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# SQL Server Compact 3.5 概述

黎 波

微软中国企业服务部顾问

<http://upto.cnblogs.com/>



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# 本次课程内容包括

- SQL Server Compact 产品定位
- 工具、开发、部署、安全性

# 收听本次课程需具备的条件

- 了解 Visual Studio 2005 或 2008 开发环境和 .NET 应用程序的开发
- 了解 SQL Server 或 SQL Server CE

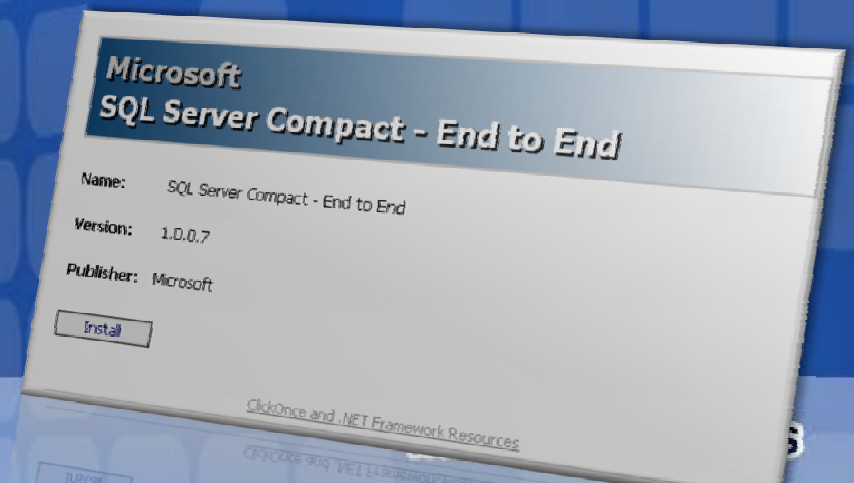
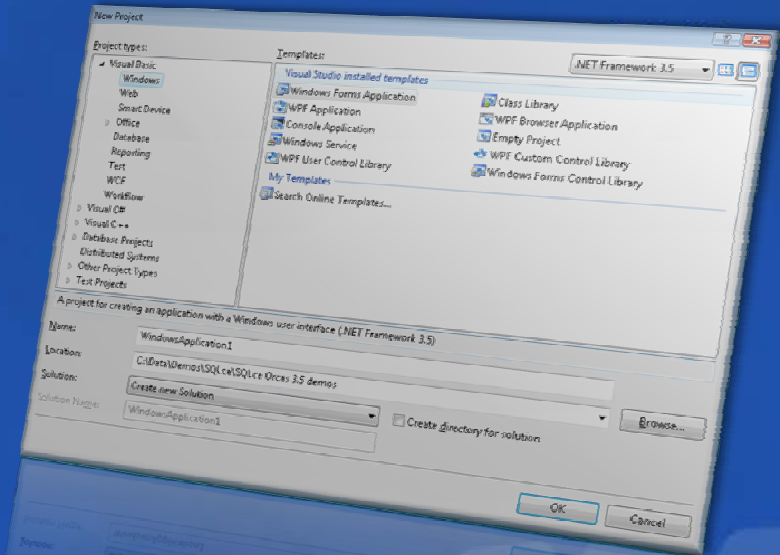
**Level 200**



# demo

## A Quick End to End Demo

- 从创建新项目到部署应用程序...how SQL Server Compact changes the game



## What it is:

- Very small (~1MB) embedded, in-proc database
- Nice subset of SQL Server types and SQL dialect
  - Does not have: Stored Procs, Views, Xquery
  - *Why limit programming to T-SQL when you have managed code?*

## Where it's deployed

- Mobile & Embedded devices
- Windows Vista, Media Center PC, MSN Client, ZUNE, Windows Media Player, ...
- Default Local/Client database offering in VS 2008

## Scenarios

- Local online / offline cache
- Local, stand alone application database
- Structured document format for custom apps
- True embedded deployment and in-proc engine

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**SQL Server™**  
Compact Edition

*Expanding usage based  
on customer demand*

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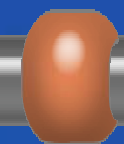
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'03

'05

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'07



**SQL Server  
CE 1.0**

针对设备的嵌入式数据库 – eVC, eVB

**SQL Server  
CE 2.0**

支持.NET Compact Framework

**SQL Server  
Mobile 3.0**

支持Tablet PC平台

**SQL Server  
Compact 3.1**

支持微软所有桌面操作系统平台

**SQL Server  
Compact 3.5**

支持Sync Services for  
ADO.NET进行数据同步

\*

在Windows Vista产品中使用

# 各个版本对应的开发平台

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## Released / Platform

- **SQL Server CE 1.0**
  - Embedded VB, Embedded VC**Embedded Tools 2000**  
Device Platform
- **SQL Server CE 2.0**
  - Compact Framework**Visual Studio 2003**  
Device Platform
- **SQL Server 2005 Mobile 3.0**
  - Compact and Full Framework**Visual Studio 2005**  
Windows Mobile - +  
TabletPC
- **SQL Server 2005 Compact Edition 3.1**      **January 2006**
  - Unlocked for all desktop operating systems
- **SQL Server Compact 3.5**      **Visual Studio 2008**
  - Enables a developer oriented SOA factored Sync Framework
  - Integrated into VS as the default local database



# SQL Server Compact

## 主要特点

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Essential database functionality in a compact footprint  
consistent across ALL Microsoft Clients

- 1.4 MB runtime(**Smaller than a floppy disk**)
- Embedded, Non-Admin and central deployment options
- Single file, code free, doc centric file format
- Doc centric security with password and encryption & EFS support
- In-Proc with the hosting app(**Doesn't run as a service**)
- Multi connections for background data operations
- Query Processor w/Transaction
- Runs on Win2k\* (SQLce 3.1), XP, Windows 2003, Vista,  
XP/Vista Embedded, Windows Mobile 5/6
- Common programming model through ADO.NET and LINQ
- Targeted programming models through SqlCeResultSet
- Multiple sync options

# SQL Server Compact 所不支持的...

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- User Code *within* the Database
  - Stored Procs
  - User Defined Functions
  - CLR within the database
- Service Hosting
  - No external network connectivity
  - Not targeted, nor *default* supported for IIS/ASP.net data service scenarios
    - Is supported for server side pre-gen of .sdf files
- Out of proc
  - If the hosting app isn't running, the database isn't running
  - Out of proc achieved through developer defined Windows Service
- Multiple User Roles
  - Database targeted around per user data
  - Application will manage user roles
  - Application will manage security rights to the database



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# Clients

# Servers

从嵌入式设备到桌面

从桌面到数据中心

Microsoft  
**SQL Server™**  
Compact

*Synchronizing data from the  
point of activity to the data center*



Microsoft  
**SQL Server™**  
Enterprise Edition

Microsoft  
**SQL Server™**  
Standard Edition

Microsoft  
**SQL Server™**  
Workgroup Edition

Microsoft  
**SQL Server™**  
Express Edition



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# SQLce 数据同步技术

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## Merge Replication

- Continues forward as the DBA focused, SQL Server specific, Katmai enhanced **database replication** product

## Sync Services for ADO.NET

- Developer Focused Sync Runtime
- **Synchronizing Data**, not replicating a database
- Componentized, SOA factored
- Supports any ADO.NET Provider
- ADO.NET Provider for the Microsoft Sync Framework
- Better w/SQL Server, Best with SQL Server 2008

## Remote Data Access (RDA)

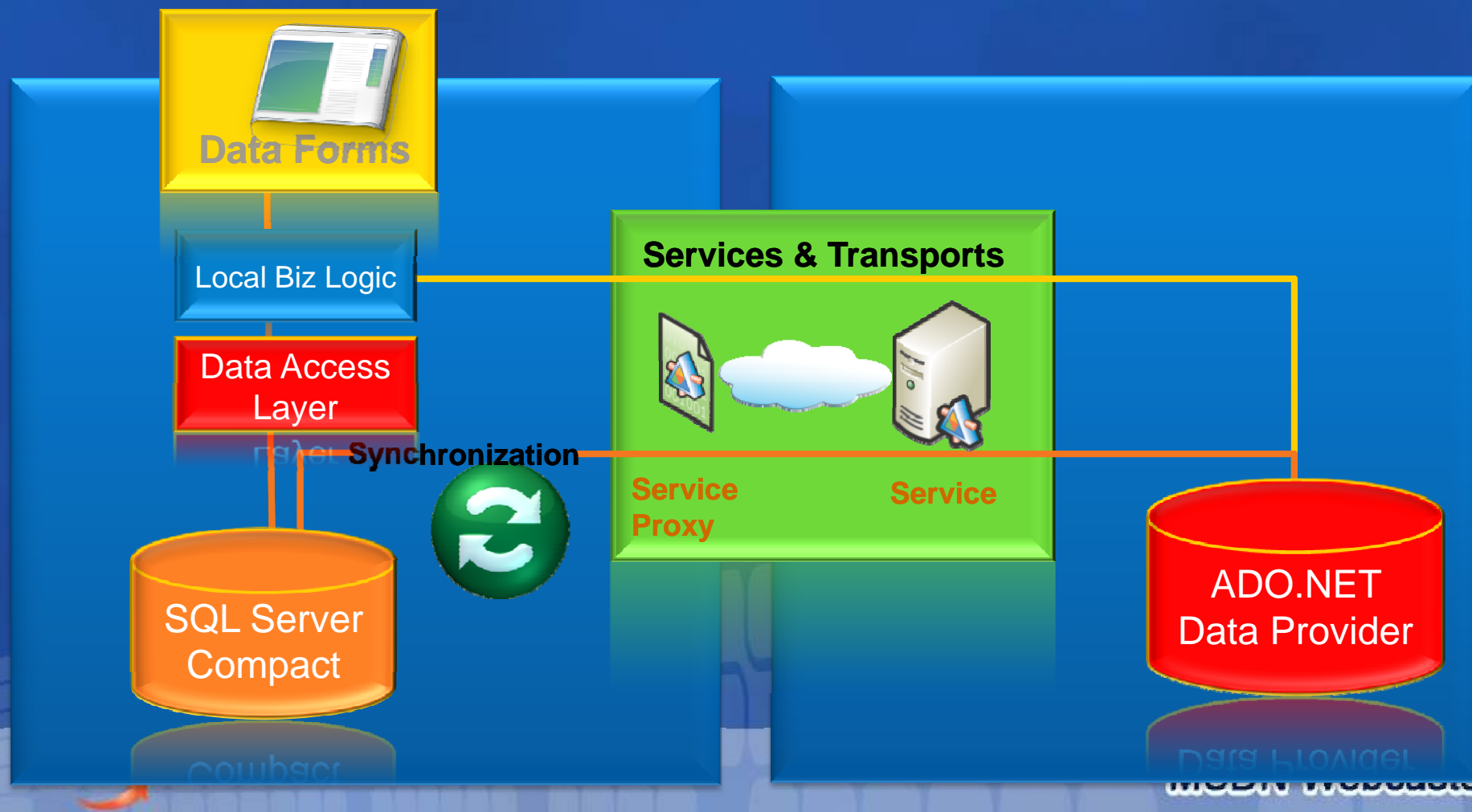
- Phasing out as Sync Services for ADO.NET enables the same level of simplicity with the ability to scale up

# 典型的客户端数据缓存架构

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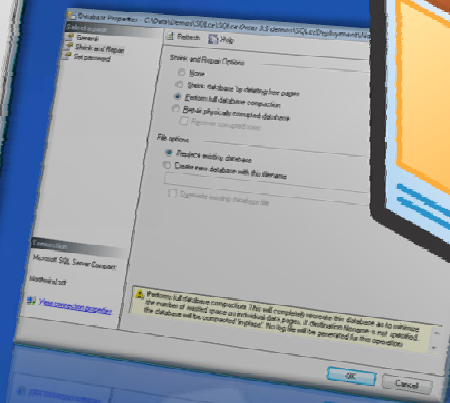
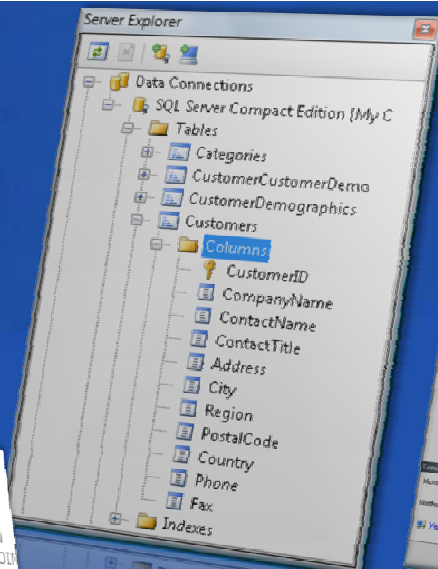
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- App works against local and remote data
- Delivers online optimized, offline enabled scenarios
- Data synchronized with remote source
- Sync over various transports and protocols





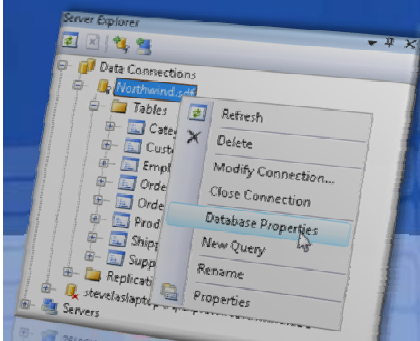
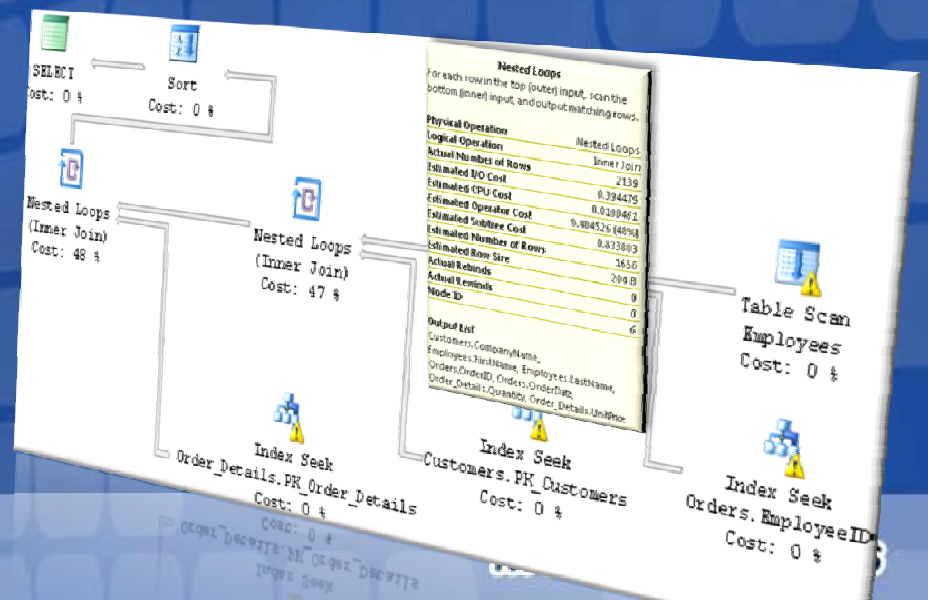
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OKDEK BA Cтаршык сыйынышымыз Олжас Олжасов  
Ембирлес гадимиз Олжас Олжас Олжас Олжас  
СКОПЬ BA Cтаршык сыйынышымыз Ембирлес гадимиз

# 工具

- 创建数据库
- 创建表
- 数据库维护
- 编辑数据
- 查询优化

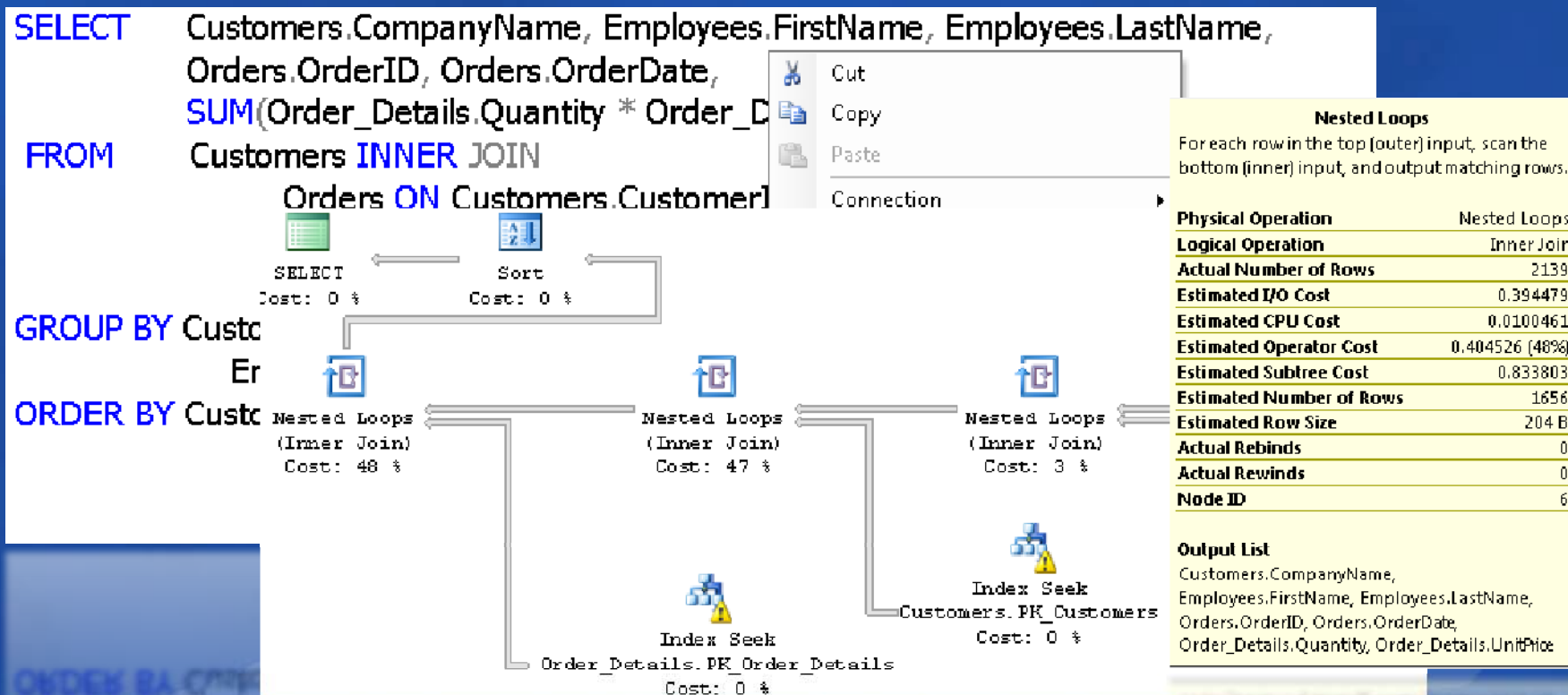


# 优化查询

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- SQL Server Management Studio and Express
- 包含估计的执行计划和实际的执行计划

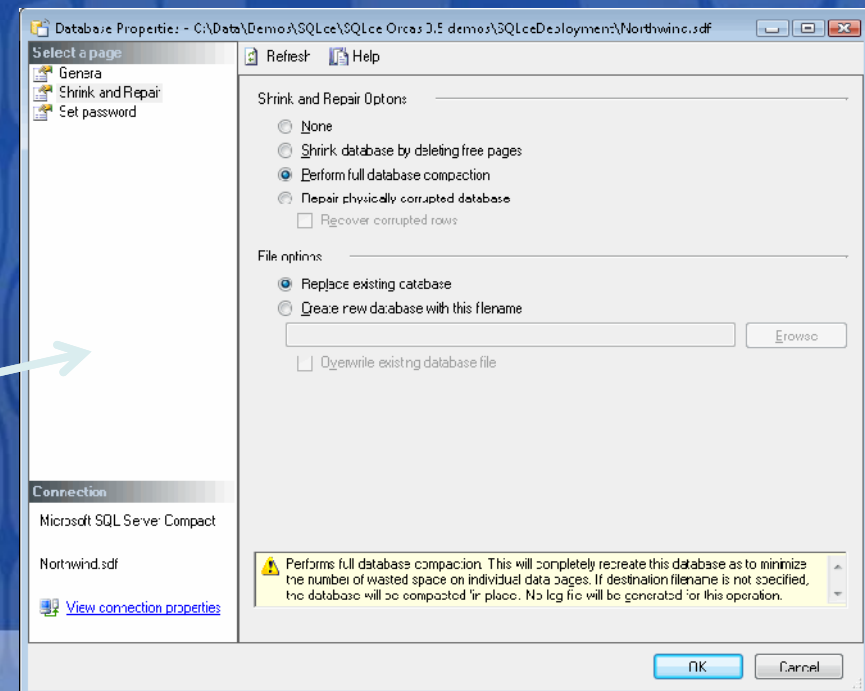
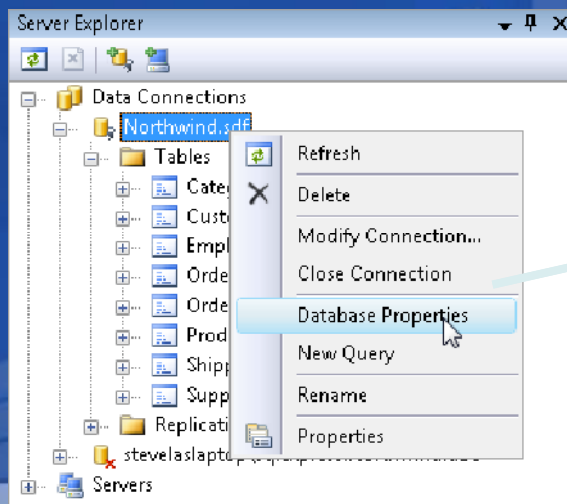


# SQL Server Compact 维护

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- 数据库压缩、收缩和修复
  - 关闭数据库连接时自动收缩
  - 可以使用代码实现
    - `SqlCeEngine.Compact()`, `Repair()`, `Verify()`,  
`Upgrade()`, `CreateDatabase()`
  - 使用 Visual Studio 服务器资源管理器 & Management Studio
    - 数据库属性



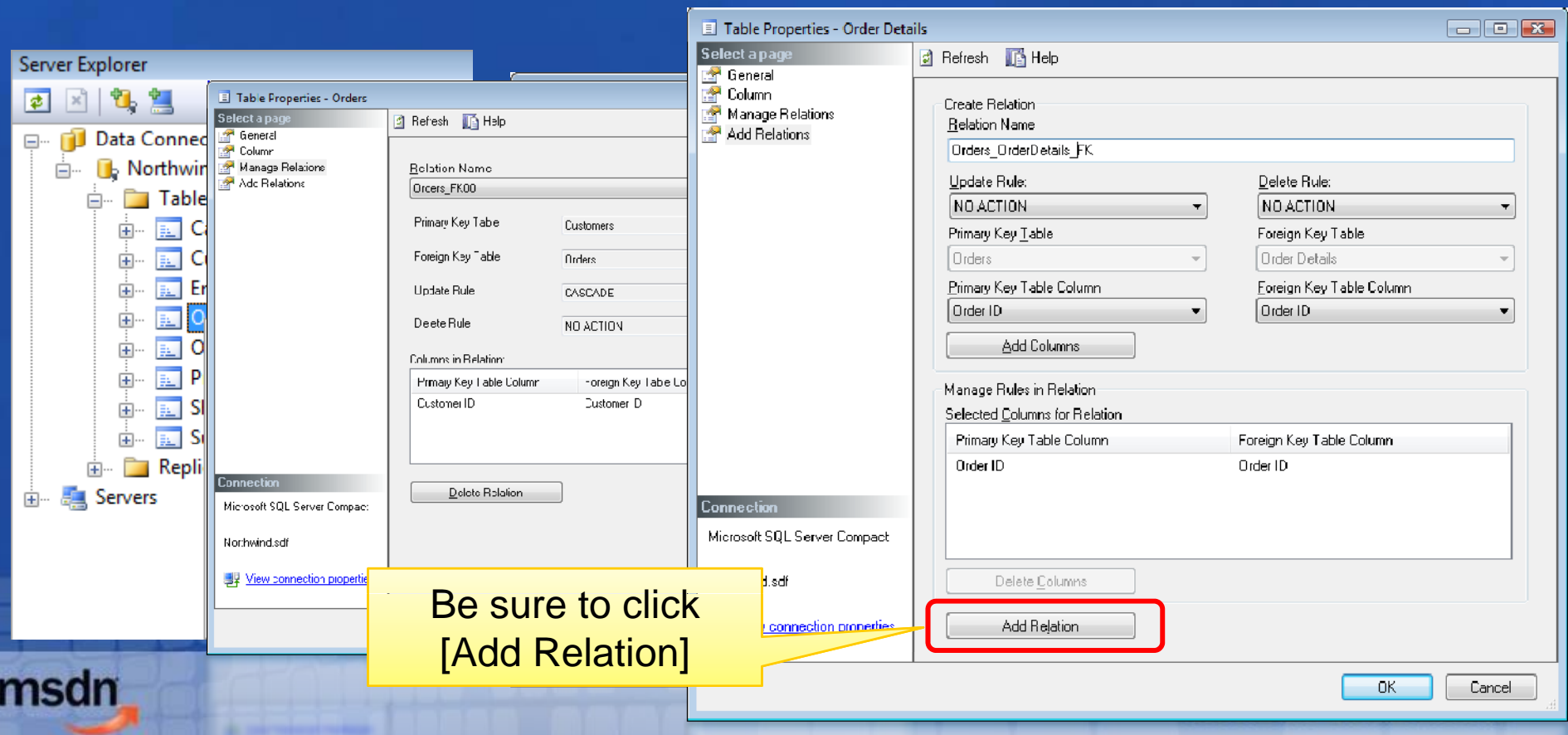


# SQLce 3.5 工具的增强

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- All Visual Studio and SQL Express SKUs now enable SQL Server Compact 3.5 as the “Local database”
- Add Relations Dialog added for ease of design



# SQL Server Compact 工具

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SQL Server Compact Version	Tools Version
SQL Server Compact 3.1	Visual Studio 2005 SP1 (Standard and above) SQL Server 2005 Management Studio SP2 (Express and above)
SQL Server Compact 3.5	Visual Studio 2008 (Express and above) SQL Server 2008 Management Studio (Express and above)

*SQL Server Compact 3.1 & 3.5 can be used for code scenarios in Visual Studio 2005 or 2008*

*Can use 3.1, 3.5 in either product for code focused scenarios*

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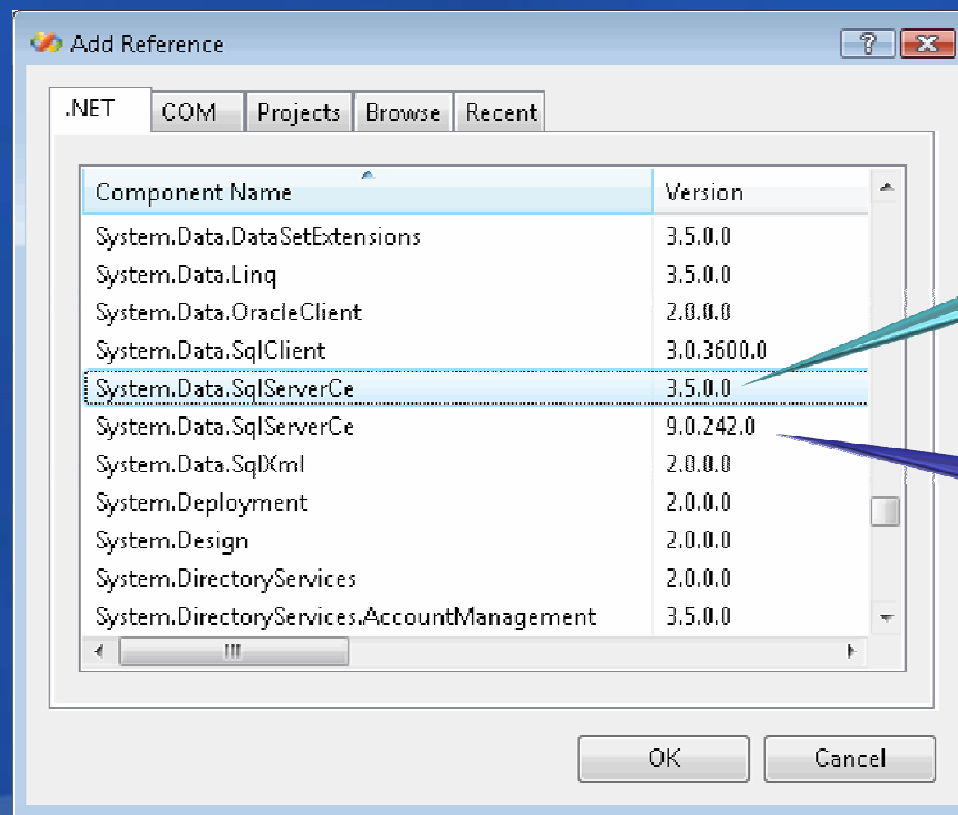


# SQL Server Compact 应用程序开发

Leveraging SQL Server Compact within  
your application

# 添加引用

- 添加对 *System.Data.SqlServerCe* 的 .NET 引用



**SQL Server  
Compact 3.5**

**SQL Server  
Compact 3.1**

# 创建连接

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- 数据库连接语句
  - 文件路径
  - 数据库访问密码
  - 其他选项...
- 使用 |DataDirectory| 宏
  - To resolve obfuscated .SDF database file location
- 设置 “Max database size” 选项支持大数据库
  - 默认值为128mb

```
Imports System.Data.SqlServerCe
Dim conn As New SqlCeConnection()
conn.ConnectionString = "Data Source=|DataDirecotry|\Northwind.sdf;password=foo;Max Database Size=256"
Try
    conn.Open()
Catch sqlCeEx As SqlCeException
    MessageBox.Show(sqlCeEx.Message)
Catch ex As Exception
    MessageBox.Show(ex.Message)
End Try
```

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# 数据库连接语句的各项属性

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Key	Default	Use
Data Source	(required)	Path to .SDF database file.  Data Directory  opt. C:\Program Files\MyApp\MyData.sdf  DataDirectory \MyData.sdf
Password/pwd	(none)	Always enables encryption
<del>Encrypt</del>	<del>False</del>	<del>Enables encryption</del> (optional to be deprecated)
Encryption Mode	Platform Default	Platform Default, Engine Default, PPC2003 Compatibility
Max database size	128 MB	Sets max file size (<= 4000 (4GB))
Max buffer size	64 KB	RAM-based DBMS cache
Mode	R/W	Read write, read only, exclusive, shared read
Flush interval	10 sec.	Lazy write interval
Autoshrink ...	60%	% of free space permitted before autoshrink
Temp file dir...	source of .sdf	Where should temp data be kept?
Temp file max...	128MB	Max size of temporary database

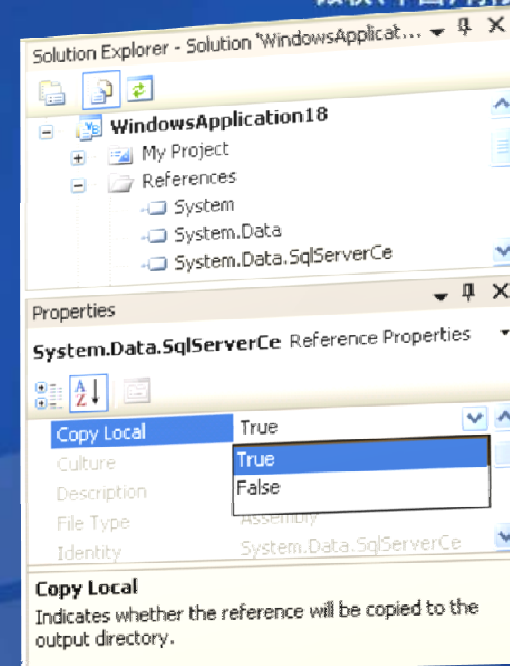


# 部署 SQL Server Compact

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- Central (GAC) install of SqlCe *overrides* private version
  - Enables painless deployment ‘till IT rolls out broadly
- Change System.Data.SqlServer.dll reference to Copy Local
- Copy sqlce\*.dll's from %ProgramFiles%\Microsoft SQL Server Compact Edition\v3.1/5
- Not visible by Microsoft Update
- Must be serviced by the hosting application



# 创建 SQLce 数据库

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- 使用工具创建
  - Visual Studio 服务器资源管理器
  - SQL Server Management Studio 对象资源管理器
  - 数据源/数据连接对话框
- 使用代码创建
  - *SqlCeEngine.CreateDatabase()* 类/方法

```
' we'll use the SqlServerCe connection object to get the database file path
Using localConnection As New SqlCeConnection(connectionString)
    ' The SqlCeConnection.Database contains the file path portion
    ' of the database from the full connectionstring
    If Not System.IO.File.Exists(localConnection.Database) Then
        ' No file, no database
        Using sqlCeEngine As New SqlCeEngine(connectionString)
            sqlCeEngine.CreateDatabase()
            CreateInitialDatabaseObjects(connectionString)
        End Using
    End If
```

**demo**

# 初始化数据库结构

- 在应用程序中使用资源文件来管理SQL脚本

```

CREATE TABLE Suppliers(
    SupplierID nVarChar(10) NOT NULL CONSTRAINT Suppliers_PK PRIMARY KEY,
    CompanyName nvarchar(40) NOT NULL,
    Description nvarchar(100) NULL,
    SortOrder int NOT NULL DEFAULT(50),
    Active bit NOT NULL DEFAULT (1)
)
GO
CREATE TABLE OrderStatus(
    OrderStatus nChar(10) NOT NULL CONSTRAINT OrderStatus_PK PRIMARY KEY,
    Status nvarchar(40) NOT NULL,
    Description nvarchar(100) NULL,
    SortOrder int NOT NULL DEFAULT(50),
    Active bit NOT NULL DEFAULT (1)
)
GO
INSERT INTO Suppliers (SupplierID, CompanyName, Description, SortOrder, Active)
VALUES ('1', 'Exotic Liquids', 'Things that make your skin warm', 1, 1)
GO
INSERT INTO Suppliers (SupplierID, CompanyName, Description, SortOrder, Active)
VALUES ('2', 'New Orleans Cajun Delights', 'Things that make your stomach warm', 2, 1)
GO
INSERT INTO Suppliers (SupplierID, CompanyName, Description, SortOrder, Active)
VALUES ('3', 'Grandma Kelly's Homestead', 'Great bread products', 4, 1)
GO
INSERT INTO Suppliers (SupplierID, CompanyName, Description, SortOrder, Active)
VALUES ('4', 'Grandma Kelly's Homestead', 'Great bread products', 4, 1)
GO

```

Using the SQL Management Studio convention of using GO  
 to identify individual commands  
 Create a list of commands to execute  
 Dim commands() As String

To simplify editing and testing TSQL statements,  
 the commands are placed in a managed resource of the dll.  
 commands = My.Resources.CreateSchema.Split( \_  
 New String() {"GO" + vbCrLf}, \_  
 StringSplitOptions.RemoveEmptyEntries)

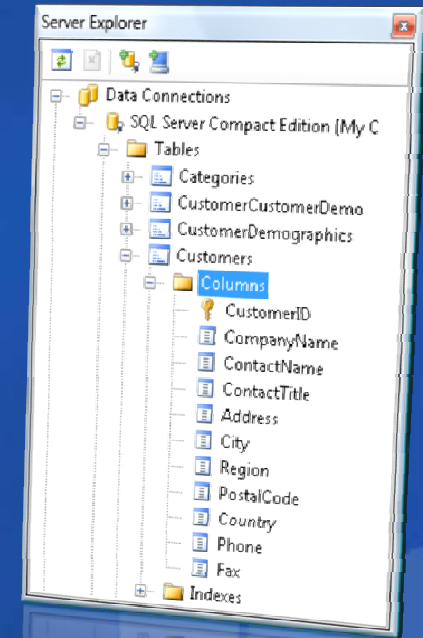
Dim cmd As New SqlCommand()  
 make sure we put the connection back to its previous state  
 cmd.Connection = connection

connection.Open()  
 For Each commandText As String In commands  
 If commandText.Trim().Length > 0 Then  
 cmd.CommandText = commandText  
 cmd.ExecuteNonQuery()  
 End If  
 Next

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# 初始化数据库结构

- Visual Studio 服务器资源管理器
- Management Studio 对象资源管理器
- 合并复制, RDA 或 Sync Services



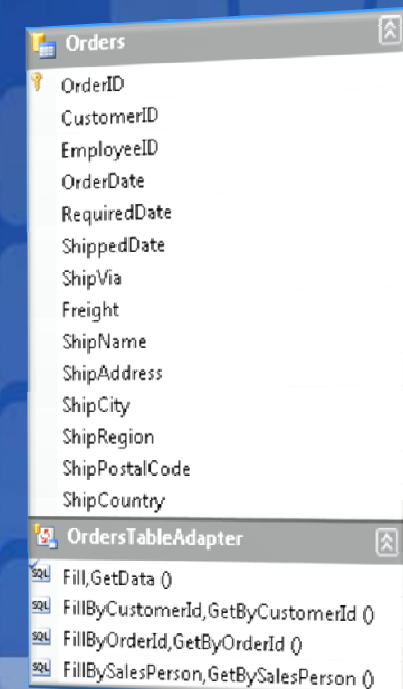


```
cmd.CommandText = "Employees"  
cmd.CommandType = CommandType.TableDirect  
Me.EmployeeBindingSource.DataSource = _  
cmd.ExecuteResultSet(ResultSetOptions.Scrollable Or ResultSetOptions.Updatable)
```

## Consistent and Unique Features of SQL Server Compact

- 强类型的DataSets和TableAdapters, LINQ
- 可更新可滚动的游标

```
Dim customerResult = _  
From cust In nwDB.Customers _  
Where cust.CompanyName Like searchString _  
Select cust.CompanyName, cust.ContactTitle
```

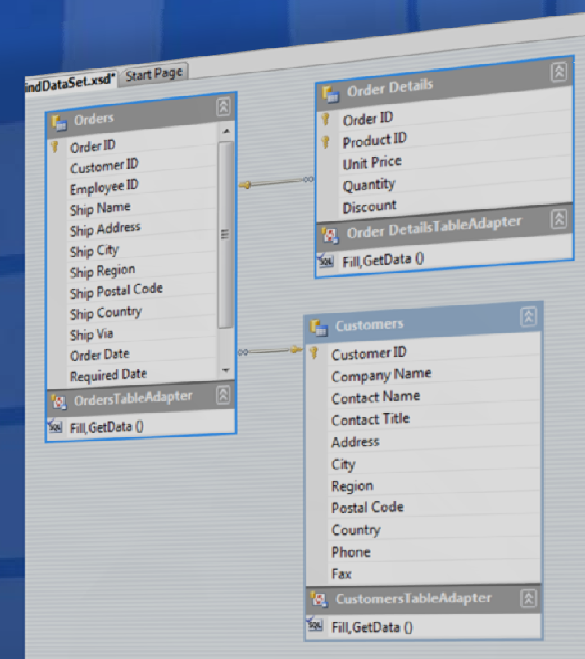


# 强类型的 DataSets 和 TableAdapters

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- TableAdapter 代码生成器
  - Exposes strongly typed database table
- 使用同样的向导创建 TableAdapters 和数据源





# 用 LINQ 访问 SQL Server Compact

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- 通过 SQLMetal 支持 LINQ to SQL
  - 不提供可视化设计器支持
- 创建 LINQ to SQL DBML 文件
  - `SQLMetal /dbml:Northwind.dbml Northwind.sdf`
- 从 DBML 文件创建类
  - `SQLMetal /map:Northwind.dbml  
code:/Northwind.cs (vb)`
- VS2008 & SQLce 3.5 SP1 支持 LINQ to Entity
  - ADO.NET Entity Framework Beta 3

# demo

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## 可滚动可更新的游标

```
Dim cmd As New SqlCommand()  
cmd.Connection = _conn  
cmd.CommandText = "Employees"  
cmd.CommandType = CommandType.TableDirect  
Me.EmployeeBindingSource.DataSource = _  
cmd.ExecuteResultSet(ResultSetOptions.Scrollable Or ResultSetOptions.Updatable)  
Me.EmployeeBindingSource.DataSource = _  
cmd.ExecuteResultSet(ResultSetOptions.Scrollable Or ResultSetOptions.Updatable)
```

# 可滚动可更新的游标

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- *SqlCeResultset*
  - “Cursor” against selected rowset
  - Product of JOIN or *TableDirect* query
  - (Optionally) Scrollable, Updatable, “sensitive”
  - 能够绕过查询处理器，直接访问表

```
Dim cmd As New SqlCeCommand()  
cmd.Connection = _conn  
cmd.CommandText = "Employees"  
cmd.CommandType = CommandType.TableDirect  
Me.EmployeeBindingSource.DataSource = _  
    cmd.ExecuteResultSet(ResultSetOptions.Scrollable Or ResultSetOptions.Updatable)
```

# ISAM Access with TableDirect



- ISAM = Indexed Sequential Access Method
- Returns rows from a single table
  - No JOIN permitted in SQL
  - SQL simply names database table
- Order determined by selected Index
  - *Command.IndexName*

```
' Based on the selected index, open a cursor directly against the table
Dim cmd As New SqlCeCommand("Customers", _conn)
cmd.CommandType = CommandType.TableDirect
' This bypasses the query processor
cmd.IndexName = "Customer_Name"
Me.BindingSource1.DataSource = _
    cmd.ExecuteResultSet(ResultSetOptions.Scrollable Or ResultSetOptions.Updatable)
```



# *demo*



## 保证 SQL Server Compact 数据库文件的安全性

- Leveraging the Windows Encrypted File System
- Protecting from the stolen laptop



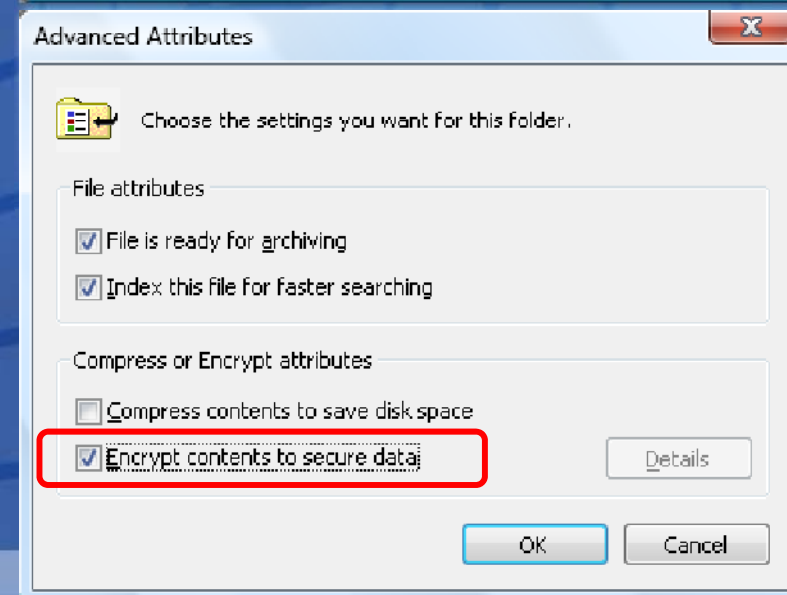
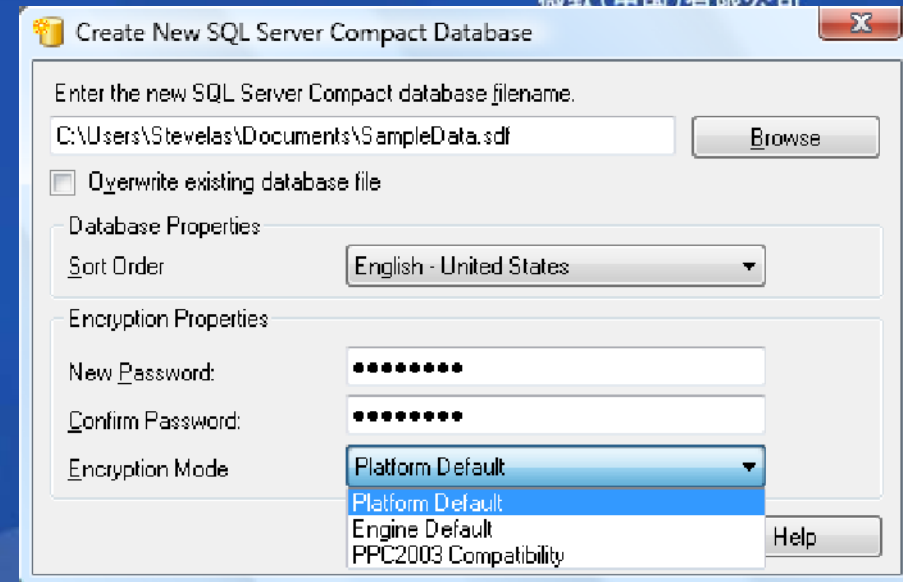


# 保护 SQL Server Compact

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- 设置数据库密码
- 数据库级别的加密
  - Platform Default
  - Engine Default
  - PPC2003 Compat
- 通过 Windows Encrypted File System (EFS) 实现文件系统加密



# demo

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Server Error in '/' Application.

*SQL Server Compact Edition is not intended for ASP.NET development.*

Exception Details: System.NotSupportedException: SQL Server Compact Edition is not intended for ASP.NET development.

Exception Details: System.NotSupportedException: SQL Server Compact Edition is not intended for ASP.NET development.

## 在 ASP.NET 使用 SQL Server Compact

- Unblocking SQL Server Compact under ASP.NET

```
AppDomain.CurrentDomain.SetData("SQLServerCompactEditionUnderWebHosting", True)
```

# 在 ASP.NET 使用 SQL Server Compact

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- 没有针对 ASP.NET 后台数据库而设计
  - 未经过并发写访问的调整
- 用于在服务器端创建 .SDF 文件
  - Large Datasets: Faster to create a file then send the completed file rather than create an empty file and sync

Server Error in '/' Application.

*SQL Server Compact Edition is not intended for ASP.NET development.*

**Exception Details:** System.NotSupportedException: SQL Server Compact Edition is not intended for ASP.NET development.

```
AppDomain.CurrentDomain.SetData("SQLServerCompactEditionUnderWebHosting", True)
```

# SQLce 3.5 功能增强

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- 支持 Sync Services for ADO.NET
  - 面向开发人员的数据同步技术(基于服务)
- 支持 LINQ (LINQ to Entities and LINQ to SQL)
- Timestamp (RowVersion) 数据类型
- 在 SELECT FROM 子句嵌套子查询
- CROSS APPLY and OUTER APPLY
- CAST and DECIMAL
- TOP
- SET IDENTITY INSERT
- System.Transactions
- Updated Encryption (Platform Default, Engine Default, PPC2003 Compat)
- Upgrade API `sqlCeEngine.Upgrade()`



# Summary

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- It's free, *fast*, *safe*/encryptable and compact
- It's *easy* to program and manage
- Supports All Microsoft Windows Platforms
- Single file, code free, doc centric file format
- Alternative to:  
JET, XML, Persisted DataSets, SQL Server Express
- It's integrated into:
  - Visual Studio 2005 SP1
  - Visual Studio 2008
    - Adds Sync Services for ADO.NET
  - SQL Server Management Studio 2008

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# SQL Server Compact 学习资源

- SQL Server Compact 官方网站  
[www.Microsoft.com/SQL/Compact](http://www.Microsoft.com/SQL/Compact)
- SQL Server Compact 博客  
[Blogs.msdn.com/SqlServerCompact](http://Blogs.msdn.com/SqlServerCompact)  
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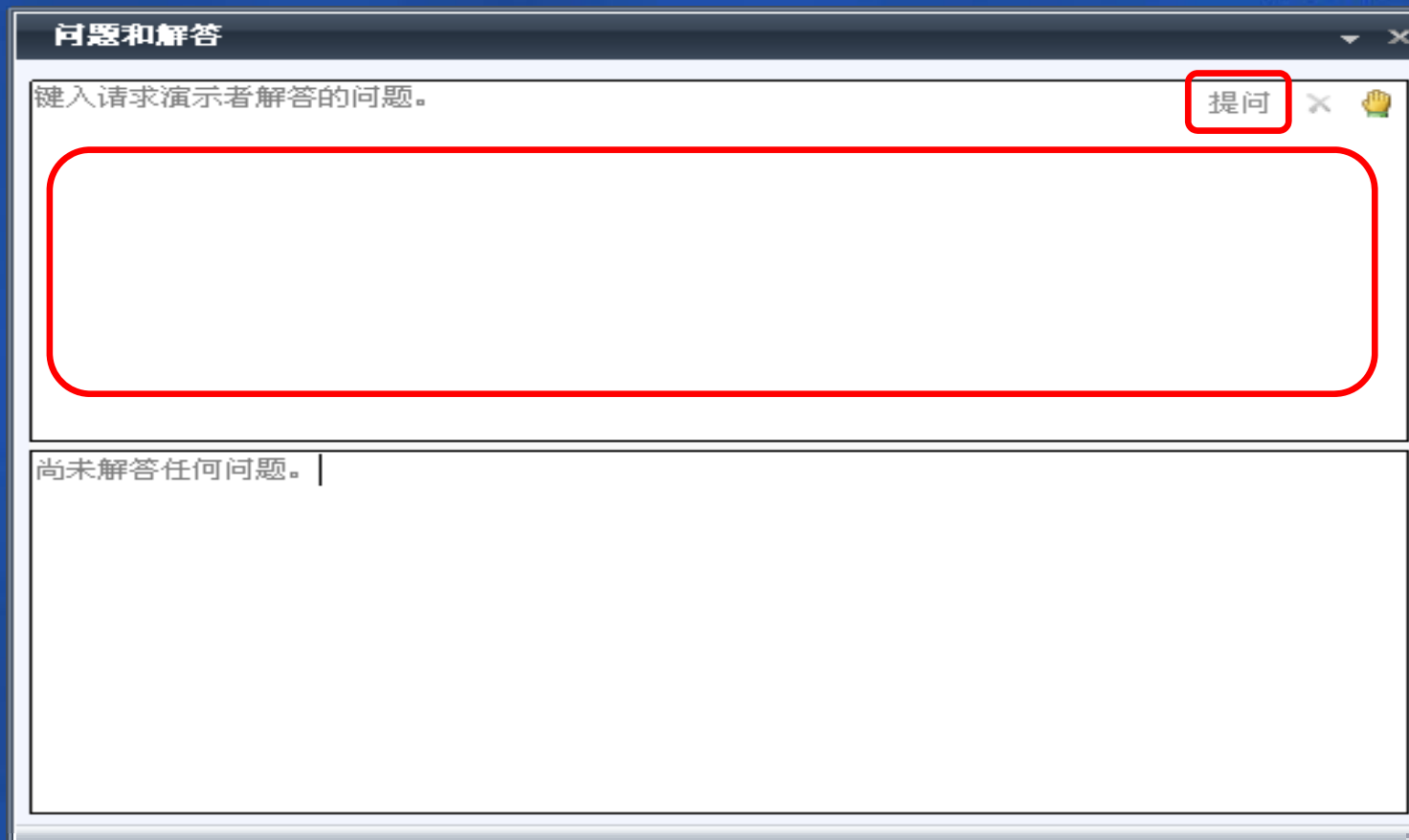
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# Question & Answer

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The screenshot shows a web browser window titled "问题和解答" (Questions and Answers). The main content area has a text input field with the placeholder text "键入请求演示者解答的问题。" (Enter the question you want the presenter to answer). To the right of the input field is a button labeled "提问" (Ask Question), which is highlighted with a red rectangle. Below the input field is a large, empty rectangular box, also outlined with a red rectangle. At the bottom of the window, there is a status bar that says "尚未解答任何问题。" (No questions have been answered yet).

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