Mining Amazon Web Services: Building Applications with the Amazon API
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To my cousin Maxine, “Mad Max”—
I appreciate the kindness, joy, and quietness you bring wherever you go.
Foreword

SOAP and XML-based web services are changing the way that applications and Web sites are designed and built. For years, the information processing industry has been trying to build a robust and easy-to-use way to build networked applications by assembling loosely coupled component parts. Earlier efforts such as DCOM, CORBA, and RMI represented the first steps in this direction. These efforts, while respectable in their prime, must now take a backseat to portable and easy-to-use protocols such as SOAP and XML over HTTP (also known as “REST”).

It is now possible to build a rich and powerful application by picking and choosing from an array of web services. Developers no longer need to pay attention to the programming language used to implement the service, the physical location of the service, the details of the internal data representation, or the type or brand of the computer running the service. Needless to say, this is a tremendous step forward. Developers can focus on what they want to build without worrying about many mundane implementation details. Service providers can upgrade and enhance their services without creating incompatibilities. The future looks bright!

The features and functionality offered through Amazon Web Services and outlined in this book are among the more powerful public web services available as of this writing. The thousands of developers who download our SDK each month show that we’ve torn down the walls between the developers and our product data, and paved the way for innovation.

The book in your hands will help you to join the wave of innovation being fueled by Amazon Web Services. John is a gifted writer, and he has written a remarkable book. Going far beyond simply how to accomplish a certain task, the book tells you why you would want to do it, and even what the consequences are of doing so. Each chapter in the book will patiently yet forcefully push you toward the next level of understanding. The slope of this “ramp” is gentle, but it is ever present. As you finish each chapter, you will be surprised to see just how far John has brought you. In an area as new and dynamic as this one, the latest information can often be found online; you will find plenty of links to the latest and greatest developments. John addresses many issues that are far too often left as unstated assumptions in other texts. No matter what your language or platform of choice, you will find a lot to like in this book.

Now, it’s your turn. Read the book, learn all about Amazon Web Services, and create something really cool!

—Jeff Barr

Amazon.com

October 2003
Acknowledgments

Thanks to my wife, Rebecca, for working with me to get this book completed. I really don’t know what I would have done without her help in researching and compiling some of the information that appears in this book. She also did a fine job of proofreading my rough draft and page proofing the result.

Russ Mullen deserves thanks for his technical edit of this book. He greatly added to the accuracy and depth of the material you see here. Russ is always providing me with great URLs for new products and ideas. I also appreciated his hard work in testing endless versions of applications and providing input for my ideas. This book is technically challenging in that it relies on a number of programming languages, new and evolving technology, and several new products. Russ met the challenge with an efficiency that few other people could match.

A number of people read all or part of this book to help me refine the approach and to test the examples on a number of systems. These unpaid volunteers helped in ways too numerous to mention here. I especially appreciate the efforts of Eva Beattie and Dennis Boyer who read the entire book and selflessly devoted themselves to this project. Osvaldo Téllez Almírall provided extensive input on international issues, making the book much better suited to international needs as a result. Richard Ward also helped with ideas and concepts, along with several other people who asked that I not directly mention their names.

Several vendors also helped with this book. The staff at Amazon has been very helpful—answering my many questions about their service. Some of the support staff at Microsoft helped in answering questions about interfacing Visual Studio to Amazon Web Services. I appreciate the efforts of Simon Fell in working with PocketSOAP.

Matt Wagner, my agent, deserves credit for helping me get the contract in the first place and taking care of all the details that most authors don’t really consider. I always appreciate his help. It’s good to know that someone wants to help.

Finally, I would like to thank Tom Cirtin, Leslie Light, Cheryl Hauser, and the rest of the editorial and production staff at Sybex for their assistance in bringing this book to print. It’s always nice to work with such a great group of professionals and I very much appreciate the friendship we have built over the last two books. I especially appreciate the efforts of Maureen Forys and the staff at Happenstance Type-O-Rama, who provided the great design for this book.
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Introduction

The unicorn is a mythical beast that has attracted the attention and imagination of many people. Unicorns are magical and many people read stories that include them as agents of good. Likewise, until recently, Web services were a mythical beast that programmers only imagined might work eventually. Developers read about Web services and fantasized about their potential. The magic of Web services is that you can combine resources from multiple companies, even if those companies have no idea that you exist. Web services are agents of good—helping developers meet incredibly tight programming schedules. Amazon Web Services is unique in that it’s a Web service offering that actually works as advertised. This book is your gateway to the magic that Amazon Web Services can add to your applications. Amazon Web Services isn’t just about books, it’s about a vast array of products. This Web service doesn’t just let you buy products, it helps you research products in new ways and help realize their full potential.

Welcome to a New World

I wrote this book because I believe in the potential of Web services to improve applications everywhere. Web services have the potential to improve data sharing—an event that has always signaled a renaissance in the human condition. Consider, for a moment, the impact of the printing press and the first public newspapers. These technologies helped improve communication and other innovations followed because more people could discuss things in more ways. This book helps you discover Amazon Web Services as a communication method.

Amazon Web Services is a perfect example of how Web services can improve communication. You now have the input of thousands of people at your fingertips. No longer do you have to rely on vendor brochures to tell you about a product, you can learn about a product through the comments of other people—people who have actually bought and purchased the product. However, Amazon Web Services helps you go further. Unlike a static review you could find anywhere, the electronic nature of Amazon Web Services lets you perform analysis and really study a product before you do something with it (and that doesn’t necessarily mean buying it).

Each of the sellers on Amazon also has a profile and you can use Amazon Web Services to learn more about that seller. You can consider how well a vendor meets buyer needs and
whether the low cost of a product will mean an absence of service after the sale. The ability
to choose is a primary human need—Amazon Web Services enhances your ability to choose
wisely.

Lest you think that this book is entirely devoted to buying, selling, analyzing, and dissect-
ing both vendors and products, I’ve also included a few unique uses for Amazon Web Services.
For example, you can create a shopping list from Amazon Web Services that you can down-
load to a cellular telephone to use as you shop. When you think about it, this use of Amazon
Web Services is just another form of communication.

Obviously, I’ll spend time filling in all the gaps. For example, you’ll find a checklist for the
Amazon Web Services licensing agreement in Appendix B. Using this simple tool helps you
ensure that you follow all of the Amazon guidelines and makes your application development
experience better.

Unlike the unicorn, Amazon Web Services is real and it’s ready to make your life easier.
For better or worse, now that Amazon Web Services has arrived and proven its usefulness,
we all live in a new world where communication takes yet another form.

Who Should Read This Book?
I’ve designed this book to meet the needs of anyone who wants to use Amazon Web Services.
You might be a corporate developer or a storeowner running a small business who needs an
Internet presence. Depending on your needs, you won’t use every part of the book, but you’ll
find that most parts have something to offer. No matter who you are, make sure you read
Chapters 1 through 4. Chapters 5 through 8 are language specific, so choose a language and
read the appropriate chapter (more if you’re multilingual). Chapter 9 helps anyone who
wants to write an application for mobile devices. Finally, Chapters 10 through 12 will help
people who want to go a little further in the development process. In short, the book has
something for everyone, but you might not need to read everything.

Some people have noted that a one-size-fits-all approach generally doesn’t work. I realized
this early on and made a few assumptions about your skills. You need to know something
about computers—you can’t pick up this book as a complete novice and expect to learn
something. This book is packed with resources—many of which you’ll need to locate on the
Internet and read. I’ve assumed that you’re motivated to learn what Amazon Web Services
can do for you and will use these resources to augment the information that I’ve provided.
That said, all of the examples include complete explanations, so you don’t have to worry that
this book is incomplete. In fact, you’ll find many instances where the information provided
doesn’t appear anywhere else.
It's possible to use this book without much programming knowledge, but you'll get a lot more out of it if you do know how to program at least a little. I've included a few examples, such as the “Using a Browser Example” in Chapter 2 for people who don’t program much (or at all). The VBA examples in Chapter 5 are very easy and might be the best choice if your programming skills are weak.

You won’t find any information on using the programming language of your choice in this book—this book concentrates on Amazon Web Services solutions of all types. In fact, I’ll suggest several additional books you might want to try in addition to this book if you don’t have the required background. Consequently, you won’t want to look at this book until you’ve already learned to use the programming language of your choice.

**Tools Required**

I’ve made some assumptions while writing the application programming examples in this book. During the writing of this book, I used a Windows 2000 server and two Windows XP workstations (along with other devices). I also tested many of the examples using Windows 9x. One of the book readers was kind enough to check as many examples as possible on a Linux setup. I even tried a few of the examples on a NetWare setup. The test machines included SQL Server and MySQL. I also created Web server setups using Internet Information Server (IIS) and Apache. The test base was as broad as I could make it, but it wasn’t possible for me to test every combination of machine and software.

I tested all of the examples in this book using the most current version of the appropriate language product. In most cases, I tell you which language version I used as part of the example description. I don’t guarantee that the example will work with any older versions of the product, nor did I test using educational versions of products. Given the relative simplicity of Amazon Web Services, however, I’m certain that most examples will work with any newer version of the supported language.

All of the desktop and Web application examples will work on a single machine, but I tested any database application on a two-machine setup as well to ensure you could place the database on another machine. The mobile device applications are all tested using an actual device, but I also tested them using an emulator. Chapter 9 tells you how to work with emulators and presents a number of emulators you might try when writing your application.
About the Author

John Mueller is a freelance author and technical editor. He has writing in his blood, having produced 61 books and over 300 articles to date. The topics range from networking to artificial intelligence and from database management to heads down programming. Some of his current books include several C# developer guides, an accessible programming guide, a book on .NET security, and several Windows XP user guides. His technical editing skills have helped over 32 authors refine the content of their manuscripts. John has provided technical editing services to both Data Based Advisor and Coast Compute magazines. He’s also contributed articles to magazines like InformIT, SQL Server Professional, Visual C++ Developer, Hard Core Visual Basic, and Visual Basic Developer. He’s currently the editor of the .NET electronic newsletter for Pinnacle Publishing (http://www.freeenewsletters.com/).

When John isn’t working at the computer, you can find him in his workshop. He’s an avid woodworker and candle maker. On any given afternoon, you can find him working at a lathe or putting the finishing touches on a bookcase. He also likes making glycerin soap, which comes in handy for gift baskets. You can reach John on the Internet at JMueller@mwt.net. John is also setting up a Web site at: http://www.mwt.net/~jmueller/, feel free to look and make suggestions on how he can improve it. One of his current projects is creating book FAQ sheets that should help you find the book information you need much faster.
Part I

Discovering Amazon Web Services

1. Learning About the Amazon Web Services
2. Using Amazon Web Services to Your Advantage
3. Working with Web Service Data
Chapter 1

Learning about Amazon Web Services

You might have already heard quite a bit about Amazon Web Services without really understanding what the phrase means. Amazon is an amazing company. Unlike many companies that created an online presence and are no longer in business, Amazon is still around today and thriving. In fact, the company’s owner, Jeff Bezos, was recently quoted as saying the Amazon Services subsidiary (the one that provides your online experience among other things) might eventually become their main business (see the InfoWorld article at http://www.infoworld.com/article/03/06/10/HNamazondives_1.html?business for details). Given all that Amazon is doing, it’s easy to understand how all of these new services could become confusing even to seasoned professionals.

This chapter helps you understand what Amazon Web Services can do for you and how it fits within your business or research plans. It also discusses what you need to know in order to best use Amazon Web Services for your particular needs. Although you might think that Amazon Web Services is only good for people who want to act as associates and sell goods through their Web site, Amazon Web Services is capable of performing myriad other interesting tasks. For example, many individuals use Amazon Web Services as a means for performing research without ever engaging in buying or selling products.

Once the chapter gets past the basic concepts behind the Amazon Web Service, it demonstrates how to obtain the required resources and set them up on your machine. For example, you need both the Amazon Web Services Kit and a developer token to perform basic tasks. In fact, the chapter describes setup scenarios that you should consider to make your machine better reflect what the user of the Web site, document, or application you build will see. Some situations might require you to set up a system that also includes alternative devices such as a Personal Digital Assistant (PDA). In short, when you complete this chapter, you’ll have a copy of the Amazon Web Services Kit installed on a machine configured to meet specific requirements.
Understanding Amazon Web Service

Whenever a new technology appears on the scene, it’s important to compare it with other technologies you might have used in the past. The comparison process often helps you decide how this new technology differs from what you used in the past and reduces problems caused by hype. The media might try to convince you that a new product or service is something completely different, when in fact it’s merely an update of an existing technology. Currently, there’s a lot of hype about Web services that makes them sound like something new and very complex. This section of the chapter defines Web services generally, examines Amazon Web Services specifically, and compares this technology to older technologies. What you’ll find might surprise you because Web services are really a new implementation of an old technique.

What Is a Web Service?

You can look at a Web service from a number of perspectives. The easiest way to view a Web service is as a means of obtaining access to information. Essentially, you ask the server for information and the server returns that information in some form. The request and the returned information normally appear in eXtensible Markup Language (XML) form. Using XML preserves the meaning behind the information, regardless of the diversity of the platforms involved, so that you receive not only the information, but understand the context in which the information is used. The “Understanding XML Basics” section of Chapter 3 tells you more about XML. All you need to know now is that you receive information in XML format.

From an Amazon Web Services perspective, you request information on one or more products, vendors, or other search criteria. The request defines the kind of information you want to know and how detailed that information will be. Amazon Web Services returns the information you request (when available) in a standardized format.

A Web service also performs some type of useful work. The useful work might be something as simple as interpreting your request, calculating the answer, and sending the result back. In the case of the Amazon Web Service, the Web service accepts your request (normally some search criteria), interacts with the database through a search engine to obtain the information you requested, and sends the information back to you. You can also perform other...
tasks using the Amazon Web Service, such as making a purchase or selling goods to others. The rest of the book shows how to perform all of these tasks.

The final consideration for a Web service (at least from the Web service user perspective) is that it executes on the remote machine, not on your machine. In short, this means you’re using resources on that other machine with the permission of the machine’s owner. The remote machine can set requirements for using the Web service, as well as require you to perform specific setup and security checks as part of your request. In the case of the Amazon Web Service, you need to obtain this permission by requesting it as part of the Amazon Web Services Kit download process. The “Getting a Developer Token” section of this chapter tells how to obtain the required permission and what this permission means to you.

**How Do Web Services Work?**

Many people fear new technology because they don’t understand how it works, and many of those who do know how it works enjoy the mystique of knowledge too much to share it with anyone else. Web services are actually quite easy to understand if you look at them in a way that relates the task to everyday occurrences. For example, you might compare the operation of a Web service to making a withdrawal at the bank—the process really is the same. The one thing to remember is that the process a Web service uses to perform a task is always the same. No matter what technology you use to make a request or receive a response, the steps are still the same. Here are the steps that most Web services, including the Amazon Web Service, use to complete a transaction.

1. *The client discovers the Web service.* During the act of discovery, the client might do things like download a file that tells how to interact with the Web service. This step is the same as someone walking into the bank. The person knows the bank exists and the bank teller might have noticed the person. The bank posts the rules for making a withdrawal or the teller might help a first-time banker understand the rules.

**TIP**

You may find that Amazon Web Services is so indispensable that you’ll want to work with Web services from other vendors. For example, Microsoft supports the MapPoint Web Service (http://www.microsoft.com/map-point/net/). In time, standards organizations will set up directories of these Web services that you can access with ease. In the meantime, you can search for companies that offer Web services using the Web Services Finder page at http://www.15seconds.com/WebService/. Some people have problems using the Web Services Finder. In some cases, you’ll need to use a specialty Web service list such as the one at http://www.flash-db.com/services/.
2. The client makes a request based on the rules delivered during the discovery phase. The rules might specify that the request has to appear in a certain form and the client must provide specific data. This step is the same as the person walking up to the teller's window with a withdrawal request. The request must contain the person's account number, the amount they wish to withdraw, and other identifying information. The bank specifies the format of the request and the information it must contain.

3. The server might ask the client for credentials depending on the openness of the Web service. Amazon Web Services is public but still requires that you supply a developer token as identification. This step is the same as the bank teller asking you for a driver's license or other form of identification before honoring your withdrawal request.

4. The Web service performs the work required to honor your request. In most cases, the Web service accesses a database for information, it could enter an order, and it might even provide some level of formatting. Amazon Web Services performs a number of tasks depending on the request you make. The easiest request is a product search. This step equates to the bank teller getting the money from the drawer and counting it.

5. The Web service sends the data to the client. The content of the information depends on the Web service. Amazon Web Services provides data in a very specific format based on the content of the associated database and the nature of the request. This step equates to the teller handing the person their money. In general, the teller orders the money in a specific way and counts it out to the person, rather than simply handing the money over.

6. The client logs out of the Web service or the Web service disconnects the client after some period of inactivity. This step equates to the person leaving the bank, money in hand. If the person doesn't leave the bank (they just hang out in the lobby), you can be sure that someone will ask them to leave.

7. The client does something with the data it receives. In many cases, it formats the data and presents it on screen for the user. This step equates to the person spending the money they receive from the bank.

You can add any amount of complexity needed to the individual steps, but these seven steps define the process every Web server follows. When you break a Web service down into these seven steps, the process that used to appear as magic suddenly becomes quite doable. Chapters 5 through 9 are essentially options you can use to perform these seven steps using different technologies. This book explores the seven steps using various languages and platforms—Amazon Web Services makes information available to just about anyone who needs to access it.