BACHELOR OF COMPUTER APPLICATIONS

SEMESTER *5*

DCA3102

VISUAL PROGRAMMING

Unit 1

Introduction to VB.NET

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1. INTRODUCTION

The .NET is the product of Microsoft that allows the users to have access to their information, files, or programs on any platform or device. When the Microsoft launched their first windows operating system, it gave a new scenario towards the application and the system design by supporting the multitasking environment. The updated versions of windows driven towards the distributed environment in that way .NET is the next exploration in this path. This course helps you to explore the details of how to develop Visual programming in .NET platform. Before we could start up with the Visual Basic .NET, it is mandatory to become familiar with the .NET Framework, Visual Studio .NET, and the Microsoft Development Environment. First we are going to discuss the concept of event driven programming and its benefits. Also we are going to learn the architecture of .NET platform. This unit is also discussing the role of JIT compiler. We are concluding this unit with the discussion of .NET framework class library is considered as one of the important component in .NET framework.

1.1 Objectives:

After studying this unit, you will be able to:

- *Explain the advantages of event driven programing*
- *List and explain the components of .NET framework*
- *Define the .NET architecture*
- *Explore the visual studio .NET environment*
- *Brief the role of JIT compiler*
- *Explain the role of .NET framework class library*

2. EVENT DRIVEN PROGRAMMING

In event driven or event based programming the flow of program is determined by events. It relies on events, triggers and handlers, program executed based on the event will be triggered by the GUI elements.

Event driven programming can also be defined as an application architecture technique here the application has a main loop and further it has been divided in to two sections.

- selection/detection of event
- handling event.

Event: Events are the actions that are performed by the user during the applications usage. It is a signal that informs an application that something has occurred. For example if a user clicks a mouse button on any object then the Click event occurs.

Event handler: Event handlers are nothing but the procedures that are called when a corresponding event occurs. If the user clicks on any object available here the object click procedure will be called with without arguments.

Advantages of event driven programming

Following are the major advantages and uses of event driven programming

- Flexibility
- Suitability for graphical interfaces
- Programming simplicity
- Ease of development

Flexibility:

Event driven programming is considered as one of most flexible programming languages. It provides the flexible way to the programs to respond for many different inputs or events. It helps the programmer to design visually with the existing objects. It provides the technique of separation of the event detection and the event handling leads to design the program in simple and flexible way.

Suitability for graphical interfaces:

In event driven programming programmers creates the program in a graphical way. Developers get the options of selecting the different controls available and place them on the container according to their needs. Executions of these controls are decided by the programmers through the events with the very minimal code. Event driven programming leave the control of program execution to the programmers also the user does not follow any routine procedure to use the program.

Programming Simplicity:

A visual effect of event driven programming simplifies the complexity of the programmer's task. Here the programmer's will not involve in the task of designing and alignment of control since it is readily available. It is enough to drag and place the controls wherever necessary. After placing if you want to change the look and feel of the control, it is easy to update these features in the respective property column. Such readymade facility makes the programmer easy and comfortable to design an application in even driven programming environment.

Ease of development:

As we discussed earlier developing a program in an event driven language is easy and also here the programmer has to deal with single event at a time. Here various controls in the containers are designed or programmed separately for the different purposes and different point of time, if it necessary it works some time together also.

3. .NET FRAMEWORK

.NET framework is the product of Microsoft has huge number of libraries and provides language interoperability runs primarily on windows platform. The .NET Framework is defining the background to execute Visual Basic

.NET applications and supporting various services to run the application. This .NET framework supports the traditional way of running applications in the windows platform also supports the application to run on the internet environment. The applications written in .NET framework will work on the software platform called CLR (Common Language Runtime). Library class in

.NET framework provides various services like data base connectivity, web application support, cryptography and various communications in network.

The common language runtime and class library together structure the .NET framework. Microsoft Visual studio is the integrated development environment to develop application for the .NET software. This platform encourages the windows application developers to use the .NET framework large in size.

Following are the main objectives of the .NET framework

- Consistent support for object-oriented programming environment immaterial of whether the object code is located and executed locally, Internet-distributed, or executed remotely.
- Designed to support minimum software deployment and conflict version in Code-execution environment
- Providing safety in execution of code even it is created by a third party or unknown person
- Designed to handle the performance problems that may arise through the interpreted environments or scripted codes.
- Maintain the experience of developer's experience in a consistent way across the applications, based on Windows and Web.

- Build all communication on industry standards to guarantee that code based on the .NET Framework can integrate with any other code.

Design features of .NET Framework

Common language runtime: CLR act as an execution engine for .NET environment it takes care of execution of code, memory, compilation process, safety services, execution of threads etc.

Base class library: It is a collection of reusable interfaces, classes and value types. Base Class Library is the small subset of class library supports the basic API of the Common Language Runtime.

Language independence: .Net framework supports Common Type System (CTS), it has the details about the allowable programming syntaxes and the data types and how it interacts with each other in the CLR environment. This in turn supports in exchange of instances between the programs that are written in the .NET languages.

Portability: Microsoft .NET framework accelerates third parties to construct or develop compatible implementations of this framework and its languages on platforms apart from the Microsoft platform.

SELF-ASSESSMENT QUESTIONS - 1

1. Event driven programming has been divided into two sections called _____ and _____events.
2. Event driven programming helps the programmer to design visually [True/False].
3. In event driven programming execution of controls are decided by the_____ .

4. .NET ARCHITECTURE AND VISUAL STUDIO .NET

To develop a Visual Basic .NET application, we can use a product called Visual Studio .NET it is a collection of products that includes three programming languages depicted in figure 1.1. Now we are going to discuss the role of Visual Basic .NET, and its role in rapid application development. Visual Studio supports different programming languages using language services; this allows the code editor and debugger to support nearly any programming language, provided a language-specific service exists.

Visual Studio comprises of several other components that make it an outstanding development product. One of the important among this is the *Microsoft Development Environment.* Another is the Microsoft SQL Server 2000 Desktop Engine (or MSDE). MSDE is a database engine that runs on PC helps to develop database applications those are compatible with Microsoft SQL Server. SQL Server is a database management system supports in providing data to large networks of users also for an Internet applications. The two other languages that come with Visual Studio .NET are C# and C++. C# .NET (pronounced "C sharp dot net") is a new language that has been developed by Microsoft especially for the .NET Framework. Visual C++ .NET is Microsoft's version of the C++ language that is used on many platforms besides Windows PCs.

Visual Studio .NET can be used on any PC that runs Windows 2000 or later versions. You can also see that the applications that are developed with Visual Studio .NET can be run on any PC that runs Windows 98 or later, depending on which .NET components are used by the application. From a practical point of view, though, you can assume that the applications that you develop with Visual Basic .NET will be run on PCs that are using Windows 2000 or later. Visual Basic .NET comes in an inexpensive

Standard Edition that includes only the Visual Basic language, not C# or C++.

Although the three languages shown in figure 1.1 are the only three programming languages you can use within Visual Studio .NET, other vendors are free to develop languages for the .NET Framework. For example, Fujitsu has already developed a version of COBOL for the .NET Framework.

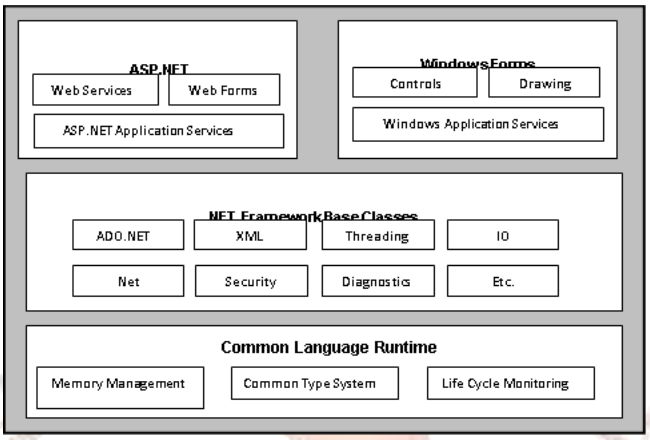

Fig. 1.1: Visual Studio .NET and the .NET Framework

Programming languages supported by Visual Studio .NET

Language	Description
Visual Basic .NET	Designed for rapid application development
Visual C# .NET	A new language that combines the features of Java and C++ and is suitable for rapid application development
Visual C++ .NET	Used to develop performance applications which arehigh in nature.

Components of Visual Studio .NET

Component	Description
Microsoft SQL Server 2000 Desktop Engine	It is a database engine which can run on PC through which we can develop applicationsbased on visual studio those are having compatibility with the Microsoft SQL Server.

Platforms that can run Visual Studio .NET

- Windows 2000 and later releases of Windows

Platforms that can run Visual Studio .NET applications

- Windows 98 and later releases Windows, depending on which .NET components the application uses.

Visual Basic .NET Standard Edition

1. An inexpensive alternative to the complete Visual Studio .NET package that supports a limited version of Visual Basic .NET as its only programming language.
   - The .NET Framework defines the environment that you use for executing Visual Basic .NET applications.
   - Visual Studio .NET is a suite of products that includes all three of the programming languages listed above. These languages run within the .NET Framework.
   - You can develop business applications using either Visual Basic .NET or Visual C# .NET. Both are integrated with the design environment, so the development techniques are similar although the language details vary.
   - Besides the programming languages listed above, third-party vendors can develop languages for the .NET Framework. However, programs written in these languages can't be developed from within Visual Studio .NET.

SELF-ASSESSMENT QUESTIONS - 2

4. Visual Studio .NET includes_____ programming languages.
5. MSDE stands for _____.
6. _____ defines the environment to execute Visual Basic .NET applications.

5. JUST-IN-TIME COMPILER

The program which is written in high level language requires appropriate runtime while compiling. The architecture on which the language runs has the details to execute its code. All the programming languages require its respective runtime to run the application. For example, to run an application developed using Visual Basic requires the system has the Visual Basic runtime is installed. Because the VB runtime can run the applications that are developed using visual basic code not the other codes like java or c#.

The main benefit of .NET Framework is the interoperability between various languages. In the .NET Framework, all the Microsoft .NET languages use a CLR that resolves the problem of installing separate runtime for each of the programming languages. Microsoft .NET Common Language Runtime installed on a computer can run any language that is Microsoft .NET compatible.

As all the Microsoft .NET languages share the common runtime language, they all work well together. For example, you can use an object written in C# from Visual Basic.NET. The same applies for all the other Microsoft .NET languages. .NET compatible provide the Microsoft .NET CLR to install on a computer. Before the MSIL (Microsoft Intermediate Language) executed, it must be converted by a .NET Framework Just-In-Time (JIT) compiler to native code, which is CPU-specific code that runs on the same computer architecture as the JIT compiler. MSIL is a group of instructions that can be rapidly translated into native code. A Microsoft.NET application can be run only after the MSIL code is translated into native machine code. In .NET Framework, the intermediate language is compiled "just in time" (JIT) into native code when the application or component is run instead of compiling the application at development time.

Types of JIT compilers

Pre-JIT Compiler: It compiles the entire code in to native code in a single cycle during the deployment of application.

Econo-JIT compiler: Here the compilation happens only at the time of requirement as well it will be freed as soon as the work gets over.

Normal-JIT compiler: Here the compilation begins when the particular method is called and the same will be stored in the cache memory. When the same method is called in future the stored content from cache will be retrieved for execution.

SELF-ASSESSMENT QUESTIONS - 3

7. MISL stands for _____
   a. Microsoft Intermediate Language
   b. Microsoft Interpreted Language
   c. Microsoft Interface Language
   d. Microsoft Informative Language
8. **Econo-JIT** compiler compiles the entire code in to native code in a single cycle. State. [True/False].
9. The main benefit of .NET Framework is the _____ between various languages.

6. .NET FRAMEWORK CLASS LIBRARY

Framework provides a common set of services that application programs written in a .NET language such as Visual Basic .NET can use to run on various operating systems and hardware platforms. As we discussed you can understand that the .NET Framework is divided into two main components: the .NET Framework Class Library and the Common Language Runtime as shown in the figure 1.2.

The .NET Framework Class Library defined as "consists of segments of pre- written code called classes that provide many of the functions that you need for developing .NET applications". For instance, the ASP.NET classes are used to develop Web Forms applications. The Windows Forms classes are used for developing Windows Forms applications and other classes allow you to work with databases, access files, manage security, and to complete many other functions.

These are not stated obviously in figure 1.2; the hierarchical structure is implemented to organize the classes inside the .NET Framework Class Library. These structures consist of related classes, organized into groups called namespaces. Each function needs to support by the namespace that contains the respective classes. For example, the System. Windows. Forms namespace classes used to create forms and the System. Data namespace classes you use to access data.

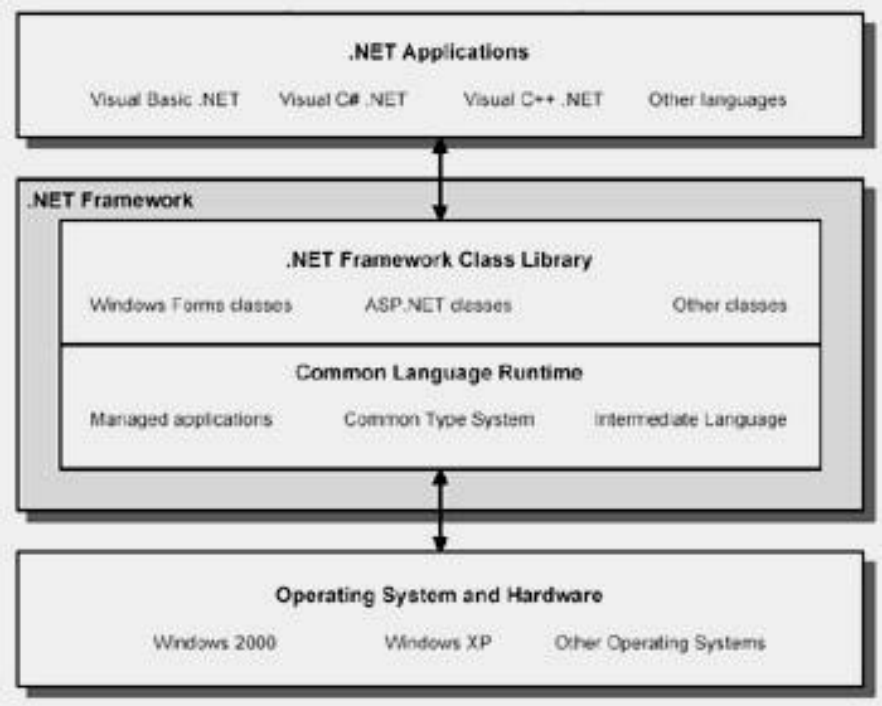

Figure 1.2: The components of the .NET Framework

The .NET Framework Class Library provides pre-written code in the form of classes that are available to all of the .NET programming languages. This class library consists of hundreds of classes, but you can create simple

.NET applications once you learn how to use just a few of them. Few of the most used namespaces are listed below in the table 1.1.

Table 1.1: Name spaces

Name Space	Description
System	Contains fundamental classes which define data types, events and event handlers, interfaces, attributes, and processing exceptions etc.
System.Activities	Pertaining to classes require to create and work with activities
System.AddIn	contain types used to identify, register, activate, andcontrol add-ins and allow to communicate with host application
System.Collections	contain types that define various standard, specialized,and generic collection objects
System.Configuration	Contains data pertaining to configuration data, like data in machine or application configuration files

System.Data	Contains classes for managing and accessing data from various sources.
System.Deployment	Contains data supports in deployment of Click One applications
System.Dynamic	Provides classes and interfaces that support Dynamic Language Runtime.
System.IO	Contains types that support input and output, including the ability to read and write data to streams.
System.Linq	Contain types that support input and output, including the ability to read and write data to streams.

SELF-ASSESSMENT QUESTIONS - 4

10. ASP.NET classes are used to develop _____
11. The .NET Framework Class Library provides pre-written code in the form of_____.
12. System. Data classe supports in managing and accessing data from various sources State **[True/False]**

7. SUMMARY

- The .NET is the product of Microsoft that allows the users to have access to their information on any platform or device.
- The flow of program is controlled or decided by the event in event driven programming.
- Event and event handler are the two main components under the event driven programming concept.
- Flexibility, suitability for graphical interface, programming simplicity and the ease of program development are the advantages of event driven programming.
- .NET framework is the product of Microsoft contains libraries and provides language interoperability.
- To develop a Visual Basic .NET application, Visual Studio .NET is used it has a collection of products and includes three programming languages.
- Visual Basic .NET, Visual C#.NET and Visual C++ .NET are the three programming languages supported by Visual Studio .NET.
- Visual Studio .NET can run on Windows 2000 and later releases.
- The role of Just-in-time compiler is to convert a CIL (Common Intermediate Language) code into native code.
- .NET Framework Class Library consists of classes that support in developing .NET applications.

8. TERMINAL QUESTIONS

1. What is event driven programming?
2. List and explain the advantages of event driven programming.
3. Discuss on .NET framework.
4. Explain the .NET architecture and Visual Studio .NET environment
5. Brief the role of Just-In-Time Compiler.
6. Discuss on .NET Framework class library.

9. ANSWERS

Self Assessment Questions

1. Detection and handling
2. True
3. Programmer
4. Three
5. Microsoft Development Environment Engine.
6. .NET Framework
7. a. Microsoft Intermediate Language
8. False
9. Interoperability
10. Web Forms applications.
11. Classes
12. True

Terminal Questions

1. The flow of program relies on events, triggers and handlers. Program executed based on the event will be triggered by the GUI elements. Refer section 1.2 for more details.

2. Flexibility, suitability for graphical interface, programming simplicity and the ease of program development are the advantages of event driven programming. Refer section 1.2 for more details.
3. The .NET Framework is defining the background to execute Visual Basic
4. .NET applications. Refer section 1.3 for more details.
5. To develop a Visual Basic .NET application, we can use a product called Visual Studio .NET it is a collection of products that includes three programming languages. Refer section 1.4 for more details.
6. The role of compiler comes where the program which is written in high level language requires appropriate runtime while compiling. Refer section 1.5 for more details.
7. .NET Framework Class Library consists of classes that support in developing .NET applications. Refer section 1.6 for more details.

10. E-REFERENCES:

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- http://msdn.microsoft.com/en-us/library/zw4w595w(v=vs.71).aspx
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