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Microsoft SQL Server™ 7.0 数据库实现

（影印版）

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Microsoft SQL Server 7.0 Database Implementation Training Kit

- MCP 70-029 考试（Microsoft SQL Server 7.0 数据库设计与实现）专用教材
- 提供实际训练，培养动手能力

Microsoft Certified Professional

MCSE Training for Exam 70-029

北京大学出版社
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微软指定 MCDBA 教材(影印版)

Microsoft SQL Server 7.0 Database Implementation Training Kit

Microsoft SQL Server 7.0 数据库实现

Microsoft 公司

北京大学出版社

内 容 简 介

本书是《微软指定 MCDBA 教材（影印版）》丛书中的一本，讲述如何使用 SQL Server 7.0 设计和实现企业数据库解决方案，包括逻辑模型开发、性能设计、物理数据库配置、Transact-SQL 语句、数据完整性、监视和优化、故障诊断和排除等。本书还为您准备 MCP 70-029 考试（面向微软认证数据库管理员、微软认证系统工程师或微软认证解决方案开发人员）提供了指导。

本书由微软公司专家编写，技术深入，权威性强，可作为信息系统专业人员和 MCP 考试应试者的参考书。

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前　言

欢迎使用微软指定 MCDBA 教材（影印版）丛书！

微软认证是一项综合性认证计划，是对个人的与软件有关的技能的重要评测标准，其证书授予那些能够使用微软公司的产品完成特定任务和实施解决方案的人。微软认证被全世界的技术管理者视为质量的标志，是雇主聘用和考核职员的重要参考依据，又是个人求职和升迁的金钥匙。

MCDBA 即微软认证数据库管理员，涉及 Microsoft SQL Server 的安装、管理及优化，企业数据库解决方案（设计、配置和开发），以及企业数据仓库解决方案（数据分析与决策支持）等技术。本套影印丛书就是针对 MCDBA 认证计划推出的，共包括 3 册，分别是《Microsoft SQL Server 7.0 系统管理（影印版）》、《Microsoft SQL Server 7.0 数据库实现（影印版）》和《Microsoft SQL Server 7.0 数据仓库开发技术（影印版）》。3 册书分别针对不同的用户群体以及 MCDBA 认证计划的不同考试，讲述 Microsoft SQL Server 7.0 的不同内容，各有侧重，互为补充。

本套丛书具有以下共同特点：

每一章一开始，首先对本章内容作以概括性介绍，让读者有一个总体性认识。然后说明在学习本章内容之前需要具有哪些预备知识，安装哪些软件。

书中提供了大量操作训练实例，让读者能够即时地对所学技能进行有效的练习。

正文当中穿插了许多提示（Tip）、要点（Important）、注意（Note）和警告（Caution）等信息，起到了画龙点睛的作用。

配套光盘中提供了丰富的辅助资料，包括多媒体演示、示例数据和操作训练文件等。多媒体演示所涉及的是本书中的一些关键概念。操作训练文件则给了读者一个亲自动手的机会。可以直接在光盘上练习，也可以安装到硬盘上之后再使用。

为了进一步提高本丛书及其配套光盘的质量，希望广大读者把有关的意见或建议反馈给微软出版社。联系方法是：

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微软出版社将通过以下网址提供对本丛书及其配套光盘的修正意见：

http://mspress.microsoft.com/support/

About This Book

Welcome to Microsoft SQL Server 7.0 Database Implementation Training kit. The book provides you with the technical skills required to implement a database solution with Microsoft SQL Server client/server database management system version 7.0. The content of this book reflects the significant changes in the product from previous versions and provides a practical discussion of database design and of the important features that SQL Server provides for implementers and developers in the Transact-SQL language.

Note For more information on becoming a Microsoft Certified Systems Engineer, see the section titled "The Microsoft Certified Professional Program" later in this chapter.

Each chapter in this book is divided into lessons. Most lessons include hands-on exercises that allow you to practice or demonstrate a particular concept or skill. Each lesson ends with a short summary and each chapter has a set of review questions to test your knowledge of the chapter material.

The "Getting Started" section of this chapter provides important setup instructions that describe the hardware and software requirements to complete the exercises in this course. It also provides information about the networking configuration necessary to complete some of the hands-on exercises. Read through this section thoroughly before you start the lessons.

Intended Audience

This book was developed for information system (IS) professionals who need to design, plan, implement, and support Microsoft SQL Server 7.0 or who plan to take the related Microsoft Certified Professional exam 70-029: Designing and Implementing a Database with Microsoft SQL Server 7.0.

Prerequisites

Experience using the Microsoft Windows NT Server network operating system:

- Working knowledge of the Windows interface
- Understand basic Microsoft network functions and terminology
- One year of experience with relational databases:
  Have supported or designed a relational database
  Understand the fundamental concepts of relational database design
- Three to six months of SQL Server experience:
  Installed at least one SQL Server
  Designed relational databases
  Worked with SQL Server client tools
- Understand basic ANSI SQL statements

Reference Materials

You might find the following reference material useful:

- SQL Server white papers and case studies available online at www.microsoft.com/sql/index.htm.
- *Microsoft OLE DB 2.0 Programmer's Reference and Data Access SDK.* Microsoft Press.
- *Hitchhiker's Guide to Visual Basic and SQL Server.*6th ed. Microsoft Press.
- SQL Server Books Online available on the product CD-ROM.

About The CD-ROMs

The Supplemental Course Materials compact disc contains a variety of informational aids that can be used throughout this book. These include multimedia presentations, sample data, and files used in hands-on exercises.

The multimedia presentations supplement some of the key concepts covered in the book. You should view these presentations when suggested, and then use them as a review tool while you work through the material. A complete version of this book is also available online with a variety of viewing options available. For information about using the online book, see the section "About the Online Book" later in this introduction. (The other CD-ROM contains an evaluation version of Microsoft SQL 7.0 120-day Evaluation Edition.)

The Supplemental Course Material compact disc also contains files required to perform the hands-on exercises, and information designed to supplement the lesson material. These files can be used directly from the CD-ROM or copied onto

your hard disk by using the Setup program. The files include demonstrations of key concepts, practice files for the exercises, and additional articles about related concepts.

The demonstrations require an HTML browser. If Microsoft Internet Explorer is installed on your system simply double-click on any of these files to view them..

Features of This Book

Each chapter opens with a "Before You Begin" section, which prepares you for completing the chapter.

► Whenever possible, lessons contain exercises that give you an opportunity to use the skills being presented or to explore the part of the application being described. All exercises are identified with a bullet symbol like the one to the left of this paragraph.

The "Review" section at the end of each chapter allows you to test what you have learned in the lesson.

Appendix A, "Questions and Answers" contains all of the book's review questions and corresponding answers.

Notes

Notes appear throughout the lessons.

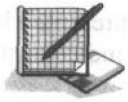
- Notes marked **Tip** contain explanations of possible results or alternative methods.
- Notes marked **Important** contain information that is essential to completing a task.
- Notes marked **Note** contain supplemental information.
- Notes marked **Caution** contain warnings about possible loss of data.

Conventions

- Hands-on practices that you are to follow are presented in numbered lists of steps (1, 2, and so on). A triangular bullet (►) indicates the beginning of a practice.
- The word *select* is used for highlighting folders, file names, text boxes, menu bars, and option buttons, and for selecting options in a dialog box.
- The word *click* is used for carrying out a command from a menu or dialog box.

Notational Conventions

- Characters or commands that you type appear in **bold lowercase** type.
- *Italic* in syntax statements indicates placeholders for variable information. *Italic* is also used for book titles.
- Names of files and folders appear in Title Caps, except when you are to type them directly. Unless otherwise indicated, you can use all lowercase letters when you type a file name in a dialog box or at a command prompt.
- File name extensions appear in uppercase.
- Acronyms appear in all uppercase.
- `Monospace` type represents code samples, examples of screen text, or entries that you might type at a command prompt or in initialization files.
- Square brackets [ ] are used in syntax statements to enclose optional items. For example, [*filename*] in command syntax indicates that you can choose to type a file name with the command. Type only the information within the brackets, not the brackets themselves.
- Braces { } are used in syntax statements to enclose required items. Type only the information within the braces, not the braces themselves.
- Icons represent specific sections in the book as follows:

Icon	Represents
	A multimedia presentation. You will find the applicable multimedia presentation on the course compact disc.
	A file contained on the CD-ROM. Some files are needed to complete a hands-on practice; others contain supplemental information about the topic being discussed. The purpose of the file and its location are described in the accompanying text.
	A hands-on practice. You should perform the practice to give yourself an opportunity to use the skills being presented in the lesson.
	Chapter review questions. These questions at the end of each chapter allow you to test what you have learned in the lessons. You will find the answers to the review questions in Appendix A, "Questions and Answers" at the end of the book.

Keyboard Conventions

- A plus sign (+) between two key names means that you must press those keys at the same time. For example, "Press ALT+TAB" means that you hold down ALT while you press TAB.
- A comma (,) between two or more key names means that you must press each of the keys consecutively, not together. For example, "Press ALT, F, X" means that you press and release each key in sequence. "Press ALT+W, L" means that you first press ALT and W together, and then release them and press L.
- You can choose menu commands with the keyboard. Press the ALT key to activate the menu bar, and then sequentially press the keys that correspond to the highlighted or underlined letter of the menu name and the command name. For some commands, you can also press a key combination listed in the menu.
- You can select or clear check boxes or option buttons in dialog boxes with the keyboard. Press the ALT key, and then press the key that corresponds to the underlined letter of the option name. Or you can press TAB until the option is highlighted, and then press the spacebar to select or clear the check box or option button.
- You can cancel the display of a dialog box by pressing the ESC key.

Chapter and Appendix Overview

This self-paced training course combines notes, hands-on exercises, multimedia presentations, and review questions to teach you SQL Server 7.0 data implementation. It is designed to be completed from beginning to end, but you can choose a customized track and complete only the sections that interest you. (See the next section, "Finding the Best Starting Point for You" for more information.) If you choose the customized track option, see the "Before You Begin" section in each chapter. Any hands-on exercises that require preliminary work from preceding chapters refer to the appropriate chapters.

The book is divided into the following chapters:

- The "About This Book" section contains a self-paced training overview and introduces the components of this training. Read this section thoroughly to get the greatest educational value from this self-paced training and to plan which lessons you will complete.
- Chapter 1, "Overview of SQL Server," introduces SQL Server. It defines some of the important characteristics of SQL Server and explains the environments in which SQL Server has been designed to work. You will be introduced to the different parts of the product and given some idea as to the role played by these parts.

- Chapter 2, "Overview of Transact-SQL," provides a high-level overview of Transact-SQL (the ANSI SQL-92-compliant SQL Server implementation of the Structured Query Language) and some of the tools you can use to program SQL Server.
- Chapter 3, "Creating Databases," begins by introducing you to the logical database design process and normalization. The chapter then discusses how data is stored in SQL Server 7.0 and finally, explains how to implement databases and manage database files, transaction log files, and filegroups.
- Chapter 4, "Creating Database Objects," shows you how to create user-defined data types and tables.
- Chapter 5, "Implementing Data Integrity," discusses the need for implementing data integrity in your databases and the different types of data integrity. The chapter then shows you how to implement constraints, defaults, and rules.
- Chapter 6, "Planning and Creating Indexes," explains how SQL Server 7.0 indexes work, and how to create and use appropriate indexes on your tables.
- Chapter 7, "Maintaining Indexes," shows you how to maintain indexes so that they continue to deliver optimal performance when used in a busy production environment. Standard SQL Server indexes offer limited support for querying text data; in the chapter you will learn how to implement another kind of index, a full-text index. A full-text index supports complex word and phrase query capabilities on SQL Server tables.
- Chapter 8, "Querying Multiple Tables," explains how to combine the data from multiple tables into useful result sets using SQL joins.
- Chapter 9, "Advanced Query Techniques," discusses subqueries, which make it possible to use queries inside of other queries to create calculated values and specify advanced selection criteria, and cursors, which are used to perform row-based processing on SQL result sets.
- Chapter 10, "Summarizing Data," discusses one of the important benefits of client/server architecture, which is the ability of database servers to quickly and efficiently produce summaries of large amounts of data and send small result sets to client applications. In the chapter, you will learn how to use the features of SQL Server that allow you to create queries that summarize data.
- Chapter 11, "Implementing Views," explains creating queries that are stored as objects, called views, in a database. Views simplify security and make it easier for users to query the data in the tables in database.
- Chapter 12, "Managing Transactions and Locks," discusses how transactions use locking to prevent other users from changing or reading data in a transaction that has not completed. Locking is required in online transac-

tion processing (OLTP) for multi-user systems. The chapter also discusses how Microsoft SQL Server version 7.0 uses the transaction log to ensure that updates are complete and recoverable.

- Chapter 13, "Working with Distributed Data," discusses a variety of methods of using data from other sources. In the chapter, you will learn how to import data from and export data to other databases using the bulk copy program (bcp). The chapter introduces Data Transformation Services, a powerful and flexible way to transfer and transform data on either a once-off basis or a regular basis. Finally, the chapter shows you how to use remote data in standard SQL Server queries, either on an ad-hoc basis or by permanently configuring a linked server.
- Chapter 14, "Implementing Stored Procedures," explains how to create stored procedures, which allow you to save named collections of Transact-SQL statements in a database. You can then repeatedly execute each of these collections with a single statement that simply refers to the stored procedure name.
- Chapter 15, "Implementing Triggers," explains how to create a special type of stored procedure called a trigger. Triggers contain collections of Transact-SQL statements that are saved as objects in a database and are associated with data modification actions (INSERT, DELETE, and UPDATE) on a particular table. Triggers are used to enforce data integrity and business rules that are too complex to be enforced by constraints.
- Appendix A, "Questions and Answers," lists all of the practice and review questions from the book by chapter number showing the suggested answer.
- Appendix B, "Library Database Case Study," provides an overview of the operations at the West Municipal Library, describes the daily library functions, and presents the database that was designed for the library. The library database is used in most of the exercises in this book.
- Appendix C, "Database Schemas," gives you graphical schema diagrams of the library database and the SQL Server 7.0 sample databases, Northwind and pubs. The diagrams show the tables, columns, and relationships in these databases.
- Appendix D, "Performing Basic Queries," shows you how to create basic SQL queries. If you are not familiar with the basic use of the SELECT, INSERT, UPDATE, and DELETE statements, you should complete this appendix before you begin chapters 8, 9, or 10. Appendix D discusses using the SELECT statement to retrieve data from one table, using the WHERE clause to limit the rows that are returned by a query, formatting and sorting data in a result set, inserting a row into a table using the INSERT statement, updating rows in a table using the UPDATE statement, and deleting rows from a table using the DELETE or TRUNCATE TABLE statements.

Finding the Best Starting Point for You

Because this book is self-paced, you can skip some lessons and revisit them later. Note, however, that you must install Microsoft SQL Server 7.0 before you can perform the exercises in the chapters. The exercises in each chapter use the library database. A batch installation file that creates the library database for each chapter is supplied on the Supplemental Course Material CD-ROM. Use the batch installation file to install a copy of the library database when you start a new chapter. Use the following table to find the best starting point for you:

If you	Follow this learning path
Are preparing to take the Microsoft Certified Professional exam 70-029, Designing and Implementing a Database with Microsoft SQL Server 7.0.	Read the "Getting Started" section. Work through the remaining chapters in any order.
Want to review information about specific topics from the exam.	Use the "Where to Find Specific Skills in This Book" section that follows this table.

Where to Find Specific Skills in This Book

The following tables provide a list of the skills measured on certification exam 70-029: Designing and Implementing a Database with Microsoft SQL Server 7.0. The tables provide the skill, and where in this book you will find the lesson relating to that skill.

Note Exam skills are subject to change without prior notice and at the sole discretion of Microsoft.

Developing a Logical Data Model

Skill Being Measured	Location in Book
Group data into entities by applying normalization rules.	Chapter 3, Lesson 1
Identify primary keys.	Chapter 3, Lesson 1 and Chapter 5, Lessons 1 & 2
Choose the foreign key that will enforce a relationship between entities and that will ensure referential integrity.	Chapter 3, Lesson 1 and Chapter 5, Lessons 1 & 2
Identify the business rules that relate to data integrity.	Chapter 3, Lesson 1 and Chapter 5
Incorporate business rules and constraints into the data model.	Chapter 3, Lesson 1 and Chapter 5
In a given situation, decide whether denormalization is appropriate.	Chapter 3, Lesson 1 & 4 and Chapter 15, Lesson 1

Deriving the Physical Design

Skill Being Measured	Location in Book
Assess the potential impact of the logical design on performance, maintainability, extensibility, scalability, availability, and security.	Chapter 3, Lesson 1 & 4

Creating Data Services

Skill Being Measured	*Location in Book*
Access data by using the dynamic SQL model.	Chapter 2, Lesson 3
Access data by using the Stored Procedure model.	Chapter 14
Manipulate data by using Transact-SQL cursors.	
■ Choose the appropriate type of cursor.	Chapter 9, Lesson 2
■ Define the appropriate level of sensitivity to change.	Chapter 9, Lesson 2
■ Choose the appropriate navigation.	Chapter 9, Lesson 2
■ Choose the scope of the cursor, specifically global or local.	Chapter 9, Lesson 2
Create and manage explicit, implicit, and distributed transactions to ensure data consistency and recoverability.	
■ Define the transaction isolation level.	Chapter 12, Lesson 3
■ Design transactions of appropriate length.	Chapter 12, Lesson 3
■ Avoid or handle deadlocks.	Chapter 12, Lesson 3
■ Use optimistic locking appropriately.	Chapter 12, Lesson 2
■ Implement error handling by using @@trancount.	Chapter 12, Lesson 1
Write INSERT, DELETE, UPDATE, and SELECT statements that retrieve and modify data.	Chapter 9, Lesson 3 and Appendix D
Write Transact-SQL statements that use joins or sub-queries to combine data from multiple tables.	Chapter 8 and Chapter 9, Lesson 1
Create scripts using Transact-SQL. Programming elements include control-of-flow methods, local and global variables, functions, and error handling methods.	Chapter 2, Lesson 2
Design, create, use, and alter views.	
■ Modify data through a view.	Chapter 11, Lesson 2
■ Query data through a view.	Chapter 11, Lesson 1

Create and execute stored procedures to enforce business rules, to modify data in multiple tables, to perform calculations, and to use input and output parameters.	
■ Implement error handling by using return codes and the RAISERROR statement.	Chapter 14, Lesson 3
■ Choose appropriate recompile options.	Chapter 14, Lessons 1 & 2
Create triggers that implement rules, that enforce data integrity, and that perform cascading updates and deletes.	
■ Implement transactional error handling.	Chapter 15, Lesson 1
Create result sets that provide summary data. Query types include TOP n PERCENT and GROUP BY, specifically HAVING, CUBE, and ROLLUP.	Chapter 10
Configure session-level options.	Chapter 2, Lesson 3
Access data from static or dynamic sources by using remote stored procedures, linked servers, and openrowset.	Chapter 13
■ Evaluate where processing occurs when using OPENQUERY.	Chapter 13

Creating a Physical Database

Skill Being Measured	Location in Book
Create and manage files, file groups, and transaction logs that define a database.	Chapter 3, Lessons 2 & 3
Create tables that enforce data integrity and referential integrity.	
■ Choose the appropriate data types.	Chapter 4, Lesson 1
■ Create user-defined data types.	Chapter 4, Lesson 1
■ Define columns as NULL or NOT NULL.	Chapter 4, Lesson 2
■ Define columns to generate values by using the IDENTITY property, the uniqueidentifier data type, and the NEWID function.	Chapter 4, Lesson 2
■ Implement constraints.	Chapter 5, Lessons 1 & 2
Create and maintain indexes.	
■ Choose an indexing strategy that will optimize performance.	Chapter 6, Lessons 1 & 2
■ Given a situation, choose the appropriate type of index to create.	Chapter 6, Lessons 1& 2
■ Choose the column or columns to index.	Chapter 6, Lesson 1

■ Choose the appropriate index characteristics, specifically FILLFACTOR, DROP_EXISTING, and PAD INDEX.	Chapter 6, Lesson 3
Populate the database with data from an external data source. Methods include bulk copy program and Data Transformation Services (DTS).	Chapter 13, Lesson 1
Implement full-text search.	Chapter 7, Lesson 3

Maintaining a Database

Skill Being Measured	Location in Book
Evaluate and optimize the performance of an execution plan by using DBCC SHOW CONTIG, SHOWPLAN_TEXT, SHOWPLAN_ALL, and UPDATE STATISTICS.	Chapter 7, Lesson 2
Evaluate and optimize the performance of query execution plans.	Chapter 2, Lesson 3 and Chapter 7, Lesson 2
Diagnose and resolve locking problems.	Chapter 12, Lesson 2
Identify SQL Server events and performance problems by using SQL Server Profiler.	Chapter 14, Lesson 3

Getting Started

This self-paced training course contains hands-on procedures to help you learn about Microsoft SQL Server 7.0.

Caution Several exercises may require you to make changes to your servers. This may have undesirable results if you are connected to a larger network. Check with your Network Administrator before attempting these exercises.

Hardware Requirements

Each computer must have the following minimum configuration. All hardware should be on the Microsoft Windows NT Server 4.0 Hardware Compatibility List.

- Intel or compatible (Pentium 166 MHz or higher, Pentium PRO, or Pentium II) computer.
- At least 64 MB of memory.
- At least 300 MB of free hard drive space.
- Sound card and speakers.
- CD-ROM drive.

Software Requirements

The following software is required to complete the exercises in this course. A 120-day evaluation copy of Microsoft SQL Server 7.0 is included on a CD-ROM in this kit.

- Microsoft Windows NT Server 4.0 with Service Pack 4, preferably installed as a Primary Domain Controller.
- Microsoft SQL Server 7.0 Standard Edition.

Caution The 120-day Evaluation Edition provided with this training is not the full retail product and is provided only for the purposes of training and evaluation. Microsoft Technical Support does not support this evaluation edition. For additional support information regarding this book and the CD-ROMs (including answers to commonly asked questions about installation and use), visit the Microsoft Press Technical Support Web site at http: //mspress.microsoft.com/mspress/support/. You can also email TKINPUT@MICROSOFT.COM, or send a letter to Microsoft Press, Attn: Microsoft Press Technical Support, One Microsoft Way, Redmond WA 98052-6399.

Setup Instructions

Set up your computer according to the manufacturer's instructions.

Caution If your computer is part of a larger network, you *must* verify with your network administrator that the computer name, domain name, and other information used in setting up Microsoft SQL Server 7.0 does not conflict with network operations. If it does conflict, ask your network administrator to provide alternative values and use those values throughout all of the exercises in this book.

Microsoft SQL Server 7.0 120-day Evaluation Edition

► **To install Microsoft SQL Server version 7.0 Evaluation Edition CD-ROM on to your hard disk drive:**

1. Insert the SQL Server 7.0 into your CD-ROM drive.
2. Select Run from the Start menu on your desktop, and start Windows Explorer.
3. If auto-run is disabled, click on your CD-ROM drive, and start autorun.exe.
4. To install, choose from the menu options provided.

You should not perform the exercises in the chapters of this book on a SQL Server that is being used by others.

The Exercise Files

The Supplemental Course Materials CD-ROM contains a set of exercise files that you will need to install on your hard disk drive to complete many of the exercises in this book.

► **To install the exercise files to your hard disk drive:**

1. Insert the Supplemental Course Materials CD-ROM into your CD-ROM drive.
2. Select Run from the Start menu on your desktop, and type: **D:\Setup.exe** (where D: is the name of your CD-ROM drive).

This will initiate the setup process that will install the exercise files to your hard disk drive.

3. Follow the instructions of the Setup wizard.

Important This book operates on the assumption that your hard disk is named C, and the Setup wizard installs the exercise files to a default folder named c:\sqlimpl. If you alter the name of this default folder during the setup, the references to exercise files in this book will differ from the true locations of files on your hard disk drive.

The Media Files

The Supplemental Course Materials CD-ROM contains a set of audio visual demonstration files that you can view by running the files from the CD-ROM. You will find prompts within the book indicating when the demonstrations should be run. You must have installed Media Player and an Internet browser on your computer to view these files. (Internet Explorer and Media Player are included on this CD for this purpose. To install either of these software products, see the installation instructions in the Readme.txt files on the CD.)

► **To view the demonstrations:**

1. Insert the Supplemental Course Materials CD-ROM in to your CD-ROM drive.
2. Select Run from the Start menu on your desktop and type: **D:\Media*demonstration_filename*** (where D is the name of your CD-ROM drive).

This will run the appropriate demonstration in your Internet browser.