



## Vertica SQL Class Outline

### The Basics of SQL

Introduction

Setting your Path

Setting Your Default Database

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

Aliasing a Column Name With Spaces or Reserved Words

Comments using Double Dashes are Single Line Comments

Comments for Multi-Lines

Comments for Multi-Lines As Double Dashes Per Line

Formatting Number

Formatting Number Examples

Formatting Dates

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

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

Quiz – 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

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 Rollup

GROUP BY Rollup Result Set

## Chapter 8 – 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.

## Date Functions

Current\_Date

Current\_Date, Current\_Time And Current\_Timestamp

Timestamp Differences

Getdate

Date and Time Keywords

Using CAST in Literal Values

Add or Subtract Days from a date

Formatting Dates

Formatting Date Example

A Summary of Math Operations on Dates

The ADD\_MONTHS Command

Using the ADD\_MONTHS Command to Add 1 Year

Using the ADD\_MONTHS Command to Add 1 Year

Using the ADD\_MONTHS Command to Add 5 Years

Using the ADD\_MONTHS Command to Add 5 Years

The EXTRACT Command

YEAR, MONTH, and DAY Functions

A Better Technique for YEAR, MONTH, and DAY Functions

Another Version of the EXTRACT Command

EXTRACT from DATES and TIME

Why EXTRACT is a Better Form

EXTRACT with DATE and TIME Literals

EXTRACT of the Month on Aggregate Queries

AGE\_IN\_MONTHS

AGE\_IN\_YEARS

DATE\_TRUNC

DATEDIFF

DAYOFWEEK

Intervals for Date, Time and Timestamp  
Interval Data Types and the Bytes to Store Them  
Using Intervals  
How a Simple Interval Handles Leap Year  
Interval Arithmetic Results  
A Time Interval Example  
A DATE Interval Example Going Back in Time  
A Complex Time Interval Example using CAST  
A Complex Time Interval Example using CAST  
The OVERLAPS Command  
An OVERLAPS Example that Returns No Rows  
The OVERLAPS Command using TIME

## 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  
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?  
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

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

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

How Moving Average Handles the Sort

Moving Average

Moving Average

Quiz – How is that Total Calculated?

Answer to Quiz – How is that Total Calculated?

Quiz – How is that 4<sup>th</sup> Row Calculated?

Answer to Quiz – How is that 4<sup>th</sup> Row Calculated?

Moving Average every 3-rows Vs a Continuous Average

Partition By Resets an ANSI OLAP

Moving Difference using ANSI Syntax

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

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

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 LAG and LEAD

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

MEDIAN with Partitioning

CUME\_DIST

CUME\_DIST With a Partition

SUM(SUM(n))

## Temporary Tables

There are Three 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

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  
A Derived Table lives only for the lifetime of a single query  
An Example of Two Derived Tables in a Single Query  
Example of Two Derived Tables in a Single WITH Statement  
Syntax for Temporary Tables  
Temporary Tables Explained  
Key Temporary Table Terms  
Creating and Populating a Local Temporary Table  
Using a Local Temporary Table  
Creating and Populating a Global Temporary Table  
Creating and Populating a Global Temporary Table  
Some Great Examples of Creating a Temporary Table Quickly  
Creating a Temporary Table That is Sorted  
A 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

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?

## Substrings and Positioning Functions

The LENGTH Command Counts Characters

The LENGTH Command – Spaces can Count too

The LENGTH Command and Char(20) Data

LENGTH and CHARACTER\_LENGTH Are Equivalent

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  
Quiz – Find that SUBSTRING Starting Position  
Answer to Quiz – Find that SUBSTRING Starting Position  
Using the SUBSTRING to Find the Second Word On  
Quiz – Why Did only one Row Return  
Answer to Quiz – Why Did only one Row Return  
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 NULLIFZERO Command  
The NULLIFZERO vs. Zeroes  
Quiz – Fill in the Blank Values in the Answer Set  
Answer to Quiz – Fill in the Blank Values in the Answer Set  
Quiz – Fill in the Answers for the NULLIF Command  
Answer – Fill in the Answers for the NULLIF Command  
The ZEROIFNULL Command  
Answer to the ZEROIFNULL Question  
The COALESCE Command  
The COALESCE Answer Set  
The Coalesce Quiz  
Answer – The Coalesce Quiz  
The COALESCE Command – Fill In the Answers  
The COALESCE Answer Set  
COALESCE is Equivalent to This CASE Statement

Some Great CAST (Convert And STore) Examples  
Some Great CAST (Convert And Store) Examples  
A Rounding Example  
Some Great CAST (Convert And Store) Examples  
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  
The Basics of the CASE Statements  
The Basics of the CASE Statement  
Valued Case Vs. A Searched Case  
Quiz - Valued Case Statement  
Answer - Valued Case Statement  
Quiz - Searched Case Statement  
Answer - Searched Case Statement  
Quiz - When NO ELSE is present in CASE Statement  
Answer - When NO ELSE is present in CASE Statement  
When an ELSE is present in CASE Statement  
Answer - When an ELSE is present in 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

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  
Testing Your Knowledge  
Answer - Testing Your Knowledge  
Testing Your Knowledge  
Answer - Testing Your Knowledge  
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  
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

Distribution Strategy 1 - Segmented By Hash  
Distribution Strategy 2 - Unsegmented  
Sorting the Data in a Table CREATE Statement  
Even Distribution  
Uneven Distribution Where the Data is Non-Unique  
Matching Distribution Keys for Co-Location of Joins  
Big Table / Small Table Joins  
Fact and Dimension Table Distribution Key Designs  
Why a Sort Key Improves Performance  
Sort Keys Help Group By, Order By and Window Functions

Syntax for Temporary Tables

Temporary Tables Explained

Key Temporary Table Terms

Creating and Populating a Local Temporary Table

Using a Local Temporary Table

Creating and Populating a Global Temporary Table

Creating and Populating a Global Temporary Table

Some Great Examples of Creating a Temporary Table Quickly

Creating a Temporary Table That is Sorted

A Temp Table That Populates Some of the Rows

A Temporary Table With Some of the Columns

## 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

Join UPDATE Command Syntax

example of an UPDATE Join Command

Fast UPDATE

Example of Subquery DELETE Command

## Statistical Aggregate Functions

The Stats Table

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 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

Using GROUP BY