# Visual Basic: New Content

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## ABSTRACT

In this paper an attempt has been made to outline some of the new features of Visual Basic .Net that were not available in the previous version of VB6. These are features that are important for the new generation of programming applications and for mastering programming skills. It was noticed that these topics did not receive proper attention or were barely covered in many Visual Basic .Net textbooks for tertiary institutions. The importance of some of these concepts is discussed. The article is supported by online tutorials and resources provided by the author.

## 1. INTRODUCTION

Visual Basic is and has been the programming language of choice for computing papers in many tertiary institutions for years. Recently most tertiary providers switched from the previous version Visual Basic (VB) 6 over to the newer VB7 known as Visual Basic.Net. Microsoft has introduced many new features to this version. With the launch of Visual Studio .NET 2003, customers gained the benefits of enhanced tool and framework functionality. The coming release of Visual Studio 2005 and the .NET Framework will offer innovations and enhancements to the class libraries, common language runtime (CLR), programming languages, and the integrated development environment (IDE). Unfortunately quite often textbooks or courses just reproduce old content with a new wrapping, without reflecting new language features.

A number of textbooks available were carefully reviewed. The results show that most of them do not even mention some important new features of VB.Net. This paper addresses these concepts that are barely covered in textbooks but quite important for the new generation of programming applications and for mastering programming skills. Some other concepts such as the object-oriented nature of the new language or data access are broadly discussed and covered in books. They are not considered in this paper.

## 2. WHAT'S NEW

On one hand one could say that Visual Basic .NET does not include major changes to the underlying language; there are merely some useful additions to an already solid set of features. But careful analysis of the Vb.Net Language Specification (Vick, 2003) and comparison with the older version shows that concepts such as, for example, delegates or threads, are new ones and worth more attention. Also it appears that the newly available tools and techniques for events and event handling increase the programmer's power dramatically. These concepts are interesting and important not from the "computer science" perspective but rather because they enhance the RAD (Rapid Application Development) programming tool set.

### 2.1 Threads

One of the many great features in Windows OS is multiple threads. Multithreading is such a common element of today's programming that it is difficult to find windows applications that do not use it. Multithreading that was available in Java for years is new to the VB developer. The VB developer has always wanted this feature in the language and its now available in VB .NET.

Multithreading is useful for a number of reasons. Multiple threads may be used to handle tasks in the background without freezing up the

application's interface, making it responsive at any time. When the task is done (and even in the process of execution), it updates data in the application so the main thread will be able to tell that it is finished and reflect changes. One common example is a file search task that may take a long time. Your application may need to respond to external events (e.g., to stop search, change search parameters etc.).

One more area where a thread could be used is when one needs a service that keeps track of or regularly monitors several different things at the same time. Threads let you juggle a lot of tasks and events simultaneously.

Probably one of the main uses of multi-threading is in multi-user network applications.

## 2.2 Events and Event Handling

Events are something we have been using in Visual Basic for years. One of the first things that you might notice when beginning to use .Net is that the parameters passed to event subroutines are very different in VB.NET. These extensions to event handling syntax give much more power to a programmer. In particular this enables us to get useful information passed through parameters to an event subroutine. However, in order to use this functionality a deeper understanding of events and event handling in .Net is needed. It worth this attention as the programming we are doing is essentially event driven programming.

One more very useful extension in .Net is a dynamic hooking of events to event handlers. To tell Visual Basic .NET that a particular event handler should handle a particular event from a particular object, you need to associate the event handler with the event. In VB6 it was only possible to do this at design time. Now we can use the AddHandler statement to set up the association at run time. This makes it much easier to develop a "dynamically generated" GUI.

## 2.3 Delegates

In any consideration of events one should not exclude delegates. The connections between events and event handlers, and also the events themselves, are actually implemented by special objects called delegates. However, the reasons for the need to talk about and use delegates are much broader.

It appears that delegates are one of the hardest of the new concepts for students to understand. One reason is that, when explaining delegates, many authors refer to function pointers available in other programming languages. But students (most of them) have never studied C++ or Delphi… On another hand, understanding and mastering delegates helps students to use events and multithreading more efficiently. When it comes to asynchronous programming (if you delve at such a depth) and networking, the notion of delegates is a must.

Application software is often designed around the notion of callbacks. The use of callbacks is a programming technique in which one part of an application (or even a separate application) sends out notifications to alert other parts of the application (or other applications) whenever something interesting has occurred. Delegates are the main tool to provide call-back functions in network applications or communication between threads, etc.

The implementation and usage of delegates is not really complicated because VB.NET does a lot of things behind the scenes

## 2.4 XML

Since the inception of XML, many developers have wondered why we need XML. In what way is it better than plain text or HTML, and what does it do? The power of XML resides in the "X" (which stands for extensible). But probably any debates about the usefulness of XML are unnecessary here.

Why should XML be used and taught in VB.Net? First, unlike VB6 the new version supports XML natively. Understanding and using XML provides us, as developers, with a number of benefits. Even many project files in the Visual Studio use XML format. (It is hard to imagine anyone arguing that students do not need to know anything about that). Probably the best example is application configuration files. They are not a default but are very handy, and sometimes are the only option for providing a flexible configuration process. Additionally developers may provide their custom XML configuration files (as opposed to App.config files managed by Visual Studio).

Second, XML is a core component of the entire .NET Framework and is involved in everything from object serialization, to Web service connectivity, to data access. In addition to supporting the core .NET Framework infrastructure, a rich set of standards compliant XML APIs are available to use from Visual Studio .NET applications (System.Xml Namespace).

Unfortunately, from the author's point of view these topics are not given sufficient attention in many textbooks. The author does not claim to give an exhaustive list of innovations in .Net, nor is he arrogate enough to state that the topics listed are extremely vital, and should become compulsory. Rather, the author would like to share some original tutorials and other resources that he has prepared to assist him in covering these topics in his programming courses.

# 3. RESOURCES FOR TEACHING

Another issue to be addressed in this paper is the availability of resources that can be used to teach the above mentioned new concepts. This problem exists because most of those textbooks that do cover these concepts are written mainly for professionals, and are too complex for students (e.g. Barwell *et al, 2003*). One of the main sources of information for VB programmers, the Microsoft Developer Network (MSDN), can also be hard to use by inexperienced programmers such as students.

Fortunately, there are a number of very helpful on-line articles and tutorials available. As an example, one of the web sites worth mention provides a collection of VB.Net tutorials aimed at programming students (Rasheed, 2005). Unfortunately, the length of this paper does not permit a discussion or even the listing of all those resources that the author has found to be very useful.

The author would also like to make his contribution to these resources, and wants to present some original materials that cover threads, delegates, events and other matters. These tutorials were prepared for his programming courses and can be found at the author's web site (Gakhovich, 2005). Links to other useful resources are also provided there.

# 4. CONCLUSION

Visual Basic and Visual Studio are not static. Recently, Microsoft released Visual Studio 2005 Beta 2 version, with some new cool features such as Design Time Configuration of Single Instance Applications, easy Design Time Configuration of Splash Screens, Compiler Feedback Control, some new language extensions etc.

Timely identification and better realization and understanding of new features in the Visual Basic language may help to bring existing courses up to date, and assist in the development of new ones. It will also better satisfy contemporary industry needs, and prepare students for the new requirements of the market.

# REFERENCES

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