

Introduction

The main objective for IT enterprises today is to add strategic value to business and provide greater return on investment. As prices fall and technology improves, technology architects have the opportunity to build innovative solutions. The architects first built intelligence into enterprise IT systems. Later they built intelligence as well as logic into the devices that connect to enterprises. For example:

- Mobile device applications provide up-to-date information and notifications to the in-field work force.
- Vending machines can order new inventory when stock reaches a threshold level and even call for support when not working.
- Weighing machines at airports, railroad stations, etc. can automatically update a central system.

To build the logic into individual machines and devices, you either need permanent connectivity between the stand-alone device and the enterprise system or you need a local store that synchronizes data with a backend enterprise system. Permanent connectivity is not always possible and can be very expensive. To use a local store, developers need a database uniquely designed for embedded systems.

To fulfill their unique requirement, embedded developers started building their own local data-management system. Building a reliable and robust custom data store had its own challenges. Being a product company, Microsoft developed the SQL Server Compact Edition database for embedded systems in mobile and desktop applications such as Pocket PC, Smartphone, and Windows CE based devices. Microsoft has written SQL Server Compact Edition from scratch while considering the unique requirements for these embedded devices. Although SQL Server Compact Edition is a new product, scratch developers can still use their existing SQL Server knowledge and enhance it for SQL Server Compact Edition.

When using SQL Server Compact Edition, it will appear as an embeddable scaled down version of SQL Server 2005. Its database has features compatible to SQL Server 2005 as well as unique features needed for Smart devices and in-proc databases.

Similar to SQL Server 2005, SQL Server Compact Edition is a standard relational database and is integrated with SQL Server 2005. You can use the SQL Server Management Studio tool to manage SQL Server Compact Edition and also synchronize the data between SQL Server 2005 and SQL Server Compact Edition. SQL Server Compact Edition supports the subset of Transact-SQL. You can also use your existing ADO.NET knowledge to develop ADO.NET and OLE DB applications for SQL Server Compact Edition. SQL Server Compact Edition is integrated with Visual Studio 2005, enabling developers to instantly develop SQL Server Compact Edition based applications.

SQL Server Compact Edition has a light weight engine making it suitable for Smart devices and in-proc databases. It provides an updatable result set for faster performance on an embedded database. It also supports Merge Replication and the Remote Data Access mechanism to synchronize data with a backend SQL Server.

This book presents SQL Server Compact Edition concepts and the overall environment that you will be using to develop and deploy SQL Server Compact Edition based applications. You will also be able to transfer your existing programming knowledge to write applications for SQL Server Compact Edition.

This book is written for the architect, designer, developer, technology consultant, and project manager. No matter what your title is, if you are responsible for applications using an embedded database, this book will provide you with the main concepts and feature details of SQL Server Compact Edition. By providing step-by-step instructions and examples for designing, developing, and deploying SQL Server Compact Edition based applications, this book will help you understand the SQL Server Compact Edition concepts and programming interface.

This book has two main objectives: (1) to teach you SQL Server Compact Edition concepts, and (2) to provide information on how to build and deploy SQL Server Compact Edition based applications using .NET Compact Framework, SQL Server Management Studio, and Visual Studio. After reading this book, you should be able to build effective applications using SQL Server Compact Edition best practices.

Overview of the Book

Chapter 1: Getting Started with SQL Server 2005 Compact Edition

Chapter 1 introduces the SQL Server Compact Edition feature set and how it meets the design goals. Also discussed are the SQL Server Compact Edition architecture components that you will need in the development and production environment. An overview of features and high-level detail of architecture components will paint the overall picture. Liken this to understanding the role of each card before playing a card game. The chapter will also provide a history of SQL Server Compact Edition and explain the difference between versions 3.1 and 3.0

Chapter 2: Platform Support and Installation

This chapter will explain the software installed in your development and production environment as well as the hardware and software requirements for installing SQL Server 2005, Visual Studio 2005, and SQL Server Compact Edition. In addition, this chapter will help you build a development environment on your computer including Windows Mobile 6.0 and Windows Mobile 5.0.

Chapter 3: Getting to Know the Tools

Presented in this chapter is the information on the correct usage of SQL Server Management Studio, Visual Studio 2005, and the Query Analyzer user interface. We will

discuss the usage of Device Emulator Manager, Device Emulator, and ActiveSync. Also, in this chapter you will learn how to connect to and manage the SQL Server Compact Edition database.

Chapter 4: Managing the SQL Server 2005 Compact Edition Database

Chapter 4 discusses how to create, secure, verify, compact, and shrink the SQL Server Compact Edition database. By providing you with information on all these options, it will also demonstrate how you can complete these operations using SQL Server Management Studio, Query Analyzer, and by writing programs.

Chapter 5: Defining Database Structure

In this chapter you will learn the Transact-SQL syntax for defining tables and indexes for the SQL Server Compact Edition database. By using SQL statements, you will create tables, columns, and indexes. In addition to SQL statements, you will use SQL Server Management Studio, Query Analyzer, and Visual Studio dialogs to create and *modify* tables, columns, and indexes. You will create a database project to manage SQL Server and SQL Server Compact Edition scripts.

Chapter 6: Manipulating the Database

In this chapter you will learn how to access and manipulate data in the SQL Server Compact Edition database using SQL Server Management Studio, Query Analyzer, and the SQL syntax. We will also discuss the usage of the SQL Server Integration package to populate the SQL Server Compact Edition database.

Chapter 7: Programming SQL Server 2005 Compact Edition with ADO.NET

Chapter 7 shows how to use ADO.NET to connect to the SQL Server Compact Edition database as well as how to read, update, and merge the changes back to the SQL Server Compact Edition database. You will learn how to create desktop- and device-based projects using SQL Server Compact Edition. You will also learn how to use Sqlclient namespace to develop device-based applications that directly access a remote SQL Server.

Chapter 8: Introducing Native Access

Here you will learn how to access and manage the SQL Server Compact database using nonmanaged programming. First you will learn Engine object method in order to do common database management tasks. Secondly, you will learn how you can use the OLE DB provider for SQL Server Compact Edition to manager and access the database. In conclusion, the specific properties and interfaces for the OLE DB provider for SQL Server Compact Edition are discussed.

Chapter 9: Using Operators in SQL Server 2005 Compact Edition

SQL Server Compact Edition supports most of the operators supported by SQL Server. In this chapter you will learn Arithmetic, Assignment, Bitwise, Logical, Comparison, String Concatenation, and Unary operators.

Chapter 10: Using the Built-In Functions

This chapter explains in detail the functions supported in the SQL Server Compact Edition database. SQL Server Compact Edition supports a subset of built-in functions that SQL Server supports. You can utilize these functions for calculations, string manipulations, and date manipulations.

Chapter 11: Upgrading from a Previous Version

In this chapter you will learn how to migrate the SQL Server CE 2.0 database file to the SQL Server Compact Edition 3.0 database file. Also, you will learn how to convert a .NET CF 1.0 project into a .NET CF 2.0 project. Additionally, you will be presented with information on how to migrate a Visual Studio 2003 project into a Visual Studio 2005 project.

Chapter 12: Synchronizing Data with Merge Replication

Here you will learn Merge Replication features. You will also learn how to synchronize data between SQL Server 2005 and SQL Server Compact Edition. In addition, you will learn how to set up a publication on SQL Server, set up a subscription on SQL Server Compact Edition, and synchronize data with a backend SQL Server.

Chapter 13: Synchronizing Data with Remote Data Access

Chapter 13 introduces another method, Remote Data Access, to synchronize data between SQL Server and SQL Server Compact Edition. You will learn how to pull the data from the SQL Server to a device and manipulate the data on a device and push the changes to SQL Server. Also you will learn how to submit an SQL statement from a device to the backend SQL Server.

Chapter 14: Securing the SQL Server 2005 Compact Edition Database

In this chapter you will learn about SQL Server Compact Edition's security features. You will learn how to secure an SQL Server Compact Edition database on a client device as well as how to securely synchronize the data between SQL Server and SQL Server Compact Edition.

Chapter 15: SQL Server 2005 Compact Edition Performance Tuning

In this chapter you will learn the factors you should consider in SQL Server Compact Edition database design and when to create an index on your tables for performance improvement. You will also be presented with performance improvement tips for programming. Finally you will learn the performance improvement guidelines for data synchronization.

How This Book Will Help You

The power of the .NET compact framework has made mobile and embedded application development easy. This book starts off with easy examples and builds a learning curve to cover the more advanced topics. You will be using the SQL Server Compact Edition database as a Database Designer, as an Application Developer, as an Administrator, or as a System Architect.

Defining Architecture

An architect needs to choose the right technology and define the evolutionary path. As an architect you need to know whether the product features meet your requirements and whether they provide security requirements to suit your enterprise. You need to consider the integration and scalability that a product provides. If you are using SQL Server Compact Edition on a device, you need to make an important decision about how to synchronize the data between the device and backend server.

Finally you also want to ensure that architecture is not only suitable for development but is also the right one for deployment, operations, and maintenance.

This book provides an overview of SQL Server Compact Edition features, the architecture components, available tools, integration with Visual Studio and SQL Server, support for T-SQL, programming languages, security features, and most importantly, the connectivity features.

Designing Database

SQL Server Compact Edition database has a small footprint. At run time it only takes 5 MB of memory space. The database size is limited to 4 GB. This book will help you to understand the limitation of memory. Chapter 15, *SQL Server 2005 Compact Edition Performance Tuning*, gives you the insight of query execution and explains the trade-offs you should consider while designing the database. It will also help you in determining when to create an index and on which columns. Chapter 3, *Getting to Know the Tools*, demonstrates SQL Server Management Studio and Visual Studio 2005 user-interface usage for defining SQL Server Compact Edition database structures.

Developing Application

A developer can leverage his existing knowledge to develop SQL Server Compact Edition based applications. The learning curve for developing SQL Server Compact Edition application is very small. SQL Server Compact Edition supports the subset of T-SQL and most of the built-in functions and operators supported by SQL Server. This book has dedicated chapters for ADO.NET programming, OLE DB Programming, SQL Server syntax for writing queries, operators, and built-in functions. If you are an experienced SQL Server developer, you will find it extremely easy to understand the commonality between SQL Server 2005 and SQL Server CE. These chapters will explain the features that are not supported in SQL Server Compact Edition and will also call out additional functionality provided by SQL Server Compact Edition that is not available in SQL Server 2005.

SQL Server Compact Edition also supports ADO.NET and OLE DB interfaces for programming. SQL Server Compact Edition is tightly integrated with Visual Studio 2005. The integration with Visual Studio allows rapid application development. Visual Studio allows a developer to create new SQL Server Compact Edition databases or add existing SQL Server Compact Edition databases into Visual projects. You can use Visual Studio Server Explorer to browse SQL Server Compact Edition database objects. Visual Studio also has the Data Source Configuration Wizard to easily manage database connections. Chapter 3, *Getting to Know the Tools*, provides an overview of the Visual Studio feature and demonstrates how to utilize these features for application development.

Merge Replication and RDA chapters are extremely useful for application developers. These chapters dive into the pros and cons of two synchronization methods. Both chapters have step-by-step guides to program Merge Replication and RDA.

Chapter 15 highlights the performance tuning techniques for SQL queries and ADO.NET programming. This chapter also shows you how to get insight and examine the execution plan that the SQL Server Compact Edition database engine is using.

Administrating Server and Client

The Server Administrator is focused on managing SQL Server, Web Server, and a large number of clients that connect to a backend server. This book explains the tools and features that help you in deploying the application as well as managing a Web Server and backend servers. Chapters related to Installation, Security, Merge Replication, and RDA show step-by-step instructions and explain how to install, secure, configure, and manage the replication and RDA set-up environment.