DB1032 DB2 for z/OS SQL Optimization, Performance & Tuning

Course ID#: 0370-212-DB-W

Hours: 28

Course Content

Course Description:

This class is designed to break down SQL statements in detail so the participants understand in depth what the DB2 optimizer goes through in fulfilling an SQL request. Time will especially be spent breaking down SQL Joins and Subqueries in order to understand the fundamental issues associated with performance.

The class will address performance-related issues in relationship to database design, indexing, efficient and effective SQL queries, and the gathering of accurate statistical information for optimization. Participants will come out of this class having a much better understanding of why certain optimizations are chosen, and what can be done to get DB2 to choose differently.

Much of the class will be in workshops where the participants will review queries, execute DB2 Explains, and perform analysis on the information. Many of the workshops have the participants rewrite and/or apply tuning statements to existing queries in order to get them to perform more efficiently. Participants will know exactly what steps to take in getting poor performing SQL queries to execute more efficiently.

Prerequisites:

A working knowledge of DB2 for z/OS environment and the SQL language.

Topics:

Module 1: Introduction
- Tuning Approaches
- The DB2 Optimizer and Access Path Decisions
- SQL Tuning Strategy
- Using Explain to Determine the Optimizers Access Path Choice
- Estimated SQL Statement Cost

Module 2: Predicate Types and Performance
- Predicate Processing
- Predicate Types
- Predicate Evaluation Sequence
- Predicate Types and Processing
  - Stage 1
  - Indexable
  - Stage 2
- Identify and tune poorly coded Predicates
  - Explain Predicate Table
  - Explain Filter Table
  - Coding tradeoffs

Module 3: Basic Access Paths and Performance

- Overview
- Tablespace Scans
- Index Structures and access paths
  - Matching Index access
  - Non-matching Index access
  - IN-list Index scans
  - List Prefetch
  - Index Screening
  - Multi-Index Access
  - Index only Access
  - Direct Row Access
  - Hash Access
- Sort Activity
- Parallel Operations
- Access Path Analysis using Explain
- What Explain Does Not Tell You

Module 4: Tuning Joins

- Join Types
  - Inner Joins
  - Outer Joins
  - Star Joins and Other types of Joins
- Join Methods
  - Nested Loop Join
  - Merge Scan Join
  - Hybrid Join
  - Using Explain to validate Join methods
- Sort Activity
  - Sorts via the Explain Tables
  - Tuning Sorts

Module 5: Aggregate Functions, SQL Subqueries & Performance

- Aggregate Functions
- Column Function Evaluations
- Subqueries
  - Scalar Fullselects
  - Non Correlated Subqueries
  - Correlated Subqueries
  - Tuning Subqueries using Explain
- Existence Checking
  - Methods of Existence Checking
  - Choosing the best method
- Row Value Expression
  - Usage
- Analyze and tune Subqueries

Module 6: Tables expressions and Performance

- Nested Table Expressions
- Common Table Expressions
- Views and Nested Table Expression Processing
- Materialization
- Using Table Expressions as a tuning approach
- Using Explain to analyze Table Expression Performance

Module 7: DB2 Catalog Statistics and Access Path Selection

- The DB2 Catalog and Access Paths
- Catalog Statistics and Filter Factors
- Maintaining Statistics in the Catalog
- Using RUNSTATS to Maintain Catalog Statistics
  - Basic Tablespace Statistics
  - Index Statistics
  - Table Statistics
  - Column Statistics
  - Distribution Statistics
  - Correlation Statistics

Module 7 continued:
- – History Statistics
- – Histogram Statistics Use
- – Is Rebind Necessary?
- Real Time Statistics
- When to REORG
- Best Practices

Module 8: Advanced Query Tuning
- DB2 Predicate Manipulation
- Predicate Generation through Transitive Closure
- Join Simplification
- Subquery Transformation
- Adding Extra Local Predicates
- Using OPTIMIZE FOR n ROWS
- Plan Management and Binds
- REOPT(VARS)
- Using Host Variables Efficiently
- Using Optimization Hints
- SQL Optimization Coding Standards and Guidelines
- Top 10+ Steps to Tuning a Query