



Teradata Database Administration Class

Outline

Introduction and Good Advice

What is Parallel Processing?

Start Small and Think Big

Give your Enterprise the Tools they need

Model the Business with ERwin

Educate the Business on the Business by Sharing the Model

Load Your Models and have the SQL Built Automatically

Five Brilliant Pieces of Teradata (1 of 5) is MPP

Five Brilliant Pieces (2 of 5) are Tactical Queries

Five Brilliant Pieces (3 of 5) Is a Traffic System

Five Brilliant Pieces (4 of 5) Is Viewpoint

Five Brilliant Pieces (5 of 5) Are Data Processing Options

Support Large Queries, but Monitor them closely

Experiment and Improve Loading Data Strategies

Compress Your Data with Multi-Value Compression

Separate your Production System from Your Test System

Teradata Architecture Fundamentals the DBA must know

Parallel Architecture

The Teradata Architecture

All Teradata Tables are spread across ALL AMPS

Teradata Systems can Add AMPS for Linear Scalability

AMPs and Parsing Engines (PE's) live inside SMP Nodes

Each Node is Attached via a Network to a Disk Farm

Two SMP Nodes Connected Become One MPP System

There are Many Nodes in a Teradata Cabinet

This is the Visual You Want to Understand Teradata

Responsibilities of the DBA

The Primary Index is the Axis of all Teradata Systems

The Primary Index is defined when the table is CREATED

A Unique Primary Index (UPI)

Primary Index in the WHERE Clause - Single-AMP Retrieve

A Non-Unique Primary Index (NUPI)

Primary Index in the WHERE Clause - Single-AMP Retrieve

A conceptual example of a Multi-Column Primary Index

Primary Index in the WHERE Clause - Single-AMP Retrieve

A conceptual example of a Table with NO PRIMARY INDEX

A Full Table Scan is likely on a table with NO Primary Index

Table CREATE Examples with four different Primary Indexes

What happens when you forget the Primary Index?

Why create a table with No Primary Index (NoPI)?

A DBA's best friend - The Data Dictionary

The Data Dictionary Resides in User DBC

The DBC.DBCInfoV View
Querying the Data Dictionary
Using the Keyword USER
Restricted Views have an X at the End of their Name
The V is New with Teradata V12
The V and the Restricted X are Now Often Combined
A Recap of What We Have Learned So Far
The DBC.DatabasesV View
The DBC.Users View
The DBC.Tables View
Using DBC.Tables to find out about Fallback
The DBC.Indices View
The DBC.Columns View
Clever Queries for the DBC.ColumnsV View
New V14 - The DBC.PartitioningConstraintsV View
The DBC.AccountInfo View
The DBC.AMPUsage View
Clearing Out the DBC.AMPUsage Data
The DBC.AllTempTables
The DBC.Triggers
The DBC.All_RI_ChildrenV
DBC.SessionInfoV Information
DBC.LogonOffV
AllRoleRights, AllRightsV, UserRightsV and UserGrantedRightsV
The DBC.Profiles View
RoleMembers, RoleInfo, UserRoleRights and ProfileInfoVX,
Understanding that Space is based on a Per-AMP Basis
Total Space for a Single Database or User
Using the Data Dictionary to see the Space for Everyone

Finding the Perm Percent Used
Finding the Perm Percent Used with a HAVING Clause
Finding the Perm Percent Left with a HAVING Clause
Creating a Macro for Perm Percent Used with a Dynamic %
Orphaned Spool Files That Need to be deleted
Finding Table Sizes
Finding Skew in the Tables in a Database
Finding Skew in a Table
Display the Distribution of a Column per AMP
Your Users and Databases
DBC Tables used in the Collect Statistics Process
The DBC Table DBC.Next
DBA Advice - ClearPeakDisk to Reset Peak Space
DBA Advice – Clean out these Tables Periodically
The DBC.AssociationV View
The DBC.JournalsV View
DBC.Databases2V is for Unresolved Reference Constraints
The DBC.All_RI_ChildrenV for Inconsistent RI
The DBC.ShowColChecksV View
The DBC.ShowTblChecksV View
The DBC.PartitioningConstraintsV View
The DBC.AccessLogV View
The DBC.AccessLogV View for Today's Queries
The DBC.AccessLogV View Denials for Today
DBC.DBQLRulesV
DBC.QryLogV
DBC.QryLogSummaryV
ResUsage Macros
Executing the ResUsage Macro DBC.Resnode

The DBC.IdCol Table

How Teradata Tracks Objects

Teradata Assigns each Object a Unique Numeric ID

The Table ID

The Table ID in Greater Detail

Looking at the TableID inside the actual Cylinders

A More Detailed View of TableID inside the actual Cylinders

The Blocks Below are All Associated with the Same Table

Bits, Bytes and More

Cylinder Sizes

Creating Users and Databases

Creating Users and Databases

Password Security Meanings

Now we have Two Users in the Teradata System

A Grant Statement so others Create a Database or User

And so the Teradata Hierarchy Begins

Creating a Database

Users are Given Passwords While Database are Not

Teradata Administrator Can CREATE Users

The Modify User Statement

A Clever Way to Reset a User Password

Accounts and their Associated Priorities

Creating a User with Multiple Account Priorities

Self-Nicing to change Account Priorities

Account String Expansion (ASE)

The DBC.AccountInfo View

The DBC.AMPUsage View

Account String Expansion (ASE) in Action
Test – Run queries Under All Accounts for TeraTom
The DBC.AMPUsage View

Profiles

Profiles

Getting Started for Profile Creation

Creating A Profile and a User

Password Security

Password Security Meanings

Creating A Profile and then Modifying a User

Quiz – What are the Profile Values?

Answer to Quiz – What are the Profile Values?

Quiz – What are the Profile Values After Null?

Answer to Quiz – What Are the Profile Values After Null?

The DBC.ProfilesVX View

The DBC.ProfilesV View

The DBC.AccountInfoVX View

ProfileInfoVX, RoleMembers, RoleInfo and UserRoleRights

Teradata Administrator Can CREATE Profiles (1 of 2)

Teradata Administrator Can CREATE Profiles (2 of 2)

Dropping a Profile

The Effects of Dropping a Profile

Roles

Roles

Getting Started for Role Creation

Create A Role and then Assign that Role It's Access Rights

Create a User and Assign them a Default Role

A Role vs. a Profile

Granting a Role to a Current User

Active Roles

Setting Your Active Role to ALL

Roles and Valid Objects

Roles and Invalid Commands

Nesting of Roles

Nesting of Roles in Action (1 of 3)

Nesting of Roles in Action (2 of 3)

Nesting of Roles in Action (3 of 3)

Quiz – What Databases Does Mandy Have Access To?

Answer – What Databases Does Mandy Have Access To?

GRANT WITH ADMIN OPTION Command

REVOKE ADMIN OPTION FOR Command

RoleMembers, RoleInfo, UserRoleRights and ProfileInfoVX,

DBC Tables for AllRoleRights, AllRightsV, UserRightsV and

UserGrantedRightsV

Access Rights

The Objects That Require Access Rights

Objects and Available Access Rights

A Few Examples to Get You Started

There are Three Types of Access Rights

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A Dinner Invitation of Access Rights

One of the Problems with Access Rights

The Rights for SysDBA and TeraTom

The GRANT Statement

Create A Role and then Assign that Role It's Access Rights

GRANT to PUBLIC

GRANT To ALL DBC

GRANT Using the ALL Keyword

GRANT Database Strategy for Users, Views and Tables

Inheriting Access Rights

GRANT at the Column Level

GRANT for the Ability to CREATE Secondary Indexes

Access Rights to CREATE Triggers

The REVOKE Command

DBC Tables for AllRoleRights, AllRightsV, UserRightsV and

UserGrantedRightsV

The GIVE Statement

A DROP User can be Better than a GIVE Statement

Removing a Level in the Teradata Hierarchy

Collect Statistics

The Teradata Parsing Engine (Optimizer) is Cost Based

The Purpose of Collect Statistics

When Teradata Collects Statistics it creates a Histogram

The Interval of the Collect Statistics Histogram

Histogram Quiz

Answers to Histogram Quiz

What to COLLECT STATISTICS On?

Why Collect Statistics?

How do you know if Statistics were collected on a Table?

A Huge Hint that No Statistics Have Been Collected

The Basic Syntax for COLLECT STATISTICS

COLLECT STATISTICS Examples for a better Understanding

The New Teradata V14 Way to Collect Statistics
COLLECT STATISTICS Directly From another Table
Where Does Teradata Keep the Collected Statistics?
The Official Syntax for COLLECT STATISTICS
How to Recollect STATISTICS on a Table
Teradata Always Does a Random AMP Sample
Random Sample is Kept in the Table Header in FSG Cache
Multiple Random AMP Samplings
How a Random AMP gets a Table Row count
Random AMP Estimates for NUSI Secondary Indexes
USI Random AMP Samples are Not Considered
There's No Random AMP Estimate for Non-Indexed Columns
A Summary of the PE Plan if No Statistics Were Collected
Stale Statistics Detection and Extrapolation
Extrapolation for Future Dates
How to Copy a Table with Data and the Statistics
How to Copy a Table with NO Data and the Statistics
When to COLLECT STATISTICS Using only a SAMPLE
Examples of COLLECT STATISTICS Using only a SAMPLE
Examples of COLLECT STATISTICS for V14
How to Collect Statistics on a PPI Table on the Partition
Teradata V12 and V13 Statistics Enhancements
Teradata V14 Statistics Enhancements
Teradata V14 Summary Statistics
Teradata V14 MaxValueLength
Teradata V14 MaxIntervals
Teradata V14 Sample N Percent
Teradata V14.10 Statistics Collection Improvements
Teradata V14.10 Statistics Collection Threshold Examples

Teradata V14.10 AutoStats feature
Teradata Statistics Wizard

Locking

The Four Major Locks of Teradata

The Read Lock

The Read Lock and Joins

The Write Lock

The Exclusive Lock

The Three Levels of Locking

Locking at the Row Hash Level

Locking at the Table Level

Locking at the Database Level

The Ongoing Battle between Read and Write Locks

Compatibility between Read Locks

Why Read Locks Wait on Write Locks

Why Write Locks Wait on Read Locks

The Access Lock is Different from the Other Locks

What is the Purpose of an Access Lock?

Locking Modifiers - Locking Row, Table or Database

All Views should consider the Locking for Access Statement

What is a Dead Lock or a Deadly Embrace?

Pseudo Tables are designed to minimize Dead Locks

Pseudo Tables are referenced in the Explain Plan

Incompatible Locks Wait on each Other

The Checksum Lock of Teradata

The Nowait Option for Locking

The Automatic Locking for Access Button inside Nexus

Viewpoint Lock Viewer

Viewpoint Lock Viewer Lets You Configure Your View
What is a Host Utility (HUT) Lock?

Protection Features

A List of the Protection Features

Transient Journal Protects the Transaction Integrity

The Transient Journal in Action

A Single Transaction could Involve All AMPs

The Secret to turning off the Transient Journal

The Transient Journal's Write Ahead Logging (WAL)

A Node with 40 AMPs and 40 Dedicated FSG Caches

The Transient Journal's Write Ahead Logging (WAL)

Working Example of the Write Ahead Log (WAL)

The First Step in our Example of the Write Ahead Log (WAL)

The Second Step in our Example of the Write Ahead Log

The Third Step in our Example of the Write Ahead Log

The Fourth Step in our Example of the Write Ahead Log

The Last Step in our Example of the Write Ahead Log

Fallback to Protect against an AMP Failure

Fallback Clusters

AMPs in a Cluster are Physically Separated

The Reason AMPs in a Cluster are Physically Separated

The Price you pay for Fallback

How to Create a Table with Fallback

How to Create a Table with No Fallback

How to Alter a Table to Add or Drop Fallback

What is a Virtual Disk?

Why do AMPs each have Four Physical Disks?

Is a Mirror just like Looking into a Mirror?

RAID 1 Mirroring – Redundant Array of Independent Disks

What does RAID Protect?

How Does RAID Fail?

Do RAID and Fallback have a Connection?

What is a Clique?

If a Node goes down the AMPs migrate within the Clique?

Does Teradata Reset during a Node Failure?

Four Node Cliques

Migrating AMPs in Four Node Cliques

The Hot Spare Node

The Hot Spare Node in Action

With a Hot Spare a Second Teradata Reset isn't Needed

A Node, It's AMPs and their Disks

How Cliques are Physically Defined

Cliques are cabled so Migrating AMPs can access their Disks

A Review of Fallback and Clusters

An Example of Fallback and Clusters

Quiz 1 – How Many Clusters do you see?

Quiz 1 Answer – How Many Clusters do you see?

Quiz 2 – How Many Cliques do you see?

Quiz 2 Answer – How Many Cliques do you see?

Quiz 3 – What have we lost? Multiple Choice Answer

Quiz 3 Answer – What have we lost? Multiple Choice Answer

Quiz 4 – What have we lost? Multiple Choice Answer

Quiz 4 Answer – What have we lost? Multiple Choice Answer

Quiz 5 – What have we lost? Which Answer is False?

Quiz 5 Answer – What have we lost? Which Answer is False?

Quiz 6 – What have we lost? Pick Two True Answers

Quiz 6 Answer – What have we lost? Pick Two True Answers

Summary of the facts for Fallback, Clusters, and Cliques

Quiz 7 –How Many Virtual Disks (Vdisks) are in this System?

Quiz 7 Answer –How Many Virtual Disks are in this System?

Quiz 8 –How Many Physical Disks are in this System?

Quiz 8 Answer–How Many Physical Disks are in this System?

Quiz 9 – How Many Transient Journals in this System?

Quiz 9 Answer –How Many Transient Journals in this System?

Quiz 10 – How Many Transient Journals are Open?

Quiz 10 Answer – How Many Transient Journals are Open?

Quiz 11 – How Much Space?

Quiz 11 Answers – How Much Space?

Quiz 12 – How Much Space with Fallback?

Quiz 12 Answers – How Much Space with Fallback?

Quiz 13 – How Many Disks could we lose with RAID 1?

Quiz 13 Answer – How Many Disks could we lose?

Quiz 14 – How Many Disk losses could Kill Us?

Quiz 14 Answer – How Many Disk losses could Kill Us?

Quiz 15 – How Many AMPs could we lose if Lucky?

Quiz 15 Answer – How Many AMPs could we lose if Lucky?

Quiz 16 – How Many AMPs could we lose if Unlucky?

Quiz 16 Answer – How Many AMPs could we lose Unlucky?

The Permanent Journal

Difference between the Transient and the Permanent Journal

Difference Between the Before and After Permanent Journal

Full System Backup compared to an After Journal

How Full System Backups work with the After Journal

The Many Different Permanent Journal Options

Where is the Permanent Journal Stored?

Using Common Sense about Journal Locations

After Journals are Never stored in the Same Node or Clique

What is a Dual After Journal?

What is a Dual Before Journal?

What is a Journal?

Creating a Table with Fallback and a Before and After Journal

Does Fallback Affect a Permanent Journal?

Permanent Journal Rules

Example 1: Permanent Journal Scenarios to Test the Rules

Example 2: Permanent Journal Scenarios to Test the Rules

Example 3: Permanent Journal Scenarios to Test the Rules

How to Create Database with a Permanent Journal

Creating Tables under different Journal Circumstances

Permanent Journal's Three Main Areas

The Current Journal consists of the Active and Saved Areas

Permanent Journal Commands

Deleting a Permanent Journal

Some Great Advice for Maintaining the Permanent Journals

Recovery Using the Permanent Journals

The Journals View in DBC (DBC.Journals)

Archive Recovery Console (ARC)

Reasons You Might Utilize ARC

ARC raising the BAR (Backup Archive Restore)

ARC Commands in Alphabetical Order

An ARC Example of an Archive and then a Restore

Top SQL Commands Cheat Sheet

SELECT All Columns from a Table and Sort

Select Specific Columns and Limiting the Rows

Changing your Default Database

Keywords that describe you
Select TOP Rows in a Rank Order
A Sample number of rows
Getting a Sample Percentage of rows
Find Information about a Database
Find information about a Table
Using Aggregates
Performing a Join
Performing a Join using ANSI Syntax
Using Date, Time and Timestamp
Using Date Functions
Using the System Calendar
Using the System Calendar in a Query
Formatting Data
Using Rank
Using a Derived Table
Using a Subquery
Correlated Subquery
Using Substring
Basic CASE Statement
Advanced CASE Statement
Using an Access Lock in your SQL
Collect Statistics
CREATING a Volatile Table with a Primary Index
CREATING a Volatile Table that is Partitioned (PPI)
CREATING a Volatile Table that is deleted after the Query
Finding the Typical Rows per Value for specific column
Finding out how much Space you have
How much Space you have Per AMP

Finding your Space

Finding Space Skew in Tables in a Database

Finding the Number of rows per AMP for a Column

Finding Account Information

Ordered Analytics

