macromedia COLDFUSION 5

The Fastest Way to Build and Deploy Powerful Web Applications

Database 2: Slicing and Dicing Data in CF and SQL

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Agenda

- **Slicing and Dicing Data in Many Ways**
- **Handling Distinct Column Values**
- **Manipulating Data with SQL**
- **Summarizing Data with SQL (Counts, Averages, etc.)**
- **Grouping Data with SQL**
- **Handling Nulls**
- **Handling Long Text**
- **Cross-Referencing Tables (Joins)**
- **Where to Learn More**
- **Q&A**

Part 2 of 3

- **This seminar is part 2 of 3 being presented today**
  - First two in conference "beginner" track
    - Database 1: Using Databases & SQL Basics
    - Database 2: Slicing and Dicing Data in CF and SQL
  - Part 3 in "Advanced" track
    - Database 3: Improving Database Processing
      - At 2:45 in Green Room
- **Most topics are not CF-specific at all**
  - Will apply just as well to J2EE, ASP, PHP developers
  - A small bit of CF used will be easily picked up

Slicing and Dicing Data in Many Ways

- **There's more to database processing than simply selecting columns for display. May want to massage the data:**
  - Handling distinct column values
    - Show each distinct lastname for employees
    - Create a phone directory with each lastname listed only once
  - Manipulating data before or after selecting it
    - Show the first 30 characters of a description column
    - Find rows where the year in a date column is a particular year

Slicing and Dicing Data in Many Ways

- **As well as:**
  - Summarizing data
    - Show how many employees we have
    - Show how many employees make more than $40k
    - Show how many employees have not been terminated
    - Show the average, max, and min salary for all employees
    - Show the total salary for all employees
    - Show how many distinct salary levels there are

Slicing and Dicing Data in Many Ways (cont.)

- **As well as:**
  - Grouping Data
    - Show those counts, averages, or totals by department
    - Show those departments whose count/avg/total meets some criteria
  - Handling Nulls
    - Show employees who have not been terminated (TerminationDate column is null)
    - Count how many employees do not live in NYC
  - Cross-referencing tables
    - Show each employee and their department
    - Show all employees and their department, even if not assigned to one
    - Show each employee and their manager

Working with Data in SQL Versus ColdFusion

- **SQL provides the means to do each of those tasks**
  - And ColdFusion has some means to do some of them
- **Many developers create complicated CF programs to do what both CF and SQL can enable with simpler constructs**
  - Same problems arise in other web app dev environments
- **Experienced developers will admonish:**
  - Don't do things in your program that you can better do in SQL
  - The challenge is deciding which to use
- **This seminar is about:**
  - making maximum use of both CF and SQL for query processing and data manipulation
  - saving time for you and your system
  - creating more effective applications
  - Only 1 topic, though, is CF-specific. Rest is pure SQL

ColdFusion vs SQL Functions

- **You may know that CF offers hundreds of functions, for string, numeric, date, list and other manipulation**
  - These are used in a format such as Left(), DateFormat()
  - Used within CF expressions, can be used to build SQL
  - Evaluated ***before*** SQL is passed to the DBMS
- **SQL also offers several functions, as we will learn**
  - Also used in ***same format***, such as Left()
  - Indeed, many ***share the same name***!
  - Evaluated by DBMS while processing the SQL
    - Effects how the query results appear or are processed
- **Could indeed use both CF and SQL functions in a given SQL statement**
  - Again, need to take care in deciding which to use
  - In this seminar, focus is on SQL functions

Handling Distinct Column Values

- **Typical Problems:**
  - Show each distinct lastname for employees
  - Create a phone directory with each lastname listed only once
- **Can try to do it manually, looping through all rows and placing unique values in an array**
  - Tedious, Slow, Unnecessary!
- **Both SQL and ColdFusion have simple solutions to produce list of unique values**
  - Use SQL approach to obtain just unique values
  - Use CF approach to create report breaks on each unique value

Handling Distinct Column Values: DISTINCT Keyword

- **Problem: Show each distinct lastname for employees**
- **Solution: *DISTINCT* keyword used before column name**
- **Example: (assuming we had a Lastname column)**

```
SELECT Distinct LastName
FROM Employees
ORDER BY Lastname
```

- **Possible Query Result Set Values:**

```
Abbot
Brown
Coleman
```

- **Note: when used with multiple columns, DISTINCT must be specified first. Applies to all columns**
  - Can't do `SELECT Degree, DISTINCT Salary`
  - Can do `SELECT DISTINCT Salary, Degree`
    - Creates distinct instances of the combined values from each

Handling Distinct Column Values: CFOUTPUT GROUP

- **Could have solved that same problem in CF**
  - Either manually (don't do it!)
  - Or by way of CFOUTPUT's *GROUP* attribute
    - Provide name of column by which data was sorted
    - Will show **only the unique values** of that column

```
<CFQUERY DATASOURCE="ProdPrsnl" NAME="GetEmployees">
   SELECT LastName FROM Employees
   ORDER BY LastName
</CFQUERY>
<CFOUTPUT QUERY="GetEmployees" GROUP="LastName">
   #LastName#<br>
</CFOUTPUT>
```

- **Would produce equivalent result to that on previous slide**
  - Note that it has **nothing to do with GROUP** in SQL (later)
  - It works. But for this problem, DISTINCT is better
  - Power of CFOUTPUT GROUP, though, is in showing both the distinct values **and all the other rows for each value**

Handling Distinct Column Values: CFOUTPUT GROUP (cont.)

- **Problem: Create a phone directory with each lastname listed only once**
- **Solution: CFOUTPUT GROUP, with embedded CFOUTPUT to process each row per unique value**
- **Example:**

Once per LastName

Once for each row having that LastName

```
<CFQUERY DATASOURCE="ProdPrsnl" NAME="GetEmployees">
   SELECT LastName, Minit, FirstName, Phone
   FROM Employees
   ORDER BY LastName
</CFQUERY>
<CFOUTPUT QUERY="GetEmployees" GROUP="LastName">
   <u>#LastName#</u><br>
   <CFOUTPUT>
         #FirstName# #Minit# - #Phone#<br>
   </CFOUTPUT>
</CFOUTPUT>
```

- **Possible Results:**

Abbot
John A – x3456
John R – x3476
Brown
Alice C – x3421
Coleman
Bob H – x3499

Handling Distinct Column Values: CFOUTPUT GROUP (cont.)

- **Can nest CFOUTPUT Groups**
  - Once for each ORDER BY column listed
- **Example:**

```
<CFQUERY DATASOURCE="ProdPrsnl" NAME="GetEmployees">
   SELECT LastName, FirstName, Minit, Phone
   FROM Employees
   ORDER BY LastName, FirstName
</CFQUERY>
<CFOUTPUT QUERY="GetEmployees" GROUP="LastName">
   <u>#LastName#</u><br>
   <CFOUTPUT GROUP="FirstName">
      #FirstName#<br><ul>
      <CFOUTPUT>
         <li>#Minit# - #Phone#
      </CFOUTPUT>
      </ul>
   </CFOUTPUT>
</CFOUTPUT>
```

Once for each row having same LastName and FirstName → No QUERY attribute

- **Possible Results:**

Abbot
John
- A - x3456
- R - x3476

Brown
Alice
- C - x3421

Coleman
Bob
- H – x3499

Manipulating Data with SQL

- **Typical Problems:**
  - Show the first 30 characters of a description column
  - Find rows where the year in a date column is a particular year
- **Tempting to try with CF functions**
  - May be wasteful, or impossible
- **SQL functions may be more efficient, and could even have more features**
  - In any case, remember admonition:
    - Don't do in CF that which you can do in SQL
  - Beware: while some SQL functions are shared by all DBMS's, each supports its own or variations

Manipulating Data with SQL: Text Functions

- **Problem: Show the first 30 characters of a description column**
  - Can certainly use CF's Left() function to substring the result passed back from SQL
    - But this means sending all data from DB to CF, only to then be stripped down to 30 chars. Wasteful!
- **Solution: Use SQL** Left() **function**
- **Example:**

```
SELECT Left(Description,30) FROM Products
```

- **Note: There are many other similar text manipulation functions, depending on DBMS**
  - Length(), Lower(), Upper(), Ltrim(), Soundex(), etc.
  - Investigate DBMS documentation to learn more

Manipulating Data with SQL: Date Functions

- **Problem: Find rows where the year in a date column is a particular year**
  - Assuming date column contains month, day, and year, how to just search on year?
  - Could find records between 01/01/xx and 12/31/xx
- **Solution: Use SQL** DatePart() **function**
- **Example:**

```
SELECT * FROM Employees
WHERE DatePart("yyyy",HireDate) = 2001
```

- **Note: each DBMS will have its own date handling functions and function arguments**
  - This example is from Access. Could also use Year(HireDate)
- **There are many other similar date manipulation functions, depending on DBMS**
  - Also will find numeric functions, system functions, and more

Summarizing Data with SQL

- **Typical Problems:**
  - Show how many employees we have
  - Show how many employees make more than $40k
  - Count how many employees have not been terminated
  - Show the average, max, and min salary for all employees
  - Show the total salary for all employees
  - Show how many distinct salary levels there are
- **Again, tempting to try with CF processing**
  - May be complicated, wasteful
  - SQL functions may be more efficient, more powerful
  - SQL functions for summarixing data are known as "aggregate functions": Count, Min, Max, Avg, Sum
    - Others include StdDev (standard deviation), Var (variance)

Summarizing Data with SQL: Count(*) Function

- **Problem: Show how many employees we have**
  - Yes, we can find all records and look at recordcount
    - But if all we want it the count, this is **wasteful**!!!
- **Solution: Use SQL Count(*) function**
- **Example:**

```
<CFQUERY DATASOURCE="ProdPrsnl" NAME="GetEmployees">
   SELECT Count(*) as RecCount
   FROM Employees
</CFQUERY>
<CFOUTPUT>
   Total Employees: #GetEmployees.RecCount#<br>
</CFOUTPUT>
```

- **Possible Query Result Set Values:**

```
Total Employees: 54
```

- **Notes:**
  - We must use a column alias in order to refer to that count within ColdFusion
  - Returns only a single-record resultset (and does it FAST!)
  - Not to be confused with SELECT * (which is SLOW!)

Summarizing Data with SQL: Count(*) Function and Filter

- **Problem: Show how many employees make more than $40k**
- **Solution: Use SQL** Count(*) **function and a filter**
  - Simple matter of adding a WHERE clause to indicate the desired criteria
- **Example:**

```
<CFQUERY DATASOURCE="ProdPrsnl" NAME="GetEmployees">
   SELECT Count(*) as RecCount
   FROM Employees
   WHERE Salary > 40000
</CFQUERY>
<CFOUTPUT>
 Num. employees making +40k: #GetEmployees.RecCount#<br>
</CFOUTPUT>
```


Summarizing Data with SQL: Count(*col*) Function

- **Problem: Count how many employees have been terminated**
- **Solution: Use SQL** Count(*column*) **function**
  - Instead of counting all records, count all having a value for a given column
  - Assume terminated employees have a value in the TerminationDate column
- **Example:**

```
<CFQUERY DATASOURCE="ProdPrsnl" NAME="GetEmployees">
   SELECT Count(TerminationDate) as RecCount
   FROM Employees
 </CFQUERY>
<CFOUTPUT>
 Num. Employees terminated: #GetEmployees.RecCount#<br>
</CFOUTPUT>
```

- **Note: doesn't count records having null column value**
  - Will discuss nulls later
  - In this case, the behavior is as expected. May not always be

Summarizing Data with SQL: AVG/MAX/MIN Functions

- **Problem: Show the average, max, and min salary for all employees**
- **Solution: Use SQL** Avg()**,** Min()**, or** Max() **functions**
  - Besides just counting records having any value for a given column, can also use these functions to summarize
- **Example:**

```
<CFQUERY DATASOURCE="ProdPrsnl" NAME="GetEmployees">
   SELECT Avg(Salary) as AvgSal, Min(Salary) as MinSal,
          Max(Salary) as MaxSal
   FROM Employees
 </CFQUERY>
<CFOUTPUT>
 Avg Sal: #GetEmployees.AvgSal#<br> ...
</CFOUTPUT>
```

- **Notes:**
  - Like Count(*column*) function, these functions ignores columns with null values
    - I.e., is average of records having a value for that column
  - Also, can add a filter in order to compute summaries for records meeting some other criteria

Summarizing Data with SQL: SUM Function

- **Problem: Show the total salary for all employees**
- **Solution: Use SQL** Sum() **function**
  - Just as other functions compute Avg/Min/Max, can use Sum function to add up all values of column
- **Example:**

```
SELECT Sum(Salary) as SumSal
FROM Employees
```

- **Notes:**
  - Can also perform mathematical computation on the column and sum that:

```
SELECT SUM(Salary * 1.20)
```

  - Or perform computation between two or more columns and sum that, as in:

```
SELECT SUM(Salary*RaisePct)
```

Summarizing Data with SQL: Using DISTINCT with Functions

- **Problem: Show how many distinct salary levels there are**
- **Solution: Use DISTINCT keyword with functions**
  - Rather than perform given function against all values of the given column in all records, can performs it against only the unique values that exist
- **Example:**

```
SELECT Count(DISTINCT Salary) as NumDistinctSals
FROM Employees
```

- **Notes:**
  - Note that this will produce just one number: the number of distinct salary values that exist
    - To produce instead a count of employees at each salary level, need to learn about SQL *GROUP BY* clause (coming next)
  - Can also use AVG (average of distinct values rather than of all values). MIN and MAX would return same result either way

Summarizing Data with SQL: Using DISTINCT with Functions

- **Notes:**
  - Note also, there's an opposing ALL keyword that can be used, instead of DISTINCT; performs aggregation against all values
    - This is the default and doesn't need to be specified
  - MS Access does not support this use of DISTINCT (or ALL) within aggregate functions

Grouping Data with SQL

- **Typical Problems:**
  - Show those counts, averages, or totals by department
  - Show which departments have count/avg/total meets some criteria
- **SQL provides a GROUP BY clause that can be used to create a list of unique values for a column**
  - Difference from DISTINCT is that it also "rolls up" the rows
    - aggregates some computation over all the records having that unique value

Grouping Data with SQL

- **Assume the employees table has a Dept column**
- **Example:**

```
SELECT Dept FROM Employees
GROUP BY Dept
```

- **Note: this simple example creates a result no different than `SELECT DISTINCT Dept`**
  - You would not typically use this statement, because you're also asking the DB to "roll up" rows having the same value of Dept, but are aggregating nothing
  - Difference comes when combined with the previously presented aggregate functions, which then aggregate the data **BY** the unique "grouped" column values

Grouping Data with SQL: Using GROUP BY with Count Function

- **Problem: Show count of employees by department**
- **Solution: Use GROUP BY with COUNT(*) function**
- **Example:**

```
SELECT Dept, Count(*) as CountEmp
FROM Employees
GROUP BY Dept
```

- **Possible Query Result Set Values:**

	4
Sales	**15**
Engineering	**33**
Marketing	**7**

- **Notes:**
  - In example, first row in resultset represents records with null value for Dept column
  - Order of rows is random. Could add `ORDER BY Dept`
    - If present, must be specified AFTER the GROUP BY

Grouping Data with SQL: Using GROUP BY with Avg Function

- **Problem: Show average salary by department**
- **Solution: Use GROUP BY with Avg(*column*) function**
  - Aggregate on a column other than that being grouped
- **Example:**

```
SELECT Dept, Avg(Salary) as AvgSalary
FROM Employees
GROUP BY Dept
```

- **Possible Query Result Set Values:**

	45687
Sales	**83276**
Engineering	**75500**
Marketing	**55000**

- **Notes:**
  - Could use Min/Max/Count(*column*) too

Grouping Data with SQL: Using GROUP BY with Functions

- **More notes:**
  - Columns to be SELECTed can only be aggregate functions and/or column named in GROUP BY
    - Could not
```
SELECT Lastname, Count(*) FROM Employees
GROUP BY Dept
```
      - Since LastName isn't being GROUPed and isn't an aggregate function itself
      - Often a source of confusion, though it clearly wouldn't make sense to show LastName here

Grouping Data with SQL: Using GROUP BY with Filter

- **Problem: Show average salary by departments of employees who've completed grade 12**
- **Solution: Use GROUP BY with filter**
  - WHERE clause limits which records are to be GROUPed
- **Example:**

```
SELECT Dept, Avg(Salary) as AvgSalary
FROM Employees
WHERE GradeCompleted >= 12
GROUP BY Dept
```

- **More notes:**
  - WHERE must occur after FROM, before GROUP
    - Order of appearance:
      - FROM, WHERE, GROUP BY, ORDER BY
  - To select records whose aggregated values meet some criteria, use HAVING clause

Grouping Data with SQL: Using GROUP BY with HAVING

- **Problem: Show departments whose employees have an average salary greater than $40,000**
- **Solution: Use GROUP BY with** HAVING
- **Example:**

```
SELECT Dept, Avg(Salary) as AvgSalary
FROM Employees
GROUP BY Dept
HAVING Avg(Salary) > 40000
```

- **Note:**
  - HAVING must occur after GROUP BY, before ORDER BY
  - Order of appearance:
    - FROM, WHERE, GROUP BY, HAVING, ORDER BY
  - Expression in HAVING can't refer to alias from SELECT clause
    - In example above, couldn't use `HAVING AvgSalary > 40000`

Handling Nulls

- **About Nulls**
  - Columns that have no value are considered NULL
    - Null is not the same as a space or 0 or empty string (““). It's no value at all
  - A column can be defined to not allow nulls
  - Can select which columns are or aren't null with IS NULL or IS NOT NULL in WHERE clause
  - When a column with a null value is selected and referred to the ColdFusion variable for the column, it will appear as an empty string
- **Typical Problems:**
  - Show employees who have not been terminated
  - Count how many employees do not live in NYC

Handling Nulls: Searching for Nulls

- **Problem: Show employees who have not been terminated**
  - Assume TerminationDate is null if not yet terminated
- **Solution: Use IS NULL in WHERE clause**
- **Example:**

```
SELECT *
FROM Employees
WHERE TerminationDate IS NULL
```


Handling Nulls: Negated Searching And Impact of Nulls

- **Problem: Count how many employees do not live in NYC**
  - Be careful selecting records that don't have some given value
  - Tempting to use:

```
Select count(*)
FROM Employees
WHERE City <> 'New York'
```

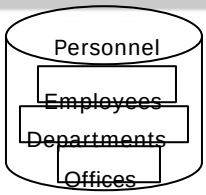
  - Problem is it doesn't find records that don't have a value for city
    - Consider 200 records: 10 in New York, 5 are null
    - Is answer 185 or 190? Depends on if you think nulls count
      - City <> 'New York' ignores records with null values (null is neither equal to nor not equal to "new york"
- **Solution: May want to add "OR column IS NULL"**
- **Example:**

```
SELECT Count(*)
FROM Employees
WHERE CITY <> 'New York'
OR CITY IS NULL
```

Handling Long Text

- **See Long Text Retrieval Settings for a given ODBC datasource in CF Administrator**
  - Hidden under “CF Settings” button
  - Can enable retrieval of very long text fields
  - Enabling the option will hamper query performance
- **May want to consider creating multiple datasources for same database**
  - one for when retrieving such columns
  - one for when not doing so
- **Place long text fields last in list of columns being SELECTed**

Understanding Relational Database Design



- ***Relational Databases* are comprised of several tables, each storing data about a particular aspect of the subject being described**
- **Goals are:**
  - store only related data in a single table
  - don’t repeat data (don’t store it in more than one place)
  - ensure integrity of data cross-referenced between tables
- **Can be challenging to cross-reference that data**

Understanding Foreign Keys

- **Recall previous examples of GROUPing on Dept column**
  - Assumed that Employees table had DEPT column holding string values for department name

Employees			
EmpID	**Name**	**HireDate**	**Dept**
1	Bob	06-04-98	Sales
2	Cindy	12-01-00	Engineering
3	John	01-01-01	Sales
4	Beth	05-30-99	Enginering

  - Problems with this include:
    - We're storing the same string multiple times on many records
    - If a mistake is made entering a given value, that record will no longer be found in searches on value (see EmpID 4)

Understanding Foreign Keys

- **More appropriate solution:**
  - Have Department table with just a list of each valid Dept and a unique DeptID (that table's primary key)
  - Then in Employees table, simply store that DeptID to indicate an employee's department

Employees			
EmpID	**Name**	**HireDate**	**DeptID**
1	Bob	06-04-98	1
2	Cindy	12-01-00	2
3	John	01-01-01	1
4	Beth	05-30-99	2

Departments	
DeptID	**Dept**
1	Sales
2	Engineering

  - This DeptID in the Employees table is called a *Foreign Key*
    - Since it holds a value that comes from the primary key of another table
    - This is the fundamental aspect of a "relational" design

Cross-Referencing Tables (Joins)

- **Typical Problems:**
  - Show each employee and their department
  - Show all employees and their department, even if not assigned to one
  - Show each employee and their manager
- **May be tempting for beginners to loop through resultset of one query (departments) and search for related records (employees for each dept)**
  - Bad! Bad! Bad!
  - Correct solution is to instead JOIN the tables together
  - There are several kinds of joins, each serving different purposes

Understanding Joins

- **To retrieve data from multiple tables, simply list both tables in FROM clause, such as:**

```
SELECT Name, Dept
FROM Employees, Departments
```

  - Note that if columns of the same name existed in each table, we'd need to prefix the table name to the column
- **Only problem is that this selects all combinations of the values in the two columns**
  - In our example table, would create 8 rows in result
    - 4 employees times 2 departments
  - Not really what we likely wanted
    - Called a *cartesian product* or a *cross join*

Bob	Sales
Cindy	Sales
John	Sales
Beth	Sales
Bob	Engineering
Cindy	Engineering
John	Engineering
Beth	Engineering

Inner Joins

- **Problem: Show each employee and their department**
- **Solution: Perform *Inner Join* of the two tables**
  - indicate columns in each table that share common value. SQL automatically matches them
    - Typically, where one table's foreign key maps to its corresponding primary key in a related table
- **Example:**

```
SELECT Name, Dept
FROM Employees, Departments
WHERE Employees.DeptID = Departments.DeptID
```

- **Correct Result:**

Bob	Sales
Cindy	Engineering
John	Sales
Beth	Engineering

- **Note: the datatype of the columns being joined must match**

Join via WHERE vs JOIN clause

- **ANSI SQL standard (and most databases) supports an alternative means of indicating joins**
  - Rather than indicate joined columns in WHERE clause
    - Use them with JOIN keyword on FROM clause
- **Example:**

```
SELECT Name, Dept
FROM Employees INNER JOIN Departments
ON Employees.DeptID = Departments.DeptID
```

- **Notes:**
  - If INNER keyword is not specified, INNER may be assumed
    - Not true in MS Access
  - Can join more than two tables with additional join clauses (of either format)
    - Any limit will be set by DBMS
    - Practical limit is that performance suffers with too many joins in a single SELECT

Outer Joins

- **With inner join, if value of join columns don't match, records will not be retrieved**
  - Unexpected problems can occur when foreign key is null
- **Assume we had at least one employee with no department indicated (null value for DeptID)**

Employees			
EmpID	**Name**	**HireDate**	**DeptID**
5	**Bill**	**11-22-00**	

  - With inner join, his record will not be displayed at all
    - he has no DeptID to match on DeptIDs in Departments table
  - Could be a real problem if expecting SELECT to show all employees!

Outer Joins

- **Problem: Show all employees and their department, even if not assigned to one**
- **Solution: Perform *Outer Join* of the two tables**
- **Example:**

```
SELECT Name, Dept
FROM Employees LEFT OUTER JOIN Departments
ON Employees.DeptID = Departments.DeptID
```

- **Possible Query Result Set Values:**

Bob	**Sales**
Cindy	**Engineering**
John	**Sales**
Beth	**Engineering**
Bill	

Notes:

  - This example indicated LEFT OUTER JOIN: there are 2 other types
    - LEFT join means retrieve all rows from table on left of JOIN even if they don't have match for join column in right table
  - Creates null values in join columns that did not match

Outer Joins (cont.)

- **WHERE clause syntax for LEFT join:**

```
WHERE ON Employees.DeptID *= Departments.DeptID
```

  - Syntax not supported in MS Access
- **Two other kinds of Outer joins:**
  - RIGHT OUTER JOIN retrieves all rows from table on right
    - In current example, that would be useful if we had a row in Departments not pointed to by an employee

Departments	
DeptID	**Dept**
5	**Accounting**

    - A RIGHT join would then show a row in the resultset for Accounting (with name being null)
      - Even though no employees had that DeptID
    - WHERE clause syntax for LEFT join (where supported):

```
WHERE ON Employees.DeptID =* Departments.DeptID
```


Outer Joins (cont.)

- **Second kind of Outer join**
  - A FULL OUTER JOIN (or FULL JOIN) retrieves rows from both tables even if join values don't match
    - In current example, would show both:
      - a row for Bill with no department and
      - A row with no employee name for Accounting
  - Not supported in MS Access
  - No equivalent WHERE clause syntax at all

Self-Joins

- **Is possible to join a table to itself**
- **Assume Employees table has column for ManagerID, to indicate each employees manager**
  - Values for that ManagerID column simply point to the EmpID for their manager

Employees				
EmpID	**Name**	**HireDate**	**DeptID**	**ManagerID**
1	Bob	06-04-98	1	5
2	Cindy	12-01-00	2	4
3	John	01-01-01	1	1
4	Beth	05-30-99	2	5
5	Bill	10-10-97		

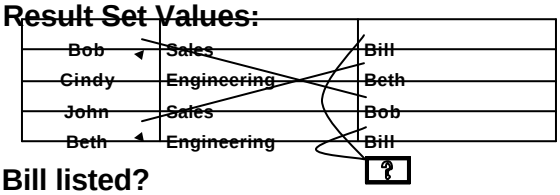
  - How to show who works for who?

Self-Joins

- **Problem: Show each employee and their manager**
- **Solution: Use self-join (just join table to itself using alias)**
  - There is no SELF keyword
- **Example:**

```
SELECT Employees.Name, Employees.Dept, Mgr.Name
FROM Employees INNER JOIN Employees as Mgr
ON Employees.ManagerID = Mgr.EmpID
```

- **Possible Query Result Set Values:**



- **Note: Why isn't Bill listed?**
  - This was an INNER join. He has null ManagerID
    - We can see from others that he's the boss and has no boss
    - To show him in table, would need OUTER join

Some Other Tidbits for You to Investigate

- **Nesting multiple joins**
- **TOP, TOP n PERCENT options on SELECT**
- **UNIONs**
- **Nested Subquery**
- **EXISTS predicate**
- **Using NULL in INSERT, UPDATE**

Where to Learn More

- **Version 5 CF manuals:**
  - Installing and Configuring ColdFusion Server
  - Developing ColdFusion Applications
  - CFML Reference
- **Books by Ben Forta:**
  - Teach Yourself SQL in 10 Minutes
  - Certified ColdFusion Developer Study Guide
  - ColdFusion Web Application Construction Kit
  - Advanced ColdFusion Development
- **Many other CF and SQL books available, including**
  - Practical SQL Handbook (new edition available)
  - SQL For Smarties (any Joe Celko book)

Subjects of Next Seminar

- **Database 3: Improving Database Processing**
  - DB Performance & Scalability
    - Query Caching, BlockFactor, Indexes
  - DB Reliability
    - Constraints, Transactions, Bind Parameters, Triggers
  - DB Extensibility and Maintainability
    - Stored Procedures

Contact Information

Contact for follow-up issues

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- **Web:** www.systemanage.com

Also available for

- Training (custom or pre-written)
  - CF, DB, Jrun/J2EE, Javascript, wireless, and more
- Consulting (very short-term engagements)
  - best practices, architecture, setup, troubleshooting, etc.
- Developer Group Mentoring, and more

Q&A

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