

Table of Contents

Teradata Advanced SQL Features Overview

Version 15.00.3

Module 0 - Course Introduction

| | |
|--|-----|
| Recommended Prerequisite Knowledge | 0-3 |
| Course Objectives | 0-4 |
| Course Modules | 0-5 |

Module 1 - Teradata Studio Features

| | |
|---|------|
| Optimize Effectiveness | 1-3 |
| Key Features | 1-4 |
| Modular Display | 1-6 |
| Teradata Studio Toolbar..... | 1-8 |
| Data Source Explorer View | 1-10 |
| Creating Connections | 1-12 |
| Creating Database Objects | 1-14 |
| Creating a SQL Statement (SQL Editor) | 1-18 |
| Project Explorer View..... | 1-20 |
| HELP TABLE Command | 1-21 |
| Other SQL HELP Commands | 1-22 |
| Setting a Default Database | 1-24 |
| The Teradata “SHOW” Command..... | 1-26 |
| Other SQL SHOW Commands | 1-27 |
| Session Information via SELECT | 1-28 |
| Session Information via HELP SESSION | 1-29 |
| SQL Editor | 1-30 |
| SQL Editor with Outline View | 1-32 |
| Using SQL Query Builder..... | 1-33 |
| Result Set Viewer..... | 1-34 |
| SQL History View | 1-35 |
| Teradata View | 1-36 |
| Shortcuts to Data Source Objects..... | 1-37 |
| Shortcuts to Typing Object Names | 1-38 |
| Commenting Lines of SQL..... | 1-39 |
| Logging on to Multiple Systems | 1-40 |
| Teradata Load Wizard..... | 1-41 |
| Choosing Studio or Studio Express | 1-42 |
| The Employee_Sales Database | 1-44 |

| | |
|---------------------------------|------|
| The Emp_VIEWS Database..... | 1-45 |
| Module 1: Summary | 1-46 |
| Module 1: Review Questions..... | 1-47 |
| Module 1: Lab Exercises | 1-48 |

Module 2 - Basic Teradata Functionality

| | |
|--|------|
| Ordering Options | 2-4 |
| The ASCII Collating Sequence and Teradata Mode | 2-6 |
| The ASCII Collating Sequence and ANSI Mode | 2-8 |
| Basic Logical Operators | 2-9 |
| DISTINCT Option | 2-10 |
| Logical Operators | 2-11 |
| The IN Operator..... | 2-12 |
| The NOT IN Operator | 2-14 |
| The BETWEEN Operator..... | 2-16 |
| Negating Conditions and Operators..... | 2-17 |
| NULL Literal in an IN-List | 2-18 |
| NULL Literal in a NOT IN-List..... | 2-19 |
| Module 2: Summary | 2-20 |
| Module 2: Review Questions..... | 2-21 |
| Module 2: Lab Exercise..... | 2-22 |

Module 3 - Data Types and Functionality

| | |
|---|------|
| Data Types | 3-4 |
| Character Data Types | 3-6 |
| Character Functionality | 3-7 |
| BETWEEN Functionality with CHARACTER..... | 3-8 |
| Integer Data Types..... | 3-10 |
| Decimal Data Types | 3-11 |
| Float Data Type | 3-12 |
| Byte Data Types | 3-13 |
| Date Data Type | 3-14 |
| ARRAY Data Type..... | 3-16 |
| NUMBER Data Type | 3-18 |
| More Data Types | 3-20 |
| Arithmetic Operators | 3-21 |
| Arithmetic and Derived Values | 3-22 |
| Arithmetic Functions | 3-23 |
| DATE Arithmetic | 3-24 |
| Data Type Conversions Using CAST | 3-26 |
| Data Type Conversions and Rounding | 3-28 |
| Concatenated Example Results..... | 3-30 |
| FORMAT..... | 3-31 |
| Methods for FORMAT in ODBC and JDBC Tools | 3-32 |

| | |
|--|------|
| Year, Month and Day Formatting Options | 3-33 |
| Module 3: Summary..... | 3-34 |
| Module 3: Review Questions | 3-35 |
| Module 3: Lab Exercise | 3-36 |

Module 4 - Basic SQL Functions

| | |
|-------------------------------------|------|
| UPPER & LOWER..... | 4-3 |
| CHARACTER_LENGTH | 4-4 |
| TRIM..... | 4-5 |
| Trimming Other Than Space..... | 4-6 |
| POSITION | 4-7 |
| SUBSTRING | 4-8 |
| SUBSTRING and Numbers | 4-9 |
| LIKE..... | 4-10 |
| LIKE Examples Using “_” | 4-11 |
| LIKE and ESCAPE | 4-12 |
| CASESPECIFIC | 4-13 |
| EXTRACT | 4-14 |
| ADD_MONTHS | 4-15 |
| DEFAULT | 4-16 |
| The Calendars..... | 4-17 |
| Calendar Differences..... | 4-18 |
| Additional Calendar Functions | 4-20 |
| Calendar Functions Example | 4-22 |
| Module 4: Summary..... | 4-23 |
| Module 4: Review Questions | 4-24 |
| Module 4: Lab Exercise | 4-25 |

Module 5 - Multiple Table Accesses

| | |
|---|------|
| The Subquery | 5-3 |
| Varied Forms of Inner Join | 5-4 |
| Using Parentheses to Understand Order | 5-5 |
| Using Parentheses with Other Forms | 5-6 |
| Cross Join | 5-8 |
| Mistakes on Table Aliasing..... | 5-10 |
| Mistakes on Column Aliasing | 5-11 |
| Left Outer Join | 5-12 |
| Right Outer Join | 5-13 |
| Full Outer Join | 5-14 |
| Three Table Outer Join | 5-15 |
| Correlated Subquery Processing | 5-16 |
| Correlated Subqueries and Aggregation | 5-17 |
| NOT IN vs. NOT EXISTS | 5-18 |
| Module 5: Summary..... | 5-19 |

| | |
|---------------------------------|------|
| Module 5: Review Questions..... | 5-20 |
| Module 5: Lab Exercise..... | 5-21 |

Module 6 - Permanent and Derived Tables

| | |
|---|------|
| Data Definition Language..... | 6-3 |
| Table Level Options | 6-4 |
| Set vs. Multiset | 6-6 |
| Column Level Options..... | 6-8 |
| Index Level Options | 6-10 |
| Creating and Dropping Secondary Indexes | 6-12 |
| Help Index | 6-13 |
| “Derived” Tables | 6-14 |
| “WITH” Form of a Derived Table..... | 6-15 |
| Module 6: Summary | 6-16 |
| Module 6: Review Questions..... | 6-17 |
| Module 6: Lab Exercise..... | 6-18 |

Module 7 - Macros

| | |
|-----------------------------------|------|
| What is a Macro? | 7-3 |
| CREATE, EXECUTE, DROP Macro | 7-4 |
| Replacing a Macro..... | 7-6 |
| A More Complex Macro..... | 7-8 |
| EXECUTE Form – 1 | 7-9 |
| EXEC – Form 2 | 7-10 |
| DDL and Macros | 7-11 |
| Module 7: Summary | 7-12 |
| Module 7: Review Questions..... | 7-13 |
| Module 7: Lab Exercise..... | 7-14 |

Module 8 - Creating Tables from Existing Tables

| | |
|---|------|
| Create Table AS..... | 8-3 |
| Cloning Attributes | 8-4 |
| Changing Table Attributes..... | 8-5 |
| Using Subqueries to Customize Tables | 8-6 |
| Changing Column Attributes | 8-7 |
| Using Inner Joins in a Subquery | 8-8 |
| Using CAST..... | 8-9 |
| Adding Unique and Primary Key Constraints | 8-10 |
| Copying Statistics | 8-12 |
| Module 8: Summary | 8-14 |
| Module 8: Review Questions..... | 8-15 |
| Module 8: Lab Exercise..... | 8-16 |

Module 9 - SAMPLE and RANDOM

| | |
|---|------|
| SAMPLE Introduction | 9-3 |
| SAMPLE Syntax | 9-4 |
| Multiple Samples (Number of Rows) | 9-5 |
| Multiple Samples (Percentage of Rows)..... | 9-6 |
| SAMPLE WITH REPLACEMENT | 9-7 |
| Other Considerations..... | 9-8 |
| Using Derived Tables..... | 9-10 |
| Stratified Sampling (No Replacement) | 9-11 |
| Stratified Sampling (With Replacement)..... | 9-12 |
| RANDOMIZED ALLOCATION | 9-13 |
| The RANDOM Function | 9-14 |
| RANDOM and Limitations..... | 9-16 |
| Module 9: Summary..... | 9-17 |
| Module 9: Review Questions | 9-18 |
| Module 9: Lab Exercise | 9-19 |

Module 10 - TOP N

| | |
|------------------------------------|-------|
| TOP N Defined | 10-3 |
| TOP N Limitations | 10-4 |
| TOP N Example | 10-6 |
| TOP N WITH TIES | 10-8 |
| Without Ties – Same Result..... | 10-9 |
| Getting Bottom Results | 10-10 |
| Unordered Rows | 10-11 |
| The PERCENT Option..... | 10-12 |
| PERCENT Option – WITH TIES | 10-13 |
| PERCENT Option – No ORDER BY | 10-14 |
| Module 10: Summary..... | 10-15 |
| Module 10: Review Questions | 10-16 |
| Module 10: Lab Exercise | 10-17 |

Module 11 - Window Aggregates - Part 1

| | |
|--|-------|
| Window Aggregate Functions | 11-4 |
| The GROUP COUNT Window | 11-6 |
| Relating the Result to the Syntax..... | 11-7 |
| GROUP COUNT and Null | 11-8 |
| Group SUM and AVG Window..... | 11-9 |
| Group AVG and QUALIFY | 11-10 |
| GROUP COUNT and PARTITION | 11-11 |
| GROUP COUNT and Null Partitions | 11-12 |
| GROUP SUM and Reordering..... | 11-13 |
| ORDER BY Placement..... | 11-14 |

| | |
|---|-------|
| Partitioning on Literals | 11-15 |
| WHERE vs. QUALIFY | 11-16 |
| Projecting Multiple Window Aggregates | 11-17 |
| Module 11: Summary | 11-18 |
| Module 11: Review Questions..... | 11-19 |
| Module 11: Lab Exercise..... | 11-20 |

Module 12 - Window Aggregates - Part 2

| | |
|--|-------|
| What's ANSI Standard and What's Not? | 12-4 |
| Cumulative Sum | 12-6 |
| Cumulative Sum with Partitioning | 12-8 |
| Moving Sum | 12-9 |
| Moving AVG – Not in Range..... | 12-10 |
| Moving Difference..... | 12-12 |
| Remaining Window | 12-14 |
| Moving Window and Following..... | 12-15 |
| RESET WHEN | 12-16 |
| PRECEDING vs. CURRENT..... | 12-18 |
| Module 12: Summary | 12-19 |
| Module 12: Review Questions..... | 12-20 |
| Module 12: Lab Exercise..... | 12-21 |

Module 13 - RANK

| | |
|--|-------|
| Ranking Values..... | 13-3 |
| QUALIFY With Tied Ending Values..... | 13-4 |
| Qualifying Without Rank Projection | 13-5 |
| Bottom Values by DESC Rank..... | 13-6 |
| RANK and PARTITION | 13-8 |
| Group Sum on Partitioned Rank..... | 13-9 |
| ROW_NUMBER | 13-10 |
| ROW_NUMBER and RESET WHEN | 13-12 |
| TD14.10 RANK Functionality | 13-14 |
| RANK Examples | 13-15 |
| PERCENT_RANK | 13-16 |
| TD14.10 PERCENTILE_CONT | 13-17 |
| TD14.10 PERCENTILE_DISC | 13-18 |
| TD14.10 MEDIAN | 13-19 |
| TD14.10 CUME_DIST | 13-20 |
| TD14.10 FIRST_VALUE and LAST_VALUE | 13-21 |
| FIRST_VALUE and RESPECT NULLS | 13-22 |
| RESPECT NULLS vs. IGNORE NULLS..... | 13-23 |
| Module 13: Summary | 13-24 |
| Module 13: Review Questions..... | 13-25 |
| Module 13: Lab Exercise..... | 13-26 |

Module 14 - QUANTILE and WIDTH_BUCKET

| | |
|---------------------------------------|-------|
| QUANTILE Overview..... | 14-4 |
| QUANTILE and QUALIFY | 14-6 |
| QUANTILE with no Projected Value..... | 14-7 |
| Aggregation and QUANTILE..... | 14-8 |
| OLAP vs. Window Aggregates..... | 14-9 |
| QUANTILE and GROUP BY..... | 14-10 |
| Varying a QUANTILE..... | 14-11 |
| Ordering a QUANTILE | 14-12 |
| PERCENT_RANK vs. Percentile | 14-13 |
| WIDTH_BUCKET | 14-14 |
| Module 14: Summary..... | 14-15 |
| Module 14: Review Questions | 14-16 |
| Module 14: Lab Exercise | 14-17 |

Module 15 - Extended Grouping Functions

| | |
|---|-------|
| Extended Grouping Functions Overview..... | 15-3 |
| ROLLUP | 15-4 |
| Two-Level Rollup | 15-6 |
| Null Group vs. Total | 15-8 |
| The GROUPING Function..... | 15-9 |
| CUBE Result..... | 15-10 |
| CUBE and GROUPING Function | 15-12 |
| Three-Level Cube..... | 15-13 |
| Aggregating Outside a Rollup..... | 15-14 |
| The GROUPING SETS Function | 15-15 |
| Adding Grand Totals..... | 15-16 |
| Combining Grouping Sets..... | 15-17 |
| Different Method for Same Result..... | 15-18 |
| The Multiplier Effect | 15-19 |
| Multiple Grouping Sets | 15-20 |
| Module 15: Summary..... | 15-21 |
| Module 15: Review Questions | 15-22 |
| Module 15: Lab Exercise | 15-23 |

Module 16 - Recursive Queries

| | |
|--|-------|
| Recursive Query Description..... | 16-3 |
| Recursive Query Logic | 16-4 |
| Recursive Query Example | 16-5 |
| Analyzing the Results | 16-6 |
| Two-City Chain Recursion | 16-8 |
| Greater than Two-City Recursion..... | 16-9 |
| Creating Recursive Views | 16-10 |
| Recursive Queries and Parameterized Macros | 16-12 |
| Flattening-Out the Hierarchy | 16-14 |
| WITH Derived Table Form without Recursive Logic..... | 16-16 |
| Limitations and Restrictions | 16-20 |
| Module 16: Summary | 16-22 |
| Module 16: Review Questions..... | 16-23 |
| Module 16: Lab Exercise..... | 16-24 |

Module 17 - Additional SQL Functions

| | |
|------------------------------|-------|
| Module Description | 17-4 |
| LAST_DAY..... | 17-6 |
| NEXT_DAY | 17-8 |
| TRUNC..... | 17-10 |
| Using TRUNC with Dates | 17-12 |
| ROUND | 17-14 |
| LTRIM | 17-16 |
| RTRIM..... | 17-17 |
| LPAD | 17-18 |
| RPAD..... | 17-19 |
| NGRAM | 17-20 |
| NGRAM Examples..... | 17-22 |
| NVP | 17-24 |
| NVP Examples..... | 17-25 |
| OREPLACE..... | 17-26 |
| OREPLACE Example | 17-28 |
| INITCAP..... | 17-29 |
| INSTR..... | 17-30 |
| NVL | 17-32 |
| CEILING and FLOOR | 17-34 |
| DECODE | 17-36 |
| GREATEST..... | 17-38 |
| LEAST | 17-40 |
| TO_NUMBER | 17-42 |
| TO_NUMBER Examples | 17-44 |
| TO_CHAR | 17-46 |
| TO_DATE | 17-48 |
| TO_TIMESTAMP..... | 17-50 |

| | |
|----------------------------------|-------|
| TO_TIMESTAMP Examples | 17-51 |
| Module 17: Summary..... | 17-52 |
| Module 17: Review Questions..... | 17-53 |
| Module 17: Lab Exercise | 17-54 |

Appendix A: Review Question Solutions

Appendix B: Lab Exercise Solutions

Appendix C: SQL Assistant