteristics of .NET Framework

1. CLR (Common Language Runtime)
2. Namespace - Predefined class and function
3. Metadata and Assemblies
4. Application domains
5. It helps to configure and deploy the .net application
6. It provides form and web-based services
7. NET and ASP.NET AJAX
8. LINQ
9. Security and Portability
10. Interoperability

11. It provides multiple environments for developing an application

Versions of .NET Framework

1. On 13 February 2002, Microsoft launched first version of .Net framework 1.0.
2. The second version 2.0 of .net framework was launched on 22 January 2006.
3. Third version 3.0 of .Net framework was released on 21 November 2006.
4. A .Net framework version 3.5 was released on 19 November 2007.
5. Version 4.0 of .Net framework was released on 29 September 2008
6. Version 4.5 of .Net framework was released on 15 August 2012.
7. .Net framework 4.5.1 version was announced on 17 October 2013
8. On 5 May 2014, a 4.5.2 version of .Net framework was released.
9. .Net framework 4.6 version was announced on 12 November 2014
10. .Net framework 4.6.1 version was released on 30 October 2015
11. .Net framework 4.6.2 version was announced on March 30, 2016
12. .Net framework 4.7 version was announced on April 5, 2017
13. .Net framework 4.7.1 version was announced on October 17, 2017
14. Version 4.7.2 of .Net framework was released on 30 April 2018.
15. And currently we are using .Net framework version 4.8 that was released on 18 April 2019

Difference Between VB.NET and Visual Basic

VB.NET

VB.NET is also known as **Visual Basic.NET**. It stands for **Visual Basic .Network Enabled Technologies.** It is a simple, high-level, object-oriented programming language developed by Microsoft in 2002. It is a successor of Visual Basic 6.0, which is implemented on the Microsoft .NET Framework. With this language, you can develop a fully object-oriented application that is similar to an application created through another language such as C++, Java, or C#.

Feature of VB.NET

- Inheritance (object-oriented language)
- Delegates and events
- Parameterized constructors
- Method overloading/overriding
- Type-safe
- Delegates and events

Visual Basic

Visual Basic (VB) is a programming language developed by Microsoft in 1992. The purpose of this language is to develop an application that can run on different versions of the Windows operating system. A Visual Basic evolved from Basic Language; Basic language is easier to read than other languages. The final version of Visual Basic was released in 1998. Microsoft then launched a Visual Basic DotNet ('VB.NET') language, which is much better than Visual Basic in all aspects such as performance, reliability, working environment, easy to build, and debugging an application.

Features of Visual Basic

- User Interface design
- Rapid Application Development
- Using this language, you can use internet or intranet services in your application.
- It has powerful database access tools, by which you can easily develop front end applications.
- It also supports ActiveX technology, in which you can access the features of other application in system application. For example: Microsoft Word, Microsoft Excel, etc.

Difference Between VB. NET and Visual Basic

VB .NET	Visual Basic
It stands for Visual Basic. Network Enables Technology. It is also developed by Microsoft, and this language was based on the .Net Framework. Furthermore, it is specially designed for VB developers.	It is a programming language developed by Microsoft for the fastest development of a window-based operating system as well as applications.
It is a modern, fully object-oriented language that replaced VB6.	VB is the predecessor of VB.NET and was not an object-oriented language. So, it is not actively maintained.
A VB.NET uses the Common Language Runtime (CLR) component of .Net Framework at runtime. It has better features and design implementation as compared to VB-Runtime.	Visual Basic uses the VB-Runtime environment.
It is a compiled language	It is an Interpreter based language
It does not support backward compatibility.	It supports backward compatibility.

It is a type-safe language.	It is not a type-safe language.
In VB.NET, data is handled using the ADO.net protocol.	Data Connectivity and handling are done through DAO, RDO, and ADO (ActiveX Data Object) protocol,
Object does not support default property.	The Object support default property of virtual basic.
In the VB.Net parameter are passed by a default value.	In VB, most of the parameters are passed by reference.
A Multithreaded application can be developed in VB.NET.	It does not support the multithread concept.

VB.NET

VB.NET is known as Visual Basic.NET. VB.NET is a simple, object-oriented programming language developed by Microsoft in 2002, and it is the successor of Visual Basic 6 (VB6) language, that implement on the .NET Framework. One of the best features of the VB.NET language is that its program can also run on mono (multi-platform), which means that it is not restricted to run on the Windows operating system; moreover, it can also run on Linux and Mac OS. The Application built using the VB.NET is much secure, robust, high-performance, and easy to develop.

There is some VB.NET application:

- Console Application
- Mobile application
- Windows forms Application
- Window control library
- .Net website

C#

C# is an open-source, general-purpose, object-oriented programming language that was developed by Microsoft in the year 2000, which runs on the .NET Framework. Furthermore, this language is also got certified as a standard programming language by the ECMA and ISO. The main purpose of using the C # programming language is that it is used to share information as well as services across all web services. It also enables the developer to develop a robust, secure, and portable application easily.

Some of the application are listed below:

- Window and web-based application or services

- Distributed application
- Database application

Difference Between VB.NET and C#

VB.NET	C#
It is pronounced as Visual Basic .NET, which is an updated feature and version of Classic Visual Basic 6.0.	It is pronounced as "C SHARP" language, that belongs to the C family.
It is also used to develop various applications running on the .NET Framework.	It is used to create a variety of application that runs on the.NET Framework
Both languages are functionally equal.	Both languages are functionally equal.
It is a case insensitive language. For example, "Hello" and "hello" are the same.	It is a case sensitive language. For example," Hello" and "hello" are different.
VB.NET supports structured and unstructured error handling.	It supports only structured error handling.
Events are automatically bound.	Events are not possible in C#.
Declaration and definition are different in both	Declaration and definition are different in both.
Whereas, it uses Simple English for defining the structure Dim x As Integer Public x As Integer = 10	It uses a simple programming structure as C, Java, Python, C++, etc. int x; int x = 10;
Each statement does not end with a semicolon.	Each statement is terminated with a semicolon (;)

Difference Between VB.NET and Java

VB.NET

VB.NET is a simple, high-level, object-oriented language programming language developed by Microsoft in 2002. The VB.NET language is the successor to Visual basic 6.0, which is implemented on the .NET Framework. Application built using the VB.NET are much secure, robust, high-performance and easy to develop.

Java

Java is a general-purpose, high-level, object-oriented programming language developed by James Gosling at Sun Microsystem in 1995 and later acquired by Oracle. Applications built with Java are very secure, robust, fast performing and platform independent. Due to the reusability of the code, programmers do not need to write Java code at every time, instead they can inherit functionality from the base class or we can say that it follows (WORA) **Write once read anywhere** which means write the code one time and read or call it anywhere in the programming language. So, in this way it reduces the code complexity in programming. Further, it is platform independent which means the developer does not need to create separate applications for different platforms. So, an application created for a single platform can run on multiple platforms such as Unix, Window, Macintosh systems

Difference Between Java and VB.NET

VB.NET	Java
VB.NET is also a high level, object-oriented language developed by the Microsystem.	Java is a high level, an object-oriented programming language that was developed by Sun Microsystem and currently owned by Oracle.
VB.NET is a platform dependent that can run on different versions of windows, but the mono organization found a new framework that can run on Linux too.	Java is a platform independent. So, it can run on any operating system.
Whereas, VB.Net uses CLR (Common Language Runtime) at runtime to execute programs.	It uses JVM (java virtual machine) at runtime.
It uses ADO.NET for database connectivity.	It uses JDBC and ODBC for database connectivity.
It supports multithreading concept.	Support Multithreading concept.
It uses Microsoft Unit Testing Framework and NUnit for unit testing, while it uses Net development services for web server Scripting.	It uses Junit for unit testing, and Java Server faces (JFS) for Web Server Scripting.
It uses LINQ to define queries in .Net	It has no LINQ features to define queries.
It is not case sensitive language.	It is a case sensitive language.
VB.NET requires a window license.	Java is an open-source framework.

Whereas, VB.NET uses a default IDE that is Microsoft Visual studio for developing an application.	Java has various IDE for developing a java-based application such as Eclipse, NetBeans, IntellJ IDE that makes the development process more comfortable.

How to Download and Install Visual Studio for VB.NET?

Now we will follow the procedure to download Visual Studio IDE, so we can simply develop program in VB.NET.

Step 1. For downloading the Visual Studio IDE, go through the link given below:

https://www.visualstudio.com/downloads