The COM and COM+ Programming Primer
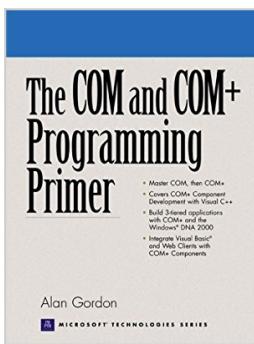
By Alan Gordon

The COM and COM+ Programming Primer By Alan Gordon

COM and COM+ are the foundation of virtually every new technology Microsoft is developing, and COM+ is an essential feature of Microsoft's Win 32 platform (and, therefore, a cornerstone of Windows 2000). COM and COM+ have a reputation for being extremely difficult to learn -- but it doesn't have to be that way. The COM and COM+ Programming Primerteaches both technologies from scratch-- step-by-step, using on-target analogies, simple example programs, and an "inside-out" teaching method that makes sure readers really understand before introducing shortcuts such as Microsoft's wizards. Alan Gordon starts with crystal-clear definitions of every Microsoft technology related to COM, including ActiveX, OLE, DCOM, DNA, and COM+. Understand the fundamental classes, objects, and interfaces associated with COM. Next, build your first COM object, and simplify it using ATL 3.0 and Visual C++ Native COM support. In Section II, dig deeper into COM: create an out-of-process server; understand Automation; work with COM callbacks and connectable objects; master threading; and review the additional distributed development features Microsoft introduced with DCOM. Next, understand the key distributed technologies that set the stage for COM+: Windows DNA, the Microsoft Transaction Server, and MSMQ. Finally, in four practical, hands-on chapters, you'll start working with COM+ in the Windows 2000 environment: creating objects, working with threading, even building full-fledged n-tier applications.

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The COM and COM+ Programming Primer By Alan Gordon Bibliography

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Editorial Review

Amazon.com Review
Besides being one of the most readable and understandable guides to the Microsoft Component Object Model (COM) (and related technologies) ever written, Alan Gordon's *The COM and COM+ Programming Primer* also gives today's COM developer an up-to-the-minute guide to COM+, including excellent hands-on demonstrations of installing and deploying COM+ objects.

The best thing about this text has to be the author's extremely engaging writing style and clear explanations of thorny COM concepts, like interfaces, GUIDs, and other nuts-and-bolts issues that help make Microsoft's component standard tough-going for beginners. An experienced educator, the author makes use of clear examples and analogies--for instance, describing COM as a "software bus" where components can be shared across applications and projects. If you've been baffled by other books on COM, this book's easygoing presentation may do the trick. It also helps that the text traces each slippery term in the Microsoft COM marketing arsenal. It shows how labels like "OLE," "COM," and "ActiveX" have changed over the years.

After a comprehensive tour of the basics, *The COM and COM+ Programming Primer* turns toward distributed COM (DCOM) and then onto today's COM+. Several useful tutorials explain building COM objects using Visual C++, including using ATL wizards. When it comes to COM+, the text shows how built-in transactions, object pooling, and queued components can be used to create more scalable and reliable distributed applications. With plenty of screenshots detailing how to install and configure COM+ components, this book will let readers get going with COM+ in their own projects.

The COM and COM+ Programming Primer shows how basic COM has evolved into today's COM+ standard--not by getting rid of the basics, but by enhancing an already capable component standard with new middle-tier resources. This title provides an excellent introduction to basic COM for anyone new to this standard, and provides the latest on COM+--which will help more experienced readers take their skills to the next level. *--Richard Dragan*

Topics covered:

- COM overview, advantages of components, COM as a "software bus," COM+ basics, and ActiveX and OLE
- Object design with COM
- Interfaces and objects
- Basic COM objects with Visual C++
- Using the Active Template Library (ATL)
- In-process and out-of-process servers
- OLE automation basics
- COM callbacks and connectable objects
- Threading (single, multiple, and thread-neutral apartments)
- Distributed COM (DCOM)
- COM+ architecture and system services
- COM+ transactions, object pooling, and queued components
- Three-tiered applications in Windows Distributed interNet Architecture (DNA)
- Tutorials for developing and deploying COM+ components
- Interception

- COM+ events

From the Inside Flap
Preface

Teaching my class at UCLA, an Introduction to COM/ActiveX Programming Using Visual C++, has given me a good background from which to write a book on COM and COM+. The target audience for this book is the same people who took my class at UCLA: intermediate-to-advanced programmers who have little or no knowledge of COM or COM+. By the time you finish this book, you should have enough knowledge of COM to begin using COM and COM+ professionally. My Approach

My objective is to teach you the 90 percent of COM that, as an application developer, you will use every day. Most of this is surprisingly simple. But there is another 10 percent of COM that is very difficult to understand and this is the part with which I have often seen otherwise excellent programmers become bogged down. It's not that these "10 percent" topics aren't important, it's just that you can get started and begin using COM without understanding all of these topics. Some "10 percent" topics that immediately come to mind are Apartments, custom marshaling, aggregation in general, manual marshaling of interface pointers, and aggregating the Free-Threaded Marshaler. I do cover all of these topics in this book, but be forewarned you probably won't understand these topics the first time you try to learn them; I certainly didn't. But don't get discouraged and don't let topics like this "bog you down" as you try to learn COM. This is not what COM and COM+ is all about. COM is about making it simple for you to build location transparent and programming-language independent software components. COM+ is all about facilitating the development of enterprise-class, distributed applications. The objective of neither of these technologies is to aggregate the Free-Threaded Marshaler. Don't allow yourself to become lost in the minutia of COM as many people do. When I cover topics that I know tend to bog down people (like Apartments), I caution you to just keep going if you don't understand it right away. Please follow this advice. You will understand the other concepts as you begin using COM professionally and start tackling more difficult problems.

Visual C++ and Visual Bask
The primary programming language used in this book is Visual C++. The world seems to be turning away from languages like Visual C++ and to languages like Visual Basic, Java, and Delphi. Unfortunately these languages hide so much of the under-lying details of COM that it is difficult to understand what's going on under the hood if you only use these languages. Only in Visual C++ can you implement the IUnknown interface, and create your own class factory, as you will do in Chapter 4. I strongly believe that the additional insight that you gain by doing this is well worth the additional complexity. In addition, there are certain things that you can do in COM+ that you simply cannot do from Visual Basic 6, such as building an object that will run in the thread-neutral apartment and using object pooling. Once you understand COM+ using Visual C++, transferring your knowledge to a more productive development environment, like Visual Basic, will be easy. Don't worry; you don't have to be a C++ Guru to read this book. I really think that a beginning C++ programmer will have little problem following along with the code in this book. I do use Visual Basic to build some of the client programs. I mainly did this to save time. It is much easier to build GUIs with Visual Basic than Visual C++. In addition, using Visual C++ for server-side development and Visual Basic for client-side development is a popular combination that I have seen on a number of projects recently.

Use of the Word Component
If you read any books about COM you quickly see that the word component has two popular uses:

It refers to a binary file (a Dynamic Link Library or Executable) that implements one or more COM classes it refers to a single COM class

Personally, I prefer the first definition of the word mainly because I believe that a COM class adequately describes the individual pieces of functionality that may reside in a single binary. People who use component to refer to a COM class usually use component server or just server to refer to the binary in which several components may be hosted. When you start using COM+ you will see that Microsoft refers to COM+ classes as components (even though they are not completely consistent either). I'm hardly a zealot on these kinds of issues so I concede the argument for now. I think there still are a few places in this book where my old bias shows through. I believe that in all places it is obvious from the context whether I am referring to a single COM class or a binary file in which several classes reside. The Book's Structure

Of the 15 chapters in this text, eight chapters (1-8) are essentially pure COM, two chapters (9 and 10) are primarily COM with some COM+, and five chapters (chapters 11-15) are pure COM+. The simple reality is that you cannot understand COM+ without first understanding COM. COM+ is really just a vastly improved and more tightly integrated version of Microsoft Transaction Server along with some key refinements to the underlying COM infrastructure such as Thread Neutral Apartments. A book that only covered COM+ features would only be usable by people who understand COM already. I covered both COM and COM+ because I wanted this book to be usable by people who are new to COM. Having said that, I teach you only enough COM so that you can understand COM+. COM+ was designed primarily to facilitate the development of enterprise-class, distributed applications, so there are many COM topics (ActiveX controls for instance) that are not covered in this book because they have little relevance to enterprise-class development and COM+.

Most of the chapters start by explaining a problem that can be resolved by using COM/COM+. That is followed by a discussion of how the COM-related technology works and how you will use it. This discussion includes a lot of analogies, diagrams, and screen shots. Finally, in most of the chapters you build a demonstration program. I don't think any of the demonstration programs are terribly sophisticated (they weren't meant to be). The example programs are designed to reinforce the topic that you are learning in that chapter. I show you how to build the example program in enough detail that a beginning Visual C++ programmer (if you can work through the Scribble tutorial in the Visual C++ documentation you're good to go) should have no problems following along. I think you will learn the most by building the example programs yourself, but if you don't want to go through the steps yourself you can download the demonstration programs from the FTP site for this book ftp://ftp.prenhall/pub/ptr/windows_technology.056/gordon.

Part 1: Laying the Foundation
In the first chapter, I define all the names in the COM namespace. Confused as to what COM, OLE, ActiveX, and the Windows DNA are? Chapter 1 defines these names and more. In Chapter 2 you learn a number of object-oriented concepts that are important pre-requisites to understanding COM. In particular, you learn what it means to be object-oriented and I define a class, an object, and an interface. The discussion of interfaces in this chapter is particularly important. In Chapter 3 I define the notion of a software bus and use it to explain some of the intricacies of COM: GUIDs, the IUnknown interface, Type libraries, Marshaling, and how COM uses the registry. In Chapter 4 you build your first COM class in an in-process server. You do this "from scratch" without the help of any wizards. You also build a COM client application. In Chapter 5 you learn how to build a COM server much more easily using the Active Template Library (ATL) and the ATL Object Wizard. All of the work that you do from Chapter 5 on uses ATL and/or Visual Basic.

Part 2: Digging Deeper In Chapter 6 you learn how to build an out-of-process server. In Chapter 7 you learn about Automation. In Chapter 8 you learn about connection points. These 8 chapters are the pure COM material in this book. In Chapter 9 I discuss COM threading and Apartments. This chapter features some material (primarily Thread Neutral Apartments) that will be new to COM programmers who have not used

COM+. In Chapter 10 I discuss DCOM and again in this chapter I discuss, briefly, some new topics like the Kerberos Security Support Provider.

Part 3: COM+
Chapter 11 begins our discussion of COM+. In Chapter 11 I discuss the COM+ architecture. You learn about Context's and Interception. You also learn how to configure a component using the Component Services Explorer. In Chapter 12 you learn about each of the Services that COM+ provides to components: fine-grained security, transactions, concurrency, store-and-forward method invocation (queued components), loosely-coupled events, load balancing, improved scalability thru just In Time activation and pooling of objects, and database connections. Chapter 13 is a big chapter in both size and significance. In this chapter you put it all together and build a 3-tiered, thin-client application using all the technologies in the Windows Distributed interNet Applications (DNA) Architecture: COM+, Active Server Pages, ADO, SQL Server 7, Visual C++, and Visual Basic. In Chapter 14 you use Queued Components to enhance your application. In this chapter you also learn how to use the Microsoft XML parser. Finally, in Chapter 15 you learn how to use COM+ Events. The Intended Audience

You need to have at least a beginner's level knowledge of both Visual C++ and Windows Programming, in general, in order to understand this book. Also, the more you know about object oriented concepts, pointers, distributed processing, and multi-threading the easier time you will have learning COM. None of this knowledge is required to understand this book, as I do start from first principles. But trust me, the more you understand these concepts, the easier time you will have understanding COM, whether you learn from this book, another book, or a class. Conventions used in this book

This book uses different features to help highlight key information. These features are discussed in the following sections.

Code Presentation
You will notice that there are three types of code listings. Some do not have a listing number, some have a listing number, and some have a listing number and numbered lines. Code that does not have a listing number is usually a short snippet that is included to illustrate a point.

Sidebars
Sidebars are used to present parenthetical information: information that is related to the topic at hand but does not flow directly with the main body of the chapter. In a few cases, I also use sidebars as a soapbox where I present information that is strictly my opinion, such as when I discuss my idea for a new COM naming scheme in Chapter 1. If you put a "by the way" or a "for your information" before each sidebar then you've got the idea.

Icons
Notes are used as small sidebars. Whenever I want to present parenthetical information that consists of only a sentence or two, I make it a note.

Tips are used to provide recommendations or to present information that can either save you time or prevent you from encountering minor problems.

Warnings are used to present information that is so important that I want it to stand out. I also use warnings to inform you of things that you must do to avoid serious problems. It is particularly important for you to pay heed to warnings that are associated with the example programs. In most cases, not following the warning will cause the example program not to work. About the FTP Site

The FTP site for this book can be found at the following URL:

ftp://ftp.prenhall/pub/ptr/windows_technology.056/gordon. The FTP site contains the errata for the book. It also contains the source code for all the example programs in the book. If you do not wish to build the example programs yourself, or you encounter problems building the examples, you can download the finished programs from the FTP site. Acknowledgements

From the Back Cover

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Learn how to build 3-tiered, thin-client application with COM+ and the Windows DNA 2000

• Extensive coverage of COM+
• Step-by-step instructions show you how to build Components that use COM+ Services: Fine-grained

security, transactions, synchronization, queued components, and loosely coupled events
- Learn how to integrate all the technologies in the Windows DNA 2000: COM+, ASP, IIS, SQL Server, OLEDB, ADO, and XML
- Starts from first principles-no need to understand COM already
- Build on your skill base with Visual C++® and Visual Basic®

COM+ is the second generation of COM. It includes new features that make COM easier to use and simplifies the development of distributed, enterprise-class applications. COM+ builds on the distributed infrastructure provided by DCOM and MTS, and it represents the evolution of COM from a desktop, application integration technology to a distributed, application development infrastructure.

In The COM and COM+ Programming Primer, you'll follow an experienced instructor and programmer/developer through COM+ and COM code from the "inside out," so you understand its deep structure. You'll build simple objects from scratch to gain a thorough familiarity with the underlying concepts. Your existing skills in Visual Basic and Visual C++ will help you master COM and COM+ so you'll be creating usable applications in record time.

With Alan Gordon's straightforward explanations and practical use of standard tools, you'll get the in-depth knowledge you need to create applications that leverage COM+ and all the technologies in the Windows DNA 2000.

Users Review

From reader reviews:

Marvin Gamez:

Spent a free the perfect time to be fun activity to accomplish! A lot of people spent their down time with their family, or their particular friends. Usually they carrying out activity like watching television, likely to beach, or picnic within the park. They actually doing same every week. Do you feel it? Would you like to something different to fill your personal free time/ holiday? Might be reading a book can be option to fill your no cost time/ holiday. The first thing that you ask may be what kinds of reserve that you should read. If you want to consider look for book, may be the publication untitled The COM and COM+ Programming Primer can be good book to read. May be it could be best activity to you.

Eileen Smith:

Reading can called mind hangout, why? Because when you are reading a book specially book entitled The COM and COM+ Programming Primer the mind will drift away trough every dimension, wandering in each and every aspect that maybe not known for but surely will end up your mind friends. Imaging every single word written in a publication then become one web form conclusion and explanation that maybe you never get previous to. The The COM and COM+ Programming Primer giving you one more experience more than blown away your thoughts but also giving you useful facts for your better life in this particular era. So now let us present to you the relaxing pattern the following is your body and mind will probably be pleased when you are finished reading it, like winning a. Do you want to try this extraordinary wasting spare time activity?

Marlene Childs:

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