

Programming with Microsoft Visual Basic.NET

Lesson 6

What have we learnt in last lesson?

- Declaring and assigning of variables, constants and arrays
- Handling of Text File I/O
- Printing Document
- Use of Color, Font File and Print Dialog
- Drawing in Form

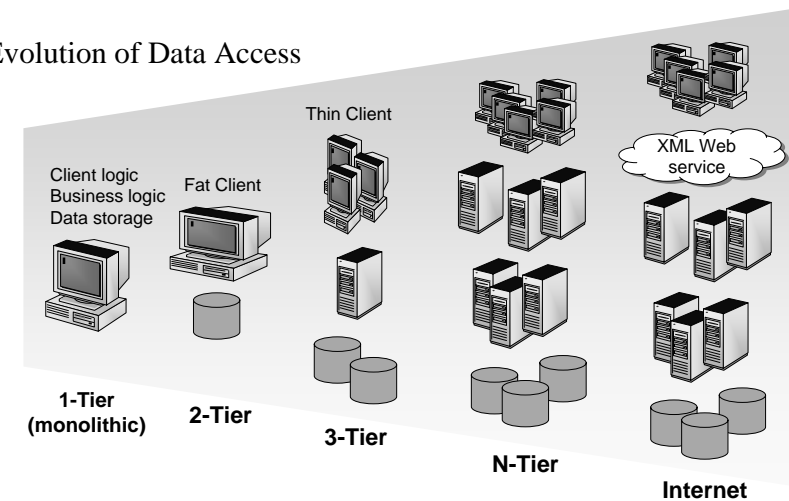


Database Foundation

Introduction to Database System

Data Access Application Models

■ Evolution of Data Access



Types of Databases

- **Flat** – A single table like a spreadsheet
 - Example: Address book
 - Advantage: Simplicity
- **Relational** – Normalized tables joined using primary and foreign keys
 - Example: Access, SQL Server, Oracle, DB2
 - Advantage: No duplicated data elements
- **Hierarchical** – Data is stored in the form it is displayed in
 - Example: XML-based
 - Advantage: Lowest common denominator
- **Network** – Data stored as some variety of linked lists
 - Example: Almost any really huge database
 - Advantage: Speed of retrieval
- **Object Oriented** – Lots of stuff besides letters and numbers

Database Files

- A **Database** is a collection of related information stored in a **Structured Format**.
- Here when we refer to a database we mean a **Relational Database**.
 - A database organizes data in **Tables**
 - Each row is referred to as a **Record**
 - Each column in a table is referred to as a **Field**
 - A unique field is an identifier that represents the **Primary Key** for the table

What is a Connected Environment?

- A connected environment is one in which users are constantly connected to a data source
- Advantages:
 - Environment is easier to secure
 - Concurrency is more easily controlled
 - Data is more likely to be current than in other scenarios
- Disadvantages:
 - Must have a constant network connection
 - Scalability

What is a Disconnected Environment?

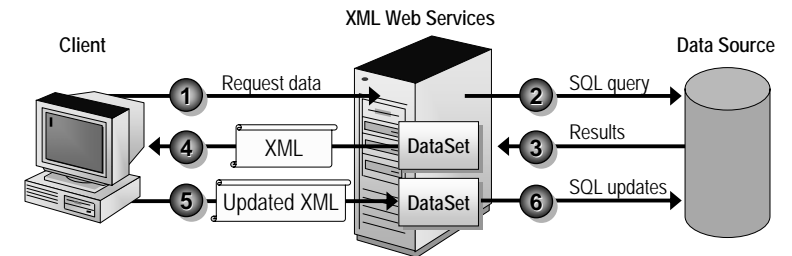
- In a disconnected environment, a subset of data from a central data store can be copied and modified independently, and the changes merged back into the central data store
- Advantages
 - You can work at any time that is convenient for you, and can connect to a data source at any time to process requests
 - Other users can use the connection
 - A disconnected environment improves the scalability and performance of applications
- Disadvantages
 - Data is not always up to date
 - Change conflicts can occur and must be resolved

Connected or Disconnected?

- Application of Connected Environment
 - If a relatively small number of people are using a relatively small number of relatively local databases all the time, then you can afford to keep connections open.
- Application of Disconnected Environment
 - If a huge number of people are occasionally using a huge number of frequently distant database, then It's better to open and close the connections each time data is accessed.

ADO.NET and XML

- ADO.NET is tightly integrated with XML
- Using XML in a disconnected ADO.NET application



Database Connection

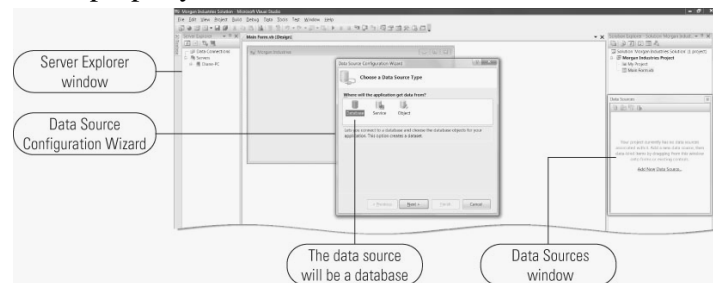
Connecting to Visual Basic to Database System

Data Binding

- Binding
 - Connecting an object to a control
- Bound Controls
 - The connected controls
- DataGridView Control
 - Displays data in row and columnar format, similar to a spreadsheet
 - One of the most popular controls for displaying table data

The Copy to Output Directory Property

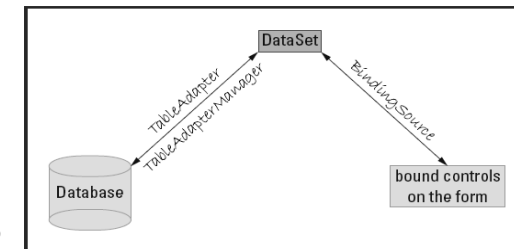
- When the Data Source Configuration Wizard connects an application to a database:
 - It adds the database file to the application's project folder
- Method of saving changes to a local database file
 - Is determined by the file's Copy to Output Directory property



13

How Does Visual Basic Do It?

- When a table or field object is dragged to the form:
 - Computer adds the appropriate controls and objects to the application
- A form's Load event
 - Occurs when the application is started and the form is displayed for the first time
- Load event procedure
 - Code to fill a dataset with data belongs here



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14

Procedure for Binding an Object?

- To bind an object in a dataset to an existing control on the form:
 - Drag the object from the Data Sources window to the control
- *BindingSource* object
 - Uses an invisible record pointer to keep track of the current record in the dataset
- *Position* property
 - Stores the position of the record pointer



15

Binding Source Object's Position Property

THE BINDINGSOURCE OBJECT'S POSITION PROPERTY

Syntax

bindingSourceName.Position

Example 1

`intRecordNumber = TblEmployBindingSource.Position`
 assigns the current record's position to the `intRecordNumber` variable

Example 2

`TblEmployBindingSource.Position = 4`
 moves the record pointer to the fifth record in the dataset

Example 3

`TblEmployBindingSource.Position = _`
`TblEmployBindingSource.Position + 1`
 moves the record pointer to the next record in the dataset

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16

Binding Source Object's Move Method

THE BINDINGSOURCE OBJECT'S MOVE METHODS

Syntax

bindingSourceName.MoveFirst()

bindingSourceName.MoveLast()

bindingSourceName.MoveNext()

bindingSourceName.MovePrevious()

Example

TblEmployBindingSource.MoveFirst()

moves the record pointer to the first record in the dataset

Figure 25-17: Syntax and an example of the BindingSource object's Move methods

SQL Statement

Database Manipulation Language

An Overview of SQL

- SQL stands for **Structured Query Language**.
- It is the most commonly used relational database language today.
- SQL works with a variety of different fourth-generation (4GL) programming languages, such as Visual Basic.
- SQL is used for:
 - Data Manipulation
 - Data Definition
 - Data Administration

SQL Requirements

- SQL Must be embedded in a programming language, or used with a 4GL like Visual Basic
- SQL is a free form language so there is no limit to the the number of words per line or fixed line break.
- Syntax statements:
 - Words or phrases are always in lower case
 - Keywords are in uppercase.

Not all versions are case sensitive!



Design

- SQL represents all information in the form of tables
- Supports three relational operations:
 - Selection
 - Projection
 - Join.
- These are for specifying exactly what data you want to display or use
- SQL is used for data manipulation, definition and administration

Table Design

Name	Address
Jane Doe	123 Main Street
John Smith	456 Second Street
Mary Poe	789 Third Ave

Columns describe one characteristic of the entity

Rows describe the Occurrence of an Entity

Data Retrieval (all Records)

- Queries search the database, fetch info, and display it. This is done using the keyword **SELECT**

```
SELECT * FROM publishers
```

pub_id	pub_name	address	state
0736	New Age Books	1 1 st Street	MA
0987	Binnet & Hardley	2 2 nd Street	DC
1120	Algodata Infosys	3 3 rd Street	CA

- The * Operator asks for every column in the table.

Data Retrieval (Specified Record)

- Queries can be more specific with a few more lines

```
SELECT *  
from publishers  
where state = "CA"
```

pub_id	pub_name	address	state
0736	New Age Books	1 1 st Street	MA
0987	Binnet & Hardley	2 2 nd Street	DC
1120	Algodata Infosys	3 3 rd Street	CA

- Only publishers in CA are displayed

Insert Record

- Putting data into a table is accomplished using the keyword **INSERT**

```
INSERT INTO publishers  
VALUES ('0010', 'pragmatics', '4 4th Ln', 'chicago', 'il')
```

pub_id	pub_name	address	state
0010	Pragmatics	4 4 th Ln	IL
0736	New Age Books	1 1 st Street	MA
0987	Binnet & Hardley	2 2 nd Street	DC
1120	Algodata Infosys	3 3 rd Street	CA

- Table is updated with new information

Create Database

- To begin, you must first **CREATE** a database using the following SQL statement:

```
CREATE DATABASE database_name
```

- Depending on the version of SQL being used the following statement is needed to begin using the database:

```
USE database_name
```

Create Table

- To create a table in the current database, use the **CREATE TABLE** keyword

```
CREATE TABLE authors  
(auth_id int(9) not null,  
auth_name char(40) not null)
```

auth_id	auth_name
(9 digit int)	(40 char string)

Delete Record

- To delete data from a table, use the **DELETE** statement:

```
DELETE from authors  
WHERE auth_name='John Smith'
```

auth_id	auth_name	auth_city	auth_state
123456789	Jane Doe	Dearborn	MI

Update Record

- To Update information in a database use the **UPDATE** keyword

```
UPDATE authors  
SET auth_name='hello'
```

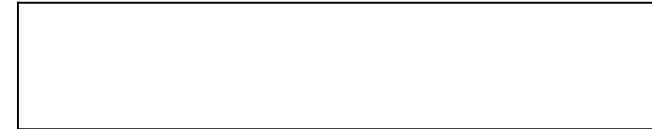
auth_id	auth_name	auth_city	auth_state
123456789	<i>Hello</i>	Dearborn	MI
000000001	<i>Hello</i>	Taylor	MI

Sets all auth_name fields to hello

Remove Database

- The **DROP** statement is also used to delete an entire database.

```
DROP DATABASE authors
```



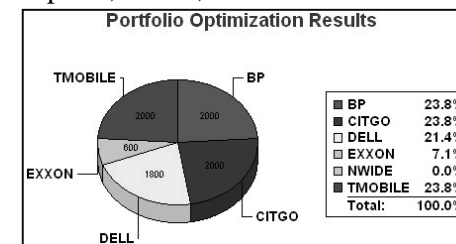
DROP removed the database and returned the memory to system

Crystal Report

Create Report for Visual Basic

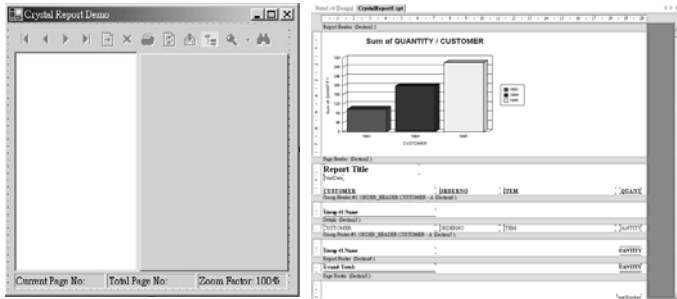
Introduction to Crystal Report

- Crystal Report is used to produce professional quality reports/graphs to summarize information.
- Crystal Report is a report designer by Crystal Decisions available in Visual Studio
- Crystal Report Gallery uses **Experts** to guide creation of reports, forms, labels



Creating Crystal Report

- In order to create and display a simple report
 - Add a **Report Designer** and design the report template.
 - Add a **Crystal Report Viewer** control to a form and connect it to the report template.



Working with Crystal Reports

Dataset with data to plot

VB .NET Code

```

817: 'Now plot the crystal report
818: Dim cryRptInstance As New rptOptPlots
819: cryRptInstance.SetDataSource(DsOptResult)
820: rptViewer1.ReportSource = cryRptInstance
    
```

Chart Expert Wizard

Type: Data | Text

Automatically set chart options

Chart type: Pie

Available fields:

- Report Fields:
 - tblOptimization.Symbol
 - tblOptimization.Cash
 - DsOptResult (ADD.NET (PML))
 - tblOptimization
 - Symbol
 - Cash

On change of: tblOptimization

Show value(s): Sum of tblOptim

Final Graph

Portfolio Optimization Results

Category	Percentage
BP	23.8%
CITGO	23.8%
DELL	21.4%
EXXON	7.1%
WNGDE	0.0%
TMOBILE	23.8%
Total	100.0%

Using the Report Designer

Use items in the toolbox to add elements such as lines, boxes, unbound text to the report.

Select View/Other Windows/Document Outline to view The Field Explorer

Use the **Field Explorer** window to add new fields to your report.

Using the Report Designer

The **Report Header** appears once at the beginning of the report.

The **Page Header** appears at the top of each page.

The **Group Header** appears when you select grouping for your report.

The **Details** section holds data for the report body.

The **Group Footer** displays group subtotals.

The **Page Footer** displays page numbers at the bottom of each page.

The **Report Footer** shows report totals (if existing).

Using a Dataset for a Report on a Web form

- Reports based on datasets from Web forms are easily displayed
- Make sure the project virtual folder's Directory Security is not set for anonymous access
- Include two lines in authentication section of the Web.config file:

```
<authentication mode="Windows" />  
<identity impersonate="true" />
```

Selecting from Multiple Reports – Set up a property

- To pass a selection to a second form:
 - Set up a property of the form
 - Set up an enum to assist in the selection

```
'Module-level property declaration  
Private mintSelectedReport As Integer 'SelectedReport property of form  
  
WriteOnly Property SelectedReport() As Integer  
    'Set SelectedReport property using ReportType enum  
  
    Set(ByVal Value As Integer)  
        mintSelectedReport = Value  
    End Set  
End Property
```

Selecting from Multiple Reports – Set up an enum

- In frmReports, enum values can be used to check the value of the property

```
'Selection for report type  
Enum ReportType  
    BooksBySubject  
    BooksByAuthor  
End Enum
```

```
'frmReports  
If mintSelectedReport = ReportType.BooksBySubject Then  
    'Print the Books by Subject report  
ElseIf mintSelectedReport = ReportType.BooksByAuthor Then  
    'Print the Books by Author report  
End If
```

```
'frmMain  
Private Sub mnuFileReportsAuthor_Click(ByVal sender As System.Object, _  
    ByVal e As System.EventArgs) Handles mnuFileReportsAuthor.Click  
    Dim frmReports As New frmReports()  
  
    frmReports.SelectedReport = frmReports.ReportType.BooksByAuthor  
    frmReports.Show()  
End Sub
```