DB2 SQL Class Outline

The Basics of SQL

- Introduction
- Finding Your Current Schema
- Setting Your Default SCHEMA
- SELECT * (All Columns) in a Table
- SELECT Specific Columns in a Table
- Commas in the Front or Back?
- Place your Commas in front for better Debugging Capabilities
- Sort the Data with the ORDER BY Keyword
- ORDER BY Defaults to Ascending
- Use the Name or the Number in your ORDER BY Statement
- Two Examples of ORDER BY using Different Techniques
- Changing the ORDER BY to Descending Order
- NULL Values sort First in Ascending Mode (Default)

NULL Values sort First in Descending Mode (DESC)

Major Sort vs. Minor Sorts

Multiple Sort Keys using Names vs. Numbers

Sorts are Alphabetical, NOT Logical

Using A CASE Statement to Sort Logically

How to ALIAS a Column Name

A Missing Comma can by Mistake become an Alias

Comments using Double Dashes are Single Line Comments

Comments for Multi-Lines

Comments for Multi-Lines as Double Dashes per Line

Formatting Number Examples

Formatting Date Example

The WHERE Clause

The WHERE Clause limits Returning Rows

Double Quoted Aliases are for Reserved Words and Spaces

Character Data needs Single Quotes in the WHERE Clause

Character Data needs Single Quotes, but Numbers Don't

Comparisons against a Null Value

NULL means UNKNOWN DATA so Equal (=) won't Work

Use IS NULL or IS NOT NULL when dealing with NULLs

NULL is UNKNOWN DATA so NOT Equal won't Work

Use IS NULL or IS NOT NULL when dealing with NULLs

Using Greater Than or Equal To (>=)

AND in the WHERE Clause

Troubleshooting AND

OR in the WHERE Clause

Troubleshooting Or

Troubleshooting Character Data

Using Different Columns in an AND Statement

Quiz – How many rows will return?

Answer to Quiz – How many rows will return?

What is the Order of Precedence?

Using Parentheses to change the Order of Precedence

Using an IN List in place of OR

The IN List is an Excellent Technique

IN List vs. OR brings the same Results

The IN List Can Use Character Data

Using a NOT IN List

Null Values in a NOT IN List Bring Back No Rows

A Technique for Handling Nulls with a NOT IN List

BETWEEN is Inclusive

NOT BETWEEN is Also Inclusive

LIKE uses Wildcards Percent '%' and Underscore '_'

LIKE command Underscore is Wildcard for one Character

LIKE Command Works Differently on Char Vs Varchar

LIKE Command on Character Data Auto Trims

Quiz – What Data is Left Justified and what is Right?

Numbers are Right Justified and Character Data is Left

Answer – What Data is Left Justified and what is Right?

An Example of Data with Left and Right Justification

A Visual of CHARACTER Data vs. VARCHAR Data

Use the TRIM command to remove spaces on CHAR Data

Escape Character in the LIKE Command changes Wildcards

Escape Characters Turn off Wildcards in the LIKE Command

Quiz – Turn off that Wildcard

ANSWER – To Find that Wildcard

The Distinct Command

Distinct vs. GROUP BY

Quiz – How many rows come back from the Distinct?

Answer – How many rows come back from the Distinct?

The FETCH Clause

The FETCH Clause with an ORDER BY Clause

Aggregation

Quiz – You calculate the Answer Set in your own Mind

Answer – You calculate the Answer Set in your own Mind

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Answer – You calculate the Answer Set in your own Mind

The 3 Rules of Aggregation

There are Five Aggregates

Quiz – How many rows come back?

Answer – How many rows come back?

Troubleshooting Aggregates

GROUP BY delivers one row per Group

GROUP BY Dept_No Works GROUP BY 1 Fails

Limiting Rows and Improving Performance with WHERE

WHERE Clause in Aggregation limits unneeded Calculations

Keyword HAVING tests Aggregates after they are totaled

Keyword HAVING is like an Extra WHERE Clause for Totals

Keyword HAVING tests Aggregates after they are totaled

Getting the Average Values per Column

Average Values per Column for all Columns in a Table

GROUP BY GROUPING SETS Command

GROUP BY Grouping Sets

GROUP BY ROLLUP Command

GROUP BY Rollup Result Set

GROUP BY CUBE Command

GROUP BY CUBE Result Set

Quiz - GROUP BY GROUPING SETS Challenge

Answer To Quiz - GROUP BY GROUPING SETS Challenge

Join Functions

A Two-Table Join Using Traditional Syntax

A two-table join using Non-ANSI Syntax with Table Alias

You Can Fully Qualify All Columns

A two-table join using ANSI Syntax

Both Queries have the same Results and Performance

Quiz – Can You Finish the Join Syntax?

Answer to Quiz – Can You Finish the Join Syntax?

Quiz – Can You Find the Error?

Answer to Quiz – Can You Find the Error?

Super Quiz – Can You Find the Difficult Error?

Answer to Super Quiz – Can You Find the Difficult Error?

Quiz – Which rows from both tables won't return?

Answer to Quiz – Which rows from both tables Won't Return?

LEFT OUTER JOIN

LEFT OUTER JOIN Results

RIGHT OUTER JOIN

RIGHT OUTER JOIN Example and Results

FULL OUTER JOIN

FULL OUTER JOIN Results

Which Tables are the Left and which Tables are Right?

Answer - Which Tables are the Left and which are the Right?

INNER JOIN with Additional AND Clause

ANSI INNER JOIN with Additional AND Clause

ANSI INNER JOIN with Additional WHERE Clause

OUTER JOIN with Additional WHERE Clause

OUTER JOIN with Additional AND Clause

OUTER JOIN with Additional AND Clause Results

Quiz – Why is this considered an INNER JOIN?

Evaluation Order for Outer Queries

The DREADED Product Join

The DREADED Product Join Results

The Horrifying Cartesian product join

The ANSI Cartesian Join will ERROR

Quiz – Do these Joins Return the Same Answer Set?

Answer – Do these Joins Return the Same Answer Set?

The CROSS JOIN

The CROSS JOIN Answer Set

The Self Join

The Self Join with ANSI Syntax

Quiz – Will both queries bring back the same Answer Set?

Answer – Will both queries bring back the same Answer Set?

Quiz – Will both queries bring back the same Answer Set?

Answer – Will both queries bring back the same Answer Set?

How would you join these two tables?

An Associative Table is a Bridge that Joins Two Tables

Quiz – Can you write the 3-Table Join?

Answer to quiz – Can you write the 3-Table Join?

Quiz – Can you write the 3-Table Join to ANSI Syntax?

Answer – Can you write the 3-Table Join to ANSI Syntax?

Quiz – Can you Place the ON Clauses at the End?

Answer – Can you Place the ON Clauses at the End?

The 5-Table Join – Logical Insurance Model

Quiz - Write a Five Table Join Using ANSI Syntax

Answer - Write a Five Table Join Using ANSI Syntax

Quiz - Write a Five Table Join Using Non-ANSI Syntax

Answer - Write a Five Table Join Using Non-ANSI Syntax

Quiz –Re-Write this putting the ON clauses at the END

Answer –Re-Write this putting the ON clauses at the END

The Nexus Query Chameleon Writes the SQL for Users

Using Nexus for DB2

Nexus is Available on the Cloud

Nexus Queries Every Major System

How to Use Nexus

Why is Nexus Special? Visualization and Automatic SQL

Why is Nexus Special? Cross-System Joins

Why is Nexus Special? The Amazing Hub System

Why is Nexus Special? Save Answer Sets as Tables

Why is Nexus Special? Automated Data Movement

Why is Nexus Special? Nexus makes the Servers Talk Directly

What Makes Nexus Special? The Garden of Analysis

The Garden of Analysis Grouping Sets Tab

The Garden of Analysis - Grouping Sets Answer Sets

The Garden of Analysis – Join Tab (1 of 4)

The Garden of Analysis – Join Tab (2 of 4)

The Garden of Analysis – Join Tab (3 of 4)

The Garden of Analysis – Join Tab (4 of 4)

The Garden of Analysis – Charts/Graphs Tab (1 of 4)

The Garden of Analysis – Charts/Graphs Tab (2 of 4)

The Garden of Analysis – Charts/Graphs Tab (3 of 4)

The Garden of Analysis – Charts/Graphs Tab (4 of 4)

The Garden of Analysis – Dynamic Charts Tab (1 of 4)

The Garden of Analysis – Dynamic Charts Tab (2 of 4)

The Garden of Analysis – Dynamic Charts Tab (3 of 4)

The Garden of Analysis – Dynamic Charts Tab (4 of 4)

The Garden of Analysis – Dashboard Tab (1 of 5)

The Garden of Analysis – Dynamic Charts Tab (2 of 5)

The Garden of Analysis – Dynamic Charts Tab (3 of 5)

The Garden of Analysis – Dynamic Charts Tab (4 of 5)

The Garden of Analysis – Dynamic Charts Tab (5 of 5)

Getting to the Super Join Builder

The Super Join Builder is the First Entry in the Menu

The Super Join Builder Shows Tables Visually

Using the Add Join Button

What to Do When No Tables are Joinable?

Drag a Joinable Object into the Super Join Builder

You will see the Add Custom Join Window

Defining the Join Columns

Your Tables Will Appear Together

Select the Columns You Want on the Report

Check out the SQL Tab to See the SQL that has been built

SQL Tab

Hit Execute to get the Report inside the Super Join Builder

The Report is delivered inside the Super Join Builder

Let's Join Two Tables Again (1 of 6)

Let's Join Two Tables Again (2 of 6)

Let's Join Two Tables Again (3 of 6)

Let's Join Two Tables Again (4 of 6)

Let's Join Two Tables Again (5 of 6)

Let's Join Two Tables Again (6 of 6)

The Tabs of the Super Join Builder Philosophy – One Query

The Tabs of the Super Join Builder – Objects Tab

The Tabs of the Super Join Builder – Columns Tab)

The Tabs of the Super Join Builder – Sorting Tab

The Tabs of the Super Join Builder – Joins Tab

The Tabs of the Super Join Builder – SQL Tab

The Tabs of the Super Join Builder – Metadata Tab

The Tabs of the Super Join Builder – Analytics Tab

The Tabs of the SJB – Analytics Tab – OLAP Screen

Getting a Simple CSUM in the Analytics Tab – OLAP

Getting a Simple CSUM – The SQL Automatically Generated

The Answer Set of the CSUM

Getting all of the OLAP functions in the Analytics Tab

A Five Table Join Using the Menu

The First Table is placed in the Super Join Builder

Using the Add Join Cascading Menu

All Five Tables Are In the Super Join Builder

A Five Table Join Two Steps (Cube)

Choose Cube with Columns from the Left Top of the Table

All Tables are Cubed (Joined Together Instantly)

Choose Cube and then Choose Your Columns

Create Cube - Tables Are Joined Without Columns Selected

Create Cube – Select the Columns You Want on the Report

How to join DB2, Oracle and SQL Server Tables

The DB2 Table is now in the Super Join Builder

Drag the Joining Oracle Table to the Super Join Builder

Defining the Join Columns

Choose the Columns You Want on Your Report

Let's Add a SQL Server Table to our DB2 and Oracle Join

Defining the Join Columns

All Three Tables are now in the Super Join Builder

Change the Hub and Run the Join on Oracle

Change the Hub and Run the Join on SQL Server

Simply Amazing - Change the Hub to the Garden of Analysis

Have the Answer Set Saved Automatically to Any System

Saving the Answer Set to an Oracle or SQL Server System

Saving the Answer Set to a DB2 System

Saving the Answer Set to a Teradata System

Date Functions

- Getting the System Date
- Extracting From a Timestamp
- The EXTRACT Command
- Using the EXTRACT Command to Extract Month, Day, Year
- Extracting From a Date Column
- Extracting the Date and Time from the Timestamp
- Formatting Dates Example
- Formatting Date Standards
- Adding and Subtracting Days from a Date
- Adding Years, Months, Days, Hours and Seconds
- Using the Add_Months Command
- Adding Years to a Date
- Add Five Years to a Date
- Converting Character Data to a Date or Time
- Timestamp DAYOFWEEK, DAYNAME and MONTHNAME
- Finding Orders That Happened on a Friday
- NEXT_DAY Command Finds a Future Day of the Week
- Finding the Last Day of a Month
- Finding the Last Day of the Previous Month
- Getting the First Day of the Month
- Finding the Number of Days between Two Dates

Resetting the Microseconds Back to Zero

Turning Date and Time into Characters

Converting Character Data to a Timestamp

Finding Differences between Timestamps

Differences between Timestamps Fractions of a Second

Find Differences between Timestamp Seconds and Minutes

Find Differences between Timestamp Hours and Days

Find Differences between Timestamp Weeks and Months

Find Differences between Timestamp Quarters and Years

Formatting Dates

Formatting Dates Example

Formatting Dates Example

Formatting Dates Example

Formatting Timestamp Example

Formatting Timestamp Example

OLAP Functions

The Row_Number Command

Quiz – How did the Row_Number Reset?

Quiz – How did the Row_Number Reset?

Using a Derived Table and Row_Number

Ordered Analytics OVER

RANK and DENSE RANK

RANK Defaults to Ascending Order

Getting RANK to Sort in DESC Order

RANK OVER and PARTITION BY

Finding Gaps between Dates

CSUM – Rows Unbounded Preceding Explained

CSUM – Making Sense of the Data

CSUM – Making Even More Sense of the Data

CSUM – The Major and Minor Sort Key(s)

The ANSI CSUM – Getting a Sequential Number

Reset with a PARTITION BY Statement

PARTITION BY only Resets a Single OLAP not ALL of them

CURRENT ROW AND UNBOUNDED FOLLOWING

Different Windowing Options

Moving Sum has a Moving Window

How ANSI Moving SUM Handles the Sort

Quiz – How is that Total Calculated?

Answer to Quiz – How is that Total Calculated?

Moving SUM every 3-rows Vs a Continuous Average

PARTITION BY Resets an ANSI OLAP

The Moving Window is Current Row and Preceding

Moving Average

Moving Average Using a CAST Statement

Moving Average every 3-rows Vs a Continuous Average

PARTITION BY Resets an ANSI OLAP

Moving Difference

Moving Difference using ANSI Syntax with Partition By

COUNT OVER for a Sequential Number

COUNT OVER without Rows Unbounded Preceding

Quiz – What caused the COUNT OVER to Reset?

Answer to Quiz – What caused the COUNT OVER to Reset?

The MAX OVER Command

MAX OVER with PARTITION BY Reset

MAX OVER without Rows Unbounded Preceding

The MIN OVER Command

MIN OVER without Rows Unbounded Preceding

MIN OVER Using PARTITION BY to Reset

Finding a Value of a Column in the Next Row with MIN

The CSUM for Each Product_Id and the Next Start Date

Quiz – Fill in the Blank

Answer – Fill in the Blank

Using FIRST_VALUE

FIRST_VALUE

FIRST_VALUE after Sorting by the Highest Value

FIRST_VALUE with Partitioning

FIRST_VALUE Combined with Row_Number

FIRST_VALUE and Row_Number with Different Sort

Using LAST_VALUE

LAST_VALUE

Using LAG and LEAD

LEAD

LEAD

LEAD With Partitioning

LEAD to Find the First Occurrence

Using LEAD

Using LEAD with an Offset of 2

Using LAG

Using LAG with an Offset of 2

LAG

LAG with Partitioning

SUM (SUM (n))

Temporary Tables

There are two types of Temporary Tables

CREATING A Derived Table

Creating Multiple Derived Tables in the WITH Command

Creating Multiple Derived Tables in the WITH Command

The Same Derived Query shown Three Different Ways

Most Derived Tables Are Used To Join To Other Tables

The Three Components of a Derived Table

Visualize This Derived Table

Our Join Example with A Different Column Aliasing Style

Column Aliasing Can Default For Normal Columns

Our Join Example With the WITH Syntax

Quiz - Answer the Questions

Answer to Quiz - Answer the Questions

Clever Tricks on Aliasing Columns in a Derived Table

An Example of Two Derived Tables in a Single Query

Example of Two Derived Tables in a Single WITH Statement

WITH RECURSIVE Derived Table Hierarchy

WITH RECURSIVE Derived Table Query

WITH RECURSIVE Derived Table Definition

WITH RECURSIVE Derived Table Seeding

WITH RECURSIVE Derived Table Looping

WITH RECURSIVE Derived Table Looping in Slow Motion

WITH RECURSIVE Derived Table Looping Continued

WITH RECURSIVE Derived Table Looping Continued

WITH RECURSIVE Derived Table Ends the Looping

WITH RECURSIVE Derived Table Definition

WITH RECURSIVE Final Answer Set

Creating and Populating a Global Temporary Table

Global Temporary Table Definitions Persist

ON COMMIT DELETE ROWS Example

Creating and Populating a Global Temporary Table

Creating a Global Temporary Table Using a CTAS

Creating a Global Temporary Table Using a CTAS Join

A Global Temp Table That Populates Some of the Rows

A Temporary Table with Some of the Columns

Sub-query Functions

An IN List is much like a Subquery

An IN List Never has Duplicates – Just like a Subquery

The Subquery

The Three Steps of How a Basic Subquery Works

These are Equivalent Queries

The Final Answer Set from the Subquery

Quiz- Answer the Difficult Question

Answer to Quiz- Answer the Difficult Question

Should you use a Subquery or a Join?

Quiz- Write the Subquery

Answer to Quiz- Write the Subquery

Quiz- Write the More Difficult Subquery

Answer to Quiz- Write the More Difficult Subquery

Quiz – Write the Extreme Subquery

Answer to Quiz- Write the Extreme Subquery

Quiz- Write the Subquery with an Aggregate

Answer to Quiz- Write the Subquery with an Aggregate

Quiz- Write the Correlated Subquery

Answer to Quiz- Write the Correlated Subquery

The Basics of a Correlated Subquery

The Top Query always runs first in a Correlated Subquery

Correlated Subquery Example vs. a Join with a Derived Table

Quiz- A Second Chance to Write a Correlated Subquery

Answer - A Second Chance to Write a Correlated Subquery

Quiz- A Third Chance to Write a Correlated Subquery

Answer - A Third Chance to Write a Correlated Subquery

Quiz- Last Chance to Write a Correlated Subquery

Answer – Last Chance to Write a Correlated Subquery

Quiz – Write the Extreme Correlated Subquery

Answer To Quiz – Write the Extreme Correlated Subquery

Quiz- Write the NOT Subquery

Answer to Quiz- Write the NOT Subquery

Quiz- Write the Subquery using a WHERE Clause

Answer - Write the Subquery using a WHERE Clause

Quiz- Write the Subquery with Two Parameters

Answer to Quiz- Write the Subquery with Two Parameters

How the Double Parameter Subquery Works

More on how the Double Parameter Subquery Works

Quiz – Write the Triple Subquery

Answer to Quiz – Write the Triple Subquery

Quiz – How many rows return on a NOT IN with a NULL?

Answer – How many rows return on a NOT IN with a NULL?

How to handle a NOT IN with potential NULL Values

IN is equivalent to =ANY

Using a Correlated Exists

How a Correlated Exists matches up

The Correlated NOT Exists

Strings

The LENGTH Command Counts Characters

The LENGTH Command – Spaces can Count too

The LENGTH Command and Character Data

The LENGTH Needs a TRIM

The TRIM Command trims both Leading and Trailing Spaces

A Visual of the TRIM Command Using Concatenation

Trim and Trailing is Case Sensitive

How to TRIM Trailing Letters

The SUBSTRING Command

How SUBSTRING Works with NO ENDING POSITION

An Example using SUBSTRING, TRIM and CHAR Together

Concatenation

Concatenation and SUBSTRING

Four Concatenations Together

UPPER and LOWER Commands

LPAD and RPAD

SOUNDEX

Interrogating the Data

Using the LOWER Command

Using the UPPER Command

Non-Letters are Unaffected by UPPER and LOWER

Quiz – Fill in the Answers for the NULLIF Command

The COALESCE Command

The COALESCE Answer Set

The COALESCE Command – Fill In the Answers

The COALESCE Answer Set

The COALESCE Command – Fill In the Answers

The COALESCE Answer Set

COALESCE is Equivalent to This CASE Statement

The Basics of CAST (Convert and Store)

Some Great CAST (Convert and Store) Examples

A Rounding Example

Quiz - The Basics of the CASE Statements

Answer to Quiz - The Basics of the CASE Statements

Using an ELSE in the Case Statement

Using an ELSE as a Safety Net

Rules for a Valued Case Statement

Rules for a Searched Case Statement

Valued Case Vs. A Searched Case

Quiz - Valued Case Statement

Answer - Valued Case Statement

Quiz - Searched Case Statement

Answer - Searched Case Statement

The CASE Challenge

The CASE Challenge Answer

Combining Searched Case and Valued Case

A Trick for getting a Horizontal Case

Nested Case

Put a CASE in the ORDER BY

View Functions

The Fundamentals of Views

Creating a Simple View to Restrict Sensitive Columns

You SELECT From a View

Creating a Simple View to Restrict Rows

A View Provides Security for Columns and Rows

Basic Rules for Views

How to Modify a View

An Exception to the ORDER BY Rule inside a View

Views Are Sometimes CREATED for Formatting

Creating a View to Join Tables Together

How to Alias Columns in a View CREATE

The Standard Way Most Aliasing is done

What Happens When Both Aliasing Options Are Present

Resolving Aliasing Problems in a View CREATE

Answer to Resolving Aliasing Problems in a View CREATE

Creating a View with a Local Check

Aggregates on View Aggregates

Altering a Table after a View Has Been Created

A View that Errors after an ALTER

Set Operators Functions

- Rules of Set Operators
- INTERSECT Explained Logically
- INTERSECT Explained Logically
- UNION Explained Logically
- UNION Explained Logically
- UNION ALL Explained Logically
- UNION ALL Explained Logically
- EXCEPT Explained Logically
- EXCEPT Explained Logically
- Minus Explained Logically
- Minus Explained Logically
- An Equal Amount of Columns in both SELECT List
- Columns in the SELECT list should be from the same Domain
- The Top Query handles all Aliases
- The Bottom Query does the ORDER BY
- Great Trick: Place your Set Operator in a Derived Table
- UNION Vs UNION ALL
- A Great Example of how MINUS works
- USING Multiple SET Operators in a Single Request
- Changing the Order of Precedence with Parentheses

Using UNION ALL for speed in Merging Data Sets

Table Create and Data Types

The Basics of Creating a Table

Creating a Table with NOT NULL Constraints

Creating a Table with a UNIQUE Constraint

Creating a Unique Index

Creating a Clustered Index

Creating a Partitioned Table for a Range on a Date Column

Creating a Partitioned Table for a Number

Declaring a Global Temporary Table

Declaring a Global Temporary Table that Persists Using Like

Creating a Table with an XML Data Type

Creating a Table with a CHECK Constraint

Creating a Table with Default Values

Creating a Table with Multiple Constraints

Defining Primary Keys

Defining a Primary Key after the Table Has Been Created

Defining a Foreign Key after the Table Has Been Created

Creating a Table with an Identity Column that is Unique

Creating a Table with an Identity Column that is Non-Unique

Creating a Sequence

Altering a Table to Add a Column

Altering a Table to Drop a Column

Renaming a Table

Dropping a Table

Creating a Table Using a CTAS or a LIKE

Creating a Table Using a CTAS Join

Data Types

Data Manipulation Language (DML)

INSERT Syntax # 1

INSERT example with Syntax 1

INSERT Syntax # 2

INSERT example with Syntax 2

INSERT/SELECT Command

INSERT/SELECT example using All Columns (*)

INSERT/SELECT example with Less Columns

Two UPDATE Examples

Subquery UPDATE Command Syntax

Example of Subquery UPDATE Command

The DELETE Command Basic Syntax

Example of Subquery DELETE Command

Example of Subquery DELETE That Gets Rid of Null Values

Statistical Aggregate Functions

Numeric Manipulation Functions

The Stats Table

The VARIANCE Function

A VARIANCE Example

The CORR Function

A CORR Example

Another CORR Example so you can compare

The REGR_INTERCEPT Function

A REGR_INTERCEPT Example

Another REGR_INTERCEPT Example so you can compare

The REGR_SLOPE Function

A REGR_SLOPE Example

Another REGR_SLOPE Example so you can compare

The REGR_AVGX Function

A REGR_AVGX Example

Another REGR_AVGX Example so you can compare

The REGR_AVGY Function

A REGR_AVGY Example

Another REGR_AVGY Example so you can compare

The REGR_COUNT Function

A REGR_COUNT Example

The REGR_R2 Function

A REGR_R2 Example

The REGR_SXX Function

A REGR_SXX Example

The REGR_SXY Function

A REGR_SXY Example

The REGR_SYY Function

A REGR_SYY Example