

Table of Contents

Getting Started with Teradata and SQL

Version 16.00.0

Module 0 - Introduction

Course Objectives	0-3
Course Description.....	0-4
Course Content.....	0-5

Module 1 - Teradata Database Overview

What is the Teradata Database?	1-4
Teradata Parallel Architecture.....	1-6
Relational Database Advantages.....	1-8
Teradata Database Manageability	1-10
Teradata Database Features.....	1-12
Module 1: Review Questions	1-14

Module 2 - Components and Architecture

Major Components of the Teradata Database.....	2-4
The Parsing Engine (PE).....	2-6
The BYNET	2-8
The Access Module Processor (AMP).....	2-10
What is a Node?	2-12
Teradata Virtual Storage	2-14
Teradata Virtual Storage Concepts	2-16
Storage Performance vs. Data Temperature.....	2-18
Teradata with Hybrid Storage	2-20
Multi-Temperature Data Example	2-22
Teradata Compression Comparison	2-24
Layers of the Data Warehouse Architecture	2-26
Linear Growth and Expandability.....	2-28
Module 2: Review Questions	2-30

Module 3 - Databases and Users

Databases and Users Defined	3-4
Teradata Database Objects	3-6
Teradata Database Space	3-8
Space Management.....	3-10
Database Security	3-12
Module 3: Review Questions.....	3-14

Module 4 - Data Distribution and Access

How Does the Teradata Database Distribute Rows?	4-4
Primary Key (PK) vs. Primary Index (PI)	4-6
Primary Indexes	4-8
Defining the Primary Index	4-10
Row Distribution via Hashing	4-12
UPI Row Distribution	4-14
Unique Primary Index (UPI) Access	4-15
NUPI Row Distribution	4-16
Non-Unique Primary Index (NUPI) Access	4-17
Highly Non-Unique NUPI Row Distribution	4-18
Partitioned Primary Index (PPI)	4-20
Multi-Level Partitioned Primary Index (MLPPI)	4-22
What is a NoPI Table?	4-24
Teradata Columnar	4-26
Teradata Columnar Benefits	4-28
Module 4: Review Questions.....	4-29

Module 5 - Secondary Indexes and Full Table Scans

Secondary Indexes	5-4
Defining a Secondary Index	5-6
Join Indexes	5-8
Other Types of Secondary Indexes.....	5-10
Primary Index vs. Secondary Index.....	5-12
Full-Table Scans	5-14
Module 5: Review Questions.....	5-16

Module 6 - Teradata Studio Features

Optimize Effectiveness	6-3
Key Features	6-4
Modular Display	6-6
Teradata Studio Toolbar.....	6-8
Data Source Explorer View	6-10
Creating Connections	6-12
Creating Database Objects	6-14
Creating a SQL Statement (SQL Editor)	6-18
Project Explorer View.....	6-20
HELP TABLE Command	6-21
Other SQL HELP Commands	6-22
Setting a Default Database	6-24
The Teradata “SHOW” Command.....	6-26
Other SQL SHOW Commands	6-27
Session Information via SELECT	6-28
Session Information via HELP SESSION	6-29
SQL Editor	6-30
SQL Editor with Outline View	6-32
Using SQL Query Builder.....	6-33
Result Set Viewer.....	6-34
SQL History View	6-35
Teradata View	6-36
Shortcuts to Data Source Objects.....	6-37
Shortcuts to Typing Object Names	6-38
Commenting Lines of SQL	6-39
Logging on to Multiple Systems.....	6-40
Teradata Load Wizard.....	6-41
Choosing Studio or Studio Express	6-42
The Employee_Sales Database	6-44
The Emp_VIEWS Database	6-45
Teradata Studio – New System	6-46
Module 6: Summary.....	6-47
Module 6: Review Questions	6-48
Module 6: Lab Exercises.....	6-49

Module 7 - Basic SELECT Clauses

SQL: Structured Query Language.....	7-3
Three SQL Classifications	7-4
A Simple SQL SELECT	7-6
Projecting All Columns and All Rows.....	7-8
Aliasing a Column Using AS.....	7-9
Aliasing Mistake?	7-10
Ordering Rows Using ORDER BY.....	7-11
Other Ordering Options	7-12

Projecting Literal Values	7-14
Using WHERE to Eliminate Rows.....	7-15
The ASCII Collating Sequence and Teradata Mode	7-16
The ASCII Collating Sequence and ANSI Mode	7-18
Basic Logical Operators	7-19
DISTINCT Option	7-20
Other Built-In Functions.....	7-21
Recommended Coding Conventions	7-22
Module 7: Summary	7-23
Module 7: Review Questions.....	7-24
Module 7: Lab Exercises	7-26

Module 8 - Logical Operators

Logical Operators Introduction.....	8-3
The “AND” Condition.....	8-4
The “OR” Condition	8-5
Mixing AND and OR.....	8-6
Parentheses and the Predicate.....	8-7
The IN Operator.....	8-8
The NOT IN Operator	8-10
Exclusive OR	8-12
The BETWEEN Operator.....	8-13
NULL.....	8-14
Conditional Expressions and NULL.....	8-16
What Gets Returned.....	8-17
NULL and the Business Question	8-18
NOT NULL and the Business Question	8-19
Negating Conditions and Operators.....	8-20
The IN Operator and NULL	8-21
The NOT IN Operator and NULL	8-22
“ \neq ” With OR vs. “ \neq ” With AND	8-23
NULL Literal in an IN-List	8-24
Including NULL to an IN-List.....	8-25
NULL Literal in a NOT IN-List	8-26
Three Versions of NOT IN	8-27
Incorrect Sequencing of the BETWEEN	8-28
Explaining the Incorrect Sequencing of BETWEEN	8-29
Unsatisfiable BETWEEN with AND Residual	8-30
Unsatisfiable BETWEEN with OR Residual	8-31
Precedence of Operators	8-32
Module 8: Summary	8-33
Module 8: Review Questions.....	8-34
Module 8: Lab Exercises	8-36

Module 9 - Data Types and Functionality

Data Types	9-4
Character Data Types.....	9-6
Character Functionality.....	9-7
BETWEEN Functionality with CHARACTER	9-8
Integer Data Types	9-10
Decimal Data Types.....	9-11
Float Data Type.....	9-12
Byte Data Types.....	9-13
Date Data Type	9-14
ARRAY Data Type	9-16
NUMBER Data Type.....	9-18
More Data Types.....	9-20
Arithmetic Operators.....	9-21
Arithmetic and Derived Values.....	9-22
Arithmetic Functions.....	9-23
DATE Arithmetic	9-24
Data Type Conversions Using CAST	9-26
Data Type Conversions and Rounding	9-28
Concatenating Data Types	9-30
Concatenated Example Results	9-31
FORMAT	9-32
Methods for FORMAT in ODBC and JDBC Tools.....	9-33
ODBC/JDBC Formatting Examples	9-34
FORMAT Exercise	9-35
Year, Month, and Day Formatting Options	9-36
Sequencing by Date Portions	9-37
User Defined Types (UDT).....	9-38
UDT Transforms	9-40
Module 9: Summary.....	9-43
Module 9: Review Questions	9-44
Module 9: Lab Exercises.....	9-46

Module 10 - Basic SQL Functions

What are Functions?	10-3
UPPER & LOWER.....	10-4
UPPER & LOWER for Case Sensitivity	10-6
CHARACTER_LENGTH	10-8
TRIM	10-10
Trimming Other Than Space	10-11
Trimming Numbers	10-12
POSITION	10-13
Other Examples Using POSITION.....	10-14
SUBSTRING	10-15
SUBSTRING and Numbers.....	10-16
LIKE	10-17
LIKE Examples Using “%”	10-18
LIKE Examples Using “_”	10-20
LIKE and ESCAPE.....	10-21
LIKE (ANY – SOME – ALL).....	10-22
NOT LIKE ANY	10-23
NOT LIKE ALL	10-24
CASESPECIFIC	10-25
EXTRACT.....	10-26
ADD_MONTHS.....	10-27
TYPE	10-28
DEFAULT	10-29
The Calendars	10-30
Calendar Differences	10-32
Additional Calendar Functions	10-34
Calendar Functions Example.....	10-36
PIVOT.....	10-37
PIVOT Example	10-38
PIVOT Column Names.....	10-40
UNPIVOT	10-41
UNPIVOT Example.....	10-42
Module 10: Summary	10-44
Module 10: Review Questions.....	10-45
Module 10: Lab Exercises	10-47

Module 11 - Subqueries

The Subquery	11-3
Basic Subquery Concepts	11-4
Relating Concepts and Subqueries	11-5
Adding Conditions.....	11-6
Nesting Subqueries	11-7
Multiple Column Matching	11-8
NOT EXISTS.....	11-10

EXISTS	11-11
NULL and NOT IN Subquery.....	11-12
Module 11: Summary.....	11-13
Module 11: Review Questions	11-14
Module 11: Lab Exercises.....	11-16

Module 12 - Inner Join

Inner Join Concepts.....	12-3
Inner Join vs. Subquery.....	12-4
Comparing Subqueries and Inner Joins	12-5
Table Name Qualifications and Aliasing	12-6
Varied Forms of INNER Join	12-7
Many-Table INNER Joins.....	12-8
Varied Forms of Many-Table Inner Joins.....	12-10
Using Parentheses to Understand Order	12-12
Using Parentheses with Other Forms	12-13
Self Joins	12-14
Guaranteeing Uniqueness.....	12-16
IN vs. Inner Join.....	12-17
NOT IN vs. Inner Join.....	12-18
Cross Join	12-20
Cartesian Products.....	12-22
Mistakes on Table Aliasing.....	12-23
Mistakes on Column Aliasing.....	12-24
Module 12: Summary.....	12-25
Module 12: Review Questions	12-26
Module 12: Lab Exercises.....	12-28

Module 13 - Set Operators

What are Set Operators?.....	13-3
The Three Set Operators	13-4
UNION	13-6
UNION ALL	13-8
INTERSECT	13-9
EXCEPT (MINUS)	13-10
EXCEPT and ALL	13-11
Module 13: Summary.....	13-12
Module 13: Review Questions	13-13
Module 13: Lab Exercises.....	13-15

Module 14 - Outer Join

What is an Outer Join.....	14-3
Outer Join Concepts.....	14-4
Simulating an Outer Join	14-5
Outer Join Syntax	14-6
Types of Outer Joins.....	14-8
Employee as Left Outer	14-9
Nulls and the Inner Table	14-10
Department as Outer	14-11
Outer Joins and WHERE	14-12
Syntax Variations.....	14-13
Parts of Speech	14-14
Three Table Inner Join – Review.....	14-15
Three Table Outer Join	14-16
Multiple Table Variations.....	14-17
Three Table Outer Join Results	14-18
A Typical Outer Join?.....	14-19
Considering Nulls	14-20
Full Outer Join	14-21
Module 14: Summary	14-22
Module 14: Review Questions.....	14-23
Module 14: Lab Exercises	14-25

Module 15 - Aggregation

The Aggregate Functions.....	15-3
Aggregate Functionality	15-4
COUNT(*).....	15-5
Getting Department Sums.....	15-6
Aggregating Groups.....	15-8
Adding Grouping Columns.....	15-10
The HAVING Clause	15-12
WHERE Clause Explain.....	15-14
HAVING on Non-Aggregates	15-15
Aggregation and Joins	15-16
COUNT DISTINCT	15-18
Some Other Variations	15-19
Module 15: Summary	15-20
Module 15: Review Questions.....	15-21
Module 15: Lab Exercises	15-23

Module 16 - CASE

CASE Overview.....	16-3
Valued Form (Projection List)	16-4
Valued Form (Predicate)	16-5
Valued Form and Null.....	16-6
Searched Form	16-7
Searched Form (Complex Example).....	16-8
CASE and Aggregation.....	16-10
NULLIF Function	16-11
NULLIF for Division	16-12
COALESCE Function.....	16-13
COALESCE and Multiple Arguments.....	16-14
NULLIF and COALESCE Aggregation Quiz	16-15
Module 16: Summary.....	16-16
Module 16: Review Questions	16-17
Module 16: Lab Exercises.....	16-19

Module 17 - Permanent and Derived Tables

Data Definition Language	17-3
Table Level Options	17-4
Set vs. Multiset.....	17-6
CREATE TABLE	17-8
Column Level Options	17-10
Index Level Options	17-12
Creating and Dropping Secondary Indexes.....	17-14
Help Index	17-15
Deleting vs. Dropping Tables	17-16
Using Real Tables – “Temporarily”	17-17
“Derived” Tables.....	17-18
Multiple “WITH” Derived Tables	17-19
Including the NULL Department.....	17-20
Module 17: Summary.....	17-22
Module 17: Review Questions	17-23
Module 17: Lab Exercises.....	17-25

Module 18 - UPDATE-INSERT-DELETE

Updating Data via SQL.....	18-3
Inserting a Single Row	18-4
Inserting an Apostrophe	18-5
Inserting Default Values	18-6
Default Values and NOT NULL	18-7
Insert-Select	18-8
CASESPECIFIC and SET Tables.....	18-9

CASESPECIFIC and MULTISET Tables.....	18-10
UPDATE.....	18-11
Updating with Joins	18-12
UPDATE and FROM	18-13
DELETE	18-14
Deleting with Joins	18-15
Module 18: Summary	18-16
Module 18: Review Questions.....	18-17
Module 18: Lab Exercises	18-19

Module 19 - SAMPLE and RANDOM

SAMPLE Introduction.....	19-3
SAMPLE Syntax	19-4
Multiple Samples (Number of Rows).....	19-5
Multiple Samples (Percentage of Rows)	19-6
SAMPLE WITH REPLACEMENT	19-7
WITH REPLACEMENT (Multiple Samples).....	19-8
Other Considerations	19-10
Significance of the Order of Operations.....	19-12
Using Derived Tables	19-13
SAMPLE and Subqueries	19-14
SAMPLE and Joins.....	19-15
Stratified Sampling – What is it?.....	19-16
Stratified Sampling (No Replacement).....	19-17
Stratified Sampling (With Replacement).....	19-18
Stratified Sampling and Joins	19-19
RANDOMIZED ALLOCATION.....	19-20
The RANDOM Function	19-22
Duplicate Random Values	19-24
RANDOM for Test Data	19-25
RANDOM and Limitations	19-26
Module 19: Summary	19-27
Module 19: Review Questions.....	19-28
Module 19: Lab Exercises	19-30

Module 20 - TOP N

TOP N Defined.....	20-3
TOP N Limitations	20-4
TOP N Example.....	20-6
TOP N WITH TIES	20-8
Without Ties – Same Result	20-9
WITH TIES – Same Result	20-10
Getting Bottom Results.....	20-11
Bottom Results – WITH TIES.....	20-12

WITH TIES – Adding a Bottom Tie.....	20-13
Unordered Rows	20-14
Unordered Rows and WITH TIES.....	20-15
TOP N and Randomness.....	20-16
The PERCENT Option.....	20-17
PERCENT Option – WITH TIES	20-18
PERCENT Option – No ORDER BY	20-19
PERCENT Option and Millions of Rows	20-20
Module 20: Summary.....	20-21
Module 20: Review Questions	20-22
Module 20: Lab Exercises.....	20-24

Module 21 - Views

What is a View?	21-3
Creating and Using Views	21-4
Replacing a View	21-6
Using Views to Rename Columns	21-8
Join View	21-9
Join Necessity?.....	21-10
Joining Views.....	21-11
Create View Strategies.....	21-12
Using Views for Formatting	21-13
Views with Aggregates	21-14
Aggregates and HAVING	21-15
Views and TOP N	21-16
Updating with Views	21-17
Views WITH CHECK OPTION.....	21-18
Restrictions on Views	21-19
Advantages and Suggestions.....	21-20
View Column Info	21-21
Module 21: Review Questions	21-22
Module 21: Lab Exercises.....	21-24

Module 22 - Macros

What is a Macro?	22-3
CREATE, EXECUTE, DROP Macro	22-4
Replacing a Macro	22-6
Multiple Statement Macros	22-8
Macros vs. Multi-Statement Requests	22-9
Simple Parameterized Macros.....	22-10
A More Complex Macro	22-11
EXECUTE – Form 1	22-12
EXECUTE – Form 2	22-13
DDL and Macros.....	22-14

Parameterizing an In-List	22-15
Parameterizing an In-List – Choice 2	22-16
Module 22: Summary	22-17
Module 22: Review Questions.....	22-18
Module 22: Lab Exercises	22-20

Module 23 - Course Survey

http://www.tensupport.com/surveys/	23-2
---	------

Appendix A: Review Question Solutions
Appendix B: Lab Exercise Solutions
Appendix C: WITH and WITH BY
Appendix D: Teradata Reserved Words
Appendix E: Domain Specific Functions
Appendix F: SQL Assistant