# Queries: Part 2 of 2

## IS240 – DBMS

## Lecture # 7 – 2010-02-22

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## Topics

- Multiple Tables (Intro & Distinct)
- Joining Tables
- SQL JOIN
- Syntax for Three Tables
- Multiple Tables (Many)
- Building a Query
- Joining Tables (Hints)
- Tables with Multiple Joins
- Table Alias
- Saved Query: Create View
- Updateable & Non-updateable Views

***As usual, this material was created by Prof Jerry Post and reformatted by Prof M. E. Kabay for use in IS240 at Norwich University***





## Multiple Tables (Intro & Distinct)

| Sale |
|---|
| SaleID |
| SaleDate |
| EmployeeID |
| CustomerID |
| SalesTax |

```
SELECT DISTINCT CustomerID
FROM Sale
WHERE (SaleDate Between '01-Apr-2004'
        And '31-May-2004')
ORDER BY CustomerID;
```

| Field | CustomerID | SaleDate |
|---|---|---|
| Table | Sale | Sale |
| Sort | Ascending | |
| Criteria | | Between '01-Apr-2004' And '31-May-2004' |
| Or | | |

| CustomerID |
|---|
| 6 |
| 8 |
| 14 |
| 19 |
| 22 |
| 24 |
| 28 |
| 36 |
| 37 |
| 38 |
| 39 |
| 42 |
| 50 |
| 57 |
| 58 |
| 63 |
| 74 |
| 80 |
| 90 |

**List the CustomerID of everyone who bought something between 01-Apr-2004 and 31-May-2004.**



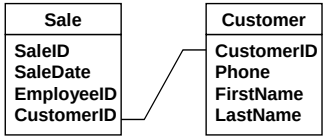


## Problem: CustomerID not Ideal

- We would much rather see the name of the customer than the CustomerID only
- The Customer's last name is in the Customer table
- We will create a VIEW that *joins* the information from the Sale table with the information from the Customer table
- Think of the JOIN operation as creating a synthetic table that combines all the records from both tables
- This allows us to SELECT the right information, including LastName, from the combined records

# Joining Tables

```
SELECT DISTINCT Sale.CustomerID, Customer.LastName
FROM Customer
INNER JOIN Sale ON Customer.CustomerID = Sale.CustomerID
WHERE (SaleDate Between '01-Apr-2004' And '31-May-2004')
ORDER BY Customer.LastName;
```




| CustomerID | LastName |
|---|---|
| 22 | Adkins |
| 57 | Carter |
| 38 | Franklin |
| 42 | Froedge |
| 63 | Grimes |
| 74 | Hinton |
| 36 | Holland |
| 6 | Hopkins |
| 50 | Lee |
| 58 | McCain |
| … | |

| Field | CustomerID | LastName | SaleDate |
|---|---|---|---|
| Table | Sale | Customer | Sale |
| Sort | | Ascending | |
| Criteria | | | Between '01-Apr-2004' And '31-May-2004' |
| Or | | | |

**List LastNames of Customers who bought between 4/1/2004 and 5/31/2004.**





# SQL JOIN

```
FROM table1
INNER JOIN table2
ON table1.column = table2.column
```

*SQL 92 syntax (Access and SQL Server)*

We use this syntax throughout IS240

~~FROM table1, table2~~
~~WHERE table1.column = table2.column~~

*SQL 89 syntax (Oracle)*

Avoid using this syntax: can cause errors

```
FROM table1, table2
JOIN table1.column = table2.column
```

*Informal syntax*





# Syntax for Three Tables

SQL '92 syntax to join three tables

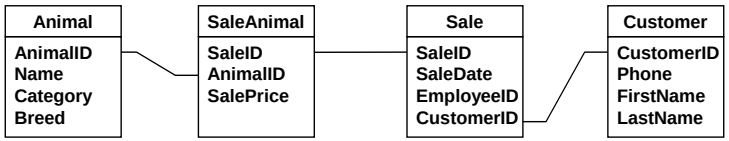
```
FROM Table1
   INNER JOIN
   (Table2 INNER JOIN Table3
      ON Table2.ColA = Table3.ColA)
   ON Table1.ColB = Table2.ColB
```





# Multiple Tables (Many)

```
SELECT DISTINCTROW Customer.LastName, Customer.Phone
FROM Customer INNER JOIN (Sale INNER JOIN (Animal INNER JOIN SaleAnimal
 ON Animal.AnimalID = SaleAnimal.AnimalID)  ON Sale.SaleID = SaleAnimal.SaleID)
 ON Customer.CustomerID = Sale.CustomerID
WHERE ((Animal.Category='Cat') AND (Animal.Registered Is Not Null)
 AND (Color Like '%White%')  AND (SaleDate Between '01-Jun-2004'
 And '31-Dec-2004'));
```




| Field | LastName | Phone | Category | Registered | Color | SaleDate |
|---|---|---|---|---|---|---|
| Table | Customer | Customer | Animal | Animal | Animal | Sale |
| Sort | Ascending | | | | | |
| Criteria | | | 'Cat' | Is Not Null | Like '%White%' | Between '01-Jun-2004' And '31-Dec-2004' |
| Or | | | | | | |

- **List the Last Name and Phone of anyone who bought a registered White cat between 6/1/2004 and 12/31/2004.**

# Building a Query

- List the Last Name and Phone of anyone who bought a registered White cat between 6/1/04 and 12/31/04.
  - Identify the tables involved.
    - Look at the columns you want to see.
      - ✓LastName, Phone: Customer
    - Look at the columns used in the constraints.
      - ✓Registered, Color, Category: Animal
      - ✓Sale Date: Sale
    - Find connector tables.
      - ✓To connect Animal to Sale: SaleAnimal
  - Select the desired columns and test the query.
  - Enter the constraints.
  - Set Order By columns.
  - Add Group By columns.
  - Add summary computations to the SELECT statement.




# Joining Tables (Hints)

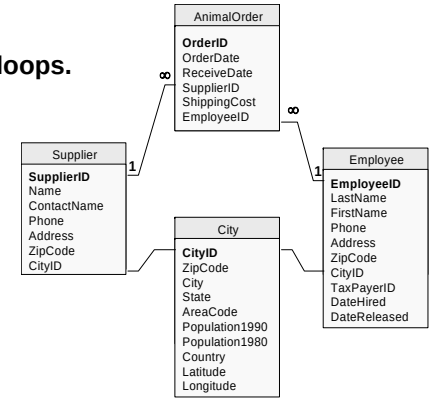
- Build Relationships First
  - Drag and drop
  - From one side to many side
- Avoid multiple ties between tables
- SQL
  - FROM Table1
  - INNER JOIN Table2
  - ON Table1.ColA = Table2.ColB
- Join columns are often keys, but they can be any columns--as long as the domains (types of data) match.
- Multiple Tables
  - FROM (Table1
  - INNER JOIN Table2
  - ON T1.ColA = T2.ColB )
  - INNER JOIN Table3
  - ON T3.ColC = T3.ColD
- Shorter Notation
  - FROM T1, T2, T3
  - JOIN T1.ColA = T2.ColB
  - T1.ColC = T3.ColD
- Shorter Notation is not correct syntax, but it is easier to write.




# Tables with Multiple Joins

- Potential problem with three or more tables.
- Access uses predefined relationships to automatically determine JOINs.
- JOINS might loop.
- Most queries will not work with loops.

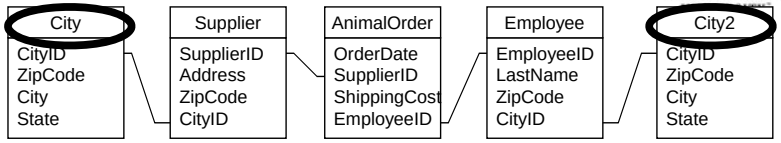
A query with these four tables with four JOINS would only return rows where the Employee had the same ZipCode as the Supplier. If you only need the Supplier city, just delete the JOIN between Employee and ZipCode. If you want both cities, add the ZipCode table again as a fifth table.







# Table Alias




```
SELECT Supplier.SID, Supplier.CityID, City.City, Employee.EID,
Employee.LastName, Employee.CityID, City2.City
FROM (City INNER JOIN Supplier ON City.CityID = Supplier.CityID) INNER
JOIN ((City AS City2 INNER JOIN Employee ON City2.CityID =
Employee.CityID) INNER JOIN AnimalOrder ON Employee.EmployeeID =
AnimalOrder.EmployeeID) ON Supplier.SupplierID = AnimalOrder.SupplierID;
```

| SID | Supplier.CityID | City.City | EID | LastName | Employee.CityID | City2.City |
|---|---|---|---|---|---|---|
| 4 | 7972 | Middlesboro | 5 | James | 7083 | Orlando |
| 2 | 10896 | Springfield | 1 | Reeves | 9201 | Lincoln |
| 4 | 7972 | Middlesboro | 3 | Reasoner | 8313 | Springfield |
| 9 | 10740 | Columbia | 8 | Carpenter | 10592 | Philadelphia |
| 5 | 10893 | Smyrna | 3 | Reasoner | 8313 | Springfield |

# Saved Query: Create View

- Save a query
  - Faster: only enter once
  - Faster: only analyze once
- Any SELECT statement
- Can use the View within other SQL queries.

**Examples:**

```
CREATE VIEW Kittens AS
SELECT *
FROM Animal
WHERE (Category = 'Cat') AND
(Today - DateBorn < 180);
```

```
SELECT Avg(ListPrice)
FROM Kittens
WHERE (Color LIKE '%Black%');
```




# Updateable Views

OrderItem(OrderID, ItemID, Quantity) Item(ItemID, Description)

OrderLine(OrderID, ItemID, Description, Quantity)

- To be updateable, a view must focus on one primary table. (OrderItem)
  - Goal is to change data in *only one table.* (OrderItem)
  - Data can be *displayed* from other tables. (Item)
  - *Never include or attempt to change primary keys from more than one table. (Item.ItemID)*




# Non-Updateable View

OrderItem(OrderID, ItemID, Quantity) Item(ItemID, Description)

| | | |
|---|---|---|
| 121 | 57 | 3 |
| 121 | 82 | 2 |
| 122 | 57 | 1 |

| | |
|---|---|
| 57 | Cat food |
| 58 | Dog food |
| 59 | Bird food |

OrderLine(OrderID, Item.ItemID, Description, Quantity)

| | | | |
|---|---|---|---|
| 121 | 57 | Cat food | 3 |
| 121 | 82 | Bird feeder | 2 |
| 122 | 57 | Cat food | 1 |

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**If you attempt to change the Item.ItemID in the OrderLineView:**

***You will simply change the primary key value in the Item table.***

***It will not add a new row to the OrderItem table.***




# Homework

- By Sunday 28 Feb 2010
- Chapter 4 main text page 176:
  - Sally's Pet Store DB from your Student CD
  - Questions 8,10,12,14,16,18, 20