

# Introduction to Database Systems

## CSE 444

### Lecture 06

### SQL in C#, Project

April 11, 2008

1

## Outline

- SQL in C#
  - Read Chapter 8
  - But note that it does not talk about C#
- Project Phase 1

2

## C# - Crash Course

- Hello World
- Properties (getters/setters)
- Enums
- Partial classes
- Dataset: DataTable, DataRow
- Connecting to a database

<http://www.ecma-international.org/activities/Languages/Introduction%20to%20Csharp.pdf>

3

## C# - Highlights

- C# = C++ Syntax + Java Semantics
- It is a “safe” language (like Java)
- Can be embedded in Webpages
- Can access a database
  - Complex, but you should see the predecessors !

4

## Hello World

```
using System;

class Hello {
    static void Main() {
        Console.WriteLine("Hello world");
    }
}
```

5

## Properties: Getters and Setters

```
public class Point {
    private int x;
    private string c;

    public int position {
        get { return x; }
        set { x = value; c = "red"; }
    }

    public string color {
        get { return c; }
        set { c = value; x++; }
    }
}
```

```
Point uvw = new Point();

uvw.position = 55;
uvw.color = "green";
uvw.position =
    uvw.position * 2;
if (uvw.color == "green")
    ...
```

6

## Indexers

```
public class Stuff {
    private int x[];

    public int this[int i] {
        get { x[2*i+1]=0; return x[2*i]; }
        set { x[2*i] = value; x[2*i+1]=1; }
    }
}
```

```
Stuff uvw = new Stuff();

uvw[12] = 55;
uvw[99] = uvw[12]*7 + 2;
```

## Enum

```
enum Color: byte {
    Red = 1,
    Green = 2,
    Blue = 4,
    Black = 0,
    White = Red | Green | Blue,
}
```

8

## Partial Classes

- Some fields defined in file 1
- Other fields defined in file 2
- Why ?  
We create file 1, you create file 2

9

## The DataSet Class

This is an important class that allows you to interact with a database

DataSet = a “mini” database (cache) in main memory

- DataTable
- DataRow

10

## DataSet

```
DataSet myLocalDB = new DataSet();
.....
..... /* create inside a table called “books” */
..... /* (this is shown on a following slide) */

/* now use “books” */
DataTable x = myLocalDB.Tables[“books”]

foreach (DataRow y in x.Rows) {
    if (y[“title”] == “Harry Potter”) y[“price”]++;
}
```

11

## Connecting to a Database

- Create or edit web.config file
  - Specify iisqlsrv, user, password
  - Give a ‘name’
- Create a SqlConnection
  - refer to ‘name’
- Create a SqlDataAdapter
  - embed SQL query string
- Execute the Fill( ) method to run query and store answers in a datarow

12

## Connecting to a Database

```
/* create inside a table called "books" */
```

```
SqlConnection c = new SqlConnection( ... "name" ... );
```

```
string q = "select title, price year  
           from products  
           where price < 100";
```

SQL = a string !!!  
"impedance  
mismatch"

```
SqlDataAdapter a = new SqlDataAdapter(q, c);  
DataSet myLocalDB = new DataSet();  
a.Fill(myLocalDB, "books");
```

## Phase 1

- Task 1: Schema design
- Task 2: Import sample data
- Task 3: Modify starter code

14

## Task 1: Schema Design

Official requirement

- Read the project description
- Design a "good" database schema
  - More about this in lecture the next week

15

## Task 1: Schema Design

- Optional: draw an E/R diagram
- Create a file:

```
CREATE TABLE Customer ( ... )  
CREATE TABLE Invoice ( ... )  
...
```

- Create a second file:

```
DROP TABLE Customer  
DROP TABLE Invoice  
...
```

(why ?)

16

## Task 1: Schema Design

What you should do:

- Read description AND look inside the starter code App\_code/Provided/...
- Read the classes, determine the fields...

17

## Task 1: Schema Design

Things to worry about:

- Keys/foreign keys: note table order matters!
- Make sure you represent all the data
- Null-able or not (don't worry too much)

Things not to worry about:

- fname or FirstName or PersonFirstName ?
- varchar(20) or char(200) or varchar(120) ?

18

## Task 2: Import Sample Data

- Create a file:

```
INSERT INTO Customer ( ... )  
VALUES ('John', ....)  
INSERT INTO Customer ( ... )  
VALUES ('Sue', ....)  
...
```

- You may need to run this:

```
DROP TABLE Customer  
DROP TABLE Invoice  
...
```

(why ?)

19

## Task 3: Modify Starter Code

The starter code:

- C#
- ASP.NET (you do not need to understand it)

It provides a Website for accessing your online store  
BUT it misses the fragments of code that get the data from the database

See

[http://iisqlsrv.cs.washington.edu/444/Phase1\\_Example/](http://iisqlsrv.cs.washington.edu/444/Phase1_Example/)

20

### Task 3: Modify Starter Code

- What you have to do:
- App\_Code/Phase1/Billing and Shipping/...

```
Public partial class Customer {
    /* add your own fields, like: */
    private int id,

    Procedure List<invoice> GetInvoices() {
        /* your GetInvoices code goes here */
    }
```

21

### Task 3: Modify Starter Code

```
/* your GetInvoices code goes here */

string s = String.Format(
    @"SELECT ...
    FROM ...
    WHERE x.customerId = {0} ...", id);

StoreContext store = StoreContext.current;
DataSet ds = new DataSet();
DataTable invoices = store.GetDataTable(s, ds, "invoices");
/* continued on next slide.... */
```

Substitutes  
id for {0}

Defined in  
Provided

### Task 3: Modify Starter Code

```
/* ... continued from previous slide */

List<Invoice> invoiceList new List<Invoice> ();

foreach(datarow r in invoices.Rows) {
    invoiceList.Add(new Invoice( r ));
}

return invoiceList;
}
```

Now you need  
to implement this

23

### Task 3: Modify Starter Code

```
public partial class Invoice {
    public Invoice(DataRow invoiceData) {
        /* here goes your code, something like that: */
        init(invoiceData); /* may need it in several places */
    }
    ....
    private void init(DataRow invoiceData) {
        invoiceId = (int) invoiceData["invoiceId"];
        orderDate = (DateTime) invoiceData["date"];
        ....
    }
```

In Provided

In you SQL

24

## Time Estimate

- Task 1: about 9 tables or so
  - 2 hours or more
- Task 2: try 2 tuples per table
  - 1 hour
- Task 3:
  - Need to find out WHAT to modify in starter code
  - May need to DROP TABLEs then go to Task 1
  - Total time here: anywhere from 2 to 14

25