



Greenplum SQL Class Outline

The Basics of Greenplum SQL

Introduction

SELECT * (All Columns) in a Table

Fully Qualifying a Database, Schema and 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 Last 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

A Great Technique for Comments to Look for SQL Errors

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
ilike

LIKE Command Works Differently on Char Vs Varchar

Troubleshooting LIKE Command on Character Data

Introducing the TRIM Command

Introducing the RTRIM Command

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

Introducing the RTRIM Command

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

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
RTRIM command Removes Trailing spaces on CHAR Data
Using Like with an AND Clause to Find Multiple Letters
Using Like with an OR Clause to Find Either Letters

Distinct vs. Group By

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?

Aggregation

Quiz – You calculate the Answer Set in your own Mind

Answer – You calculate the Answer Set in your own Mind

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 when Aggregates and Normal Columns Mix

GROUP BY delivers one row per Group

GROUP BY Dept_No or GROUP BY 1 the same thing

Limiting Rows and Improving Performance with WHERE

WHERE Clause in Aggregation limits unneeded Calculations

Keyword HAVING tests Aggregates after they are Totaled

Aggregates Return Null on Empty Tables

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

Three types of Advanced Grouping

Group By Grouping Sets

Group By Rollup

GROUP BY Rollup Result Set

GROUP BY Cube

GROUP BY CUBE Result Set

GROUP BY CUBE Result Set – check paragraph

Quiz - GROUP BY GROUPING SETS Challenge

Answer To Quiz - GROUP BY GROUPING SETS Challenge

Join Functions

Greenplum Join Quiz Answer

Redistribution

Big Table Small Table Join Strategy

Duplication of the Smaller Table across All-Distributions

If the Join Condition is the Distribution Key no Movement

Matching Rows That Are On The Same Node Naturally

Strategy 1 of 4 – The Merge Join

Quiz – Redistribute the Employees by their Dept_No

Quiz – Employees' Dept_No landed on segment with Matches

Quiz – Redistribute the Orders to the Proper segment

Answer to Redistribute the Employees by their Dept_No Quiz

Strategy 2 of 4 – The Hash Join

Strategy 3 of 4 – The Nested Join

Strategy 4 of 4 – The Product Join

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.

Date Function

Current_Date

Current_Date, Current_Time, and Current_Timestamp

Current_Time vs. LocalTime With Precision

Local_Time and Local_Timestamp With Precision

Now() and Timeofday() Functions

Adding A Week to a Date

Add or Subtract Days from a date

Formatting Dates and Dollar Amounts

The EXTRACT Command

EXTRACT from DATES and TIME

EXTRACT Command on the Century

EXTRACT Command for the Decade, DOW and DOY

EXTRACT Microseconds, Milliseconds and Millennium

EXTRACT of the Month on Aggregate Queries

Date_part Command

Date_Trunc Command With Time

Date_Trunc Command With Dates

The AGE Command

AGE Challenge

AGE Challenge Results

Epoch

Using Intervals

More Interval Examples

Interval Arithmetic Results

A Complex Time Interval example using CAST

The OVERLAPS Command

An OVERLAPS example that Returns No Rows

The OVERLAPS Command using TIME

Using Both CAST and CONVERT in Literal Values
A Better Technique for YEAR, MONTH, and DAY Functions

Conversions and Formatting

Postgres Conversion Functions

Postgres Conversion Function Templates

Postgres Conversion Function Templates Continued

To_Char command Examples

Formatting A Date with To_Char

Formatting A Date With To_Char Continued

To_Number

The to_number syntax, and postgres parameters and their explanation are listed above. Not all above work on Greenplum

To_Number Examples

To_Date

To_Timestamp

Sub-query Functions

An IN List is much like a Subquery

An IN List Never has Duplicates – Just like a Subquery

An IN List Ignores Duplicates

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 of 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

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

The Correlated NOT Exists Answer Set

Quiz – How many rows come back from this NOT Exists?

Answer – How many rows come back from this NOT Exists?

OLAP Functions

CSUM

CSUM – The Sort Explained

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

Troubleshooting The ANSI OLAP on a GROUP BY

Reset with a PARTITION BY Statement

PARTITION BY only Resets a Single OLAP not ALL of them

Moving SUM

ANSI Moving Window is Current Row and Preceding n Rows

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

Both the Greenplum Moving Average and ANSI Version
Moving Average

The Moving Window is Current Row and Preceding

How Moving Average Handles the Sort

Quiz – How is that Total Calculated?

Answer to Quiz – How is that Total Calculated?

Quiz – How is that 4th Row Calculated?

Answer to Quiz – How is that 4th Row Calculated?

Moving Average every 3-rows Vs a Continuous Average

Partition By Resets an ANSI OLAP

Moving Difference using ANSI Syntax with Partition By

RANK Defaults to Ascending Order

Getting RANK to Sort in DESC Order

RANK() OVER and PARTITION BY

RANK and DENSE RANK

PERCENT_RANK() OVER

PERCENT_RANK() OVER with 14 rows in Calculation

PERCENT_RANK() OVER with 21 rows in Calculation

Quiz – What Causes the Product_ID to Reset?

Answer to Quiz – What Cause the Product_ID to Reset?

COUNT OVER for a Sequential Number

Troubleshooting COUNT OVER

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

Troubleshooting MAX OVER

The MIN OVER Command

Troubleshooting MIN OVER

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

Quiz – Fill in the Blank

Answer – Fill in the Blank

The Row_Number Command

Using a Derived Table and Row_Number

Quiz – How did the Row_Number Reset?

Answer – How did the Row_Number Reset?

Ordered Analytics OVER

CURRENT ROW AND UNBOUNDED FOLLOWING

Different Windowing Options

The CSUM For Each Product_Id and the Next Start Date

How Ntile Works

Ntile

Ntile Continued

Ntile Percentile

Another Ntile example

Using Tertiles (Partitions of Four)

NTILE

NTILE Using a Value of 10

NTILE With a Partition

Using FIRST_VALUE

FIRST_VALUE

FIRST_VALUE After Sorting by the Highest Value

FIRST_VALUE with Partitioning

Using LAST_VALUE

LAST_VALUE

Using LEAD

Using LEAD With and Offset of 2

LEAD

LEAD With Partitioning
Using LAG
Using LAG With an Offset of 2
LAG
LAG with Partitioning
CUME_DIST
CUME_DIST With a Partition
SUM(SUM(n))

Temporary Tables

There are Two Types of Temporary Tables
CREATING A Derived Table
Naming the Derived Table
Aliasing the Column Names in The Derived Table
Multiple Ways to Alias the Columns in a Derived Table
CREATING A Derived Table using 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
A Derived Table and CAST Statements
A Derived example Using 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
MULTIPLE Derived Tables using the WITH Command
Three Steps to Creating a Temporary Table
Three Versions of Creating a Temporary Table

ON COMMIT PRESERVE ROWS is the Greenplum Default

ON COMMIT DELETE ROWS

How to Use the ON COMMIT DELETE ROWS Option

ON COMMIT DROP

How to Use the ON COMMIT DROP Option

Create Table AS

Create Table LIKE

Creating a Clustered Index on a Temporary Table

Substrings and Positioning Functions

The CHARACTERS Command Counts Characters

The CHARACTERS Command and Char(20) Data

CHARACTER_LENGTH and OCTET_LENGTH

The TRIM Command trims both Leading and Trailing Spaces

Trim Combined with the CHARACTERS Command

How to TRIM only the Trailing Spaces

A Visual of the TRIM Command Using Concatenation

Trim and Trailing is Case Sensitive

How to TRIM Trailing Letters

The SUBSTRING Command

SUBSTRING and SUBSTR are equal, but use different syntax

How SUBSTRING Works with NO ENDING POSITION

Using SUBSTRING to move Backwards

How SUBSTRING Works with a Starting Position of -1

How SUBSTRING Works with an Ending Position of 0

An example using SUBSTRING, TRIM and CHAR Together

The POSITION Command finds a Letters Position

Concatenation

Concatenation and SUBSTRING

Four Concatenations Together

Troubleshooting Concatenation

Interrogating the Data

Quiz – What would the Answer be?

Answer to Quiz – What would the Answer be?

The NULLIF Command

Quiz – Fill in the Answers for the NULLIF Command

Answer– Fill in the Answers for the NULLIF Command

The COALESCE Command – Fill In the Answers

The COALESCE Answer Set

COALESCE is Equivalent to This CASE Statement

The COALESCE Command

The COALESCE Answer Set

The COALESCE Quiz

Answer - The COALESCE Quiz

The Basics of CAST (Convert and Store)

Some Great CAST (Convert and Store) Examples

Some Great CAST (Convert and Store) Examples

A Rounding Example

Some Great CAST (Convert And Store) 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

Set Operators Functions

Rules of Set Operators
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
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 (a Number)
Great Trick: Place your Set Operator in a Derived Table
UNION Vs UNION ALL
Using UNION ALL and Literals
A Great example of how EXCEPT works
Quiz – Build that Query

Answer To Quiz – Build that Query

USING Multiple SET Operators in a Single Request

Changing the Order of Precedence with Parentheses

Using UNION ALL for speed in Merging Data Sets

View Functions

The Fundamentals of Views

Creating a Simple View to Restrict Sensitive Columns

Creating a Simple View to Restrict Rows

Basic Rules for Views

Exception to the ORDER BY Rule inside a View

Views sometimes CREATED for Formatting

Creating a View to Join Tables Together

Another Way 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

Aggregates on View Aggregates

Altering A Table

Altering A Table After a View has been Created

A View that Errors After An ALTER

Table Create and Data Types

Greenplum Has Only Two Distribution Policies

Creating a Table With A Single Column Distribution Key

The Default Table Storage is a Heap

Creating a Table With a Multi-Column Distribution Key

Creating a Table With Random Distribution

Creating a Table With No Distribution Key
Guidelines for Partitioning a Table
Creating a Partitioned Table Using a Range
A Visual of One Year of Data with Range Partitioning
Creating a Partitioned Table Using a Range Per Day
A Visual of One Year of Data with Range Per Day
Creating a Partitioned Table Using a List
Creating a Multi-Level Partitioned Table
Changing a Table to a Partitioned Table – Check paragraph
Not Null Constraints
Unique Constraints
Primary Key Constraints
Check Constraints
Append Only Tables
Storage is Either Row, Column, or a Combination of Both
Column-Orientated Tables
CREATE INDEX Syntax
CREATE INDEX Syntax
Create Table LIKE
Greenplum Data Types

Data Manipulation Language (DML)

INSERT Syntax # 1
INSERT example with Syntax 1
INSERT Syntax # 2
INSERT example with Syntax 2
INSERT example with Syntax 3
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

Join UPDATE Command Syntax

example of an UPDATE Join Command

Fast UPDATE

The DELETE Command Basic Syntax

DELETE and TRUNCATE Examples

To DELETE or to TRUNCATE

Subquery and Join DELETE Command Syntax

Example of Subquery DELETE Command

ANALYZE and VACUUM

ANALYZE

ANALYZE Options

What Columns Should You Analyze?

Why Analyze?

VACUUM

VACUUM Options

Greenplum Explain

How to See an EXPLAIN Plan

The Eight Rules to Reading an EXPLAIN Plan

Interpreting Keywords in an EXPLAIN Plan

Interpreting an EXPLAIN Plan

A Single Segment Retrieve – The Fastest Query

EXPLAIN With an ORDER BY Statement

EXPLAIN ANALYZE

EXPLAIN With a Range Query on a Table Partitioned By Day

EXPLAIN That Uses a B-Tree Index Scan

EXPLAIN That Uses a Bitmap Scan

EXPLAIN With a Simple Subquery

EXPLAIN With a Columnar Query

EXPLAIN With a Clustered Index

The Most Important Concept for Joins is the Distribution Key

EXPLAIN With Join that has to Move Data

EXPLAIN With Join that has to Move Data

Changing the Join Query Changes the EXPLAIN Plan

Analyzing the Tables Structures For a 3-Table Join

An EXPLAIN For a 3-Table Join

Explain of a Derived Table vs. a Correlated Subquery

Explain of The Correlated Subquery

Explain of The Derived Table

Statistical Aggregate Functions

The Stats Table

Above, is the Stats_Table data in which we will use in our statistical examples.

The STDDEV_POP Function

A STDDEV_POP Example

The STDDEV_SAMP Function

A STDDEV_SAMP Example

The VAR_POP Function

A VAR_POP Example

The VAR_SAMP Function

A VAR_SAMP Example

The VARIANCE Function

A VARIANCE Example

The CORR Function

A CORR Example

Another CORR Example so you can Compare

The COVAR_POP Function

A COVAR_POP Example

Another COVAR_POP Example so you can Compare

The COVAR_SAMP Function

A COVAR_SAMP Example

Another COVAR_SAMP 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 COVAR_POP 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
Using GROUP BY

