



IBM: Db2 11.1 Quickstart for Experienced Relational DBAs (CL487G)

Course ID #: 0370-370-11.1-W

Hours: 28

Course Content

Course Description:

This course teaches you to perform, basic and advanced, database administrative tasks using Db2 11.1. These tasks include creating and populating databases and implementing a logical design to support recovery requirements. The access strategies selected by the Db2 Optimizer will be examined using the Db2 Explain tools. Various diagnostic methods will be presented, including using various db2pd command options. Students will learn how to implement automatic archival for database logs and how to plan a redirected database restore to relocate either selected table spaces or an entire database. The REBUILD option of RESTORE, which can build a database copy with a subset of the tablespaces, will be discussed. We will also cover using the TRANSPORT option of RESTORE to copy schemas of objects between two Db2 databases. The selection of indexes to improve application performance and the use of SQL statements to track database performance and health will be covered. This course provides a quick start to Db2 database administration skills for experienced relational Database Administrators (DBA).

The lab demonstrations are performed using DB2 LUW 11.1 for Linux. For some lab tasks, students will have the option to complete the task using a DB2 command line processor, or using the graphical interface provided by IBM Data Server Manager.

Course Objectives:

After completing this course, you should be able to:

- An overview of the Db2 11.1 environment
- Using the command line processor (CLP) and GUI
- How to create databases and data placement
- Creating database objects
- Moving data best practices
- Backup and recovery procedures
- Locks and concurrency
- Database maintenance, monitoring and problem determination best practices
- Security tasks and considerations
- Database rebuilding support
- Db2 database and table space relocation
- Using the Explain tools
- Using indexes for improved performance
- Advanced Monitoring



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Target Audience:

This is an intermediate course for experienced DBAs and technical individuals, with experience on other relational database platforms, who plan, implement, and maintain Db2 11.1 for Linux, UNIX, and Windows databases. These skills can also be utilized to support cloud based databases using Db2 on Cloud or Db2 Hosted environments.

Prerequisites:

Participants should have the following skills:

- Perform basic database administration tasks on a relational database system
- Use basic OS functions such as utilities, file permissions, hierarchical file system, commands, and editor
- State the functions of the Structured Query Language (SQL) and be able to construct DDL, DML, and authorization statements
- Discuss basic relational database concepts and objects such as tables, indexes, views, and joins
- These skills can be developed by taking:
 - DB2 SQL Workshop
 - DB2 Fundamentals

Topics:

Overview of Db2 11

- Describe the system platforms supported by the Db2 Family of products
- Compare the features available with different Db2 product editions
- Select the appropriate Db2 client software to support application client or server systems
- Choose a method to install your Db2 product edition and plan migrations of existing Db2 servers to the latest release
- Compare cloud-based Db2 options to a locally installed Db2 server

Db2 Command Line Processor (CLP) and GUI tools

- Utilize the Db2 Command Line Processor to run Db2 commands, SQL statements and command scripts
- Invoke the CLPPlus command line processor to connect databases and to define, edit, and run statements, scripts, and commands

- List some of the ways IBM Data Server Manager can be used to support Db2 database administration and SQL execution with Db2 servers

The Db2 database manager instance

- Specify the key features of an instance
- Create and drop a Db2 instance
- Use db2start and db2stop commands to manage a Db2 instance
- Display and set Db2 registry variables
- Describe and modify the database manager configuration

Creating databases and data placement

- Plan the initial storage allocations for a database including catalog tables and log files
- Create a new database using Db2 native encryption
- Explore the System Catalog tables and views
- Check and update Database configuration parameter settings



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- Compare DMS and Automatic Storage management for table space
- Differentiate between table spaces, containers, extents, and pages
- Create and alter table spaces
- Use Db2 commands and SQL statements to display current table space statistics and status information

Creating database objects

- Create schemas, tables, views, aliases, and indices
- Review the use of temporary tables,
- Explore the use and implementation of check constraints, referential integrity and triggers
- Use BLU Acceleration, column-organized tables to improve analytics query performance
- Explain the difference between system-period temporal tables and Application-period temporal tables
- List the types of compression available for tables and indexes
- Use the db2look utility to export database structures for future use

Moving data

- Discuss using the INSERT SQL statement to populate tables
- Explain the differences between IMPORT and LOAD processing
- Explain the EXPORT, IMPORT, and LOAD command options
- Create and use Exception Tables and Dump-Files
- Check table status using LOAD QUERY
- Describe the ANALYZE phase of LOAD command processing used for loading BLU Acceleration, column-organized tables.
- Check the Load Pending and Set Integrity Pending status for a table
- Use the SET INTEGRITY command
- Discuss the db2move and db2look commands
- Use the ADMIN_MOVE_TABLE procedure to move a table to different table spaces

- List some of the features of the Ingest utility for continuous data ingest

Backup and recovery

- Describe the major principles and methods for backup and recovery
- State the three types of recovery used by Db2
- Explain the importance of logging for backup and recovery
- Describe how data logging takes place, including circular logging and archival logging
- Use the BACKUP, RESTORE, ROLLFORWARD and RECOVER commands
- Perform a table space backup and recovery
- Restore a database to the end of logs or to a point-in-time
- Discuss the configuration parameters and the recovery history file and use these to handle various backup and recovery scenarios
- Create an encrypted backup image to improve data security

Database maintenance, monitoring and problem determination

- Plan the use of RUNSTATS, REORGCHK and REORG utilities for maintaining database efficiency
- Configure the Db2 instance to set the location for diagnostic data and message severity levels for basic problem analysis
- Describe the methods that can be used for monitoring database and application activity including db2pd commands, Event Monitors and using SQL statements to access statistics
- Describe the function of EXPLAIN and use this facility to assist basic analysis
- Use the db2advis command to analyze a workload for potential performance improvements
- Use the db2fodc command to collect diagnostic data for a system hang



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Locking and concurrency

- Explain why locking is needed
- List objects that can be locked
- Describe and discuss the various lock modes and their compatibility
- Explain four different levels of data protection
- Set isolation level and lock time out for current activity
- Explain lock conversion and escalation
- Describe the situation that causes deadlocks
- Create a LOCKING EVENT monitor to collect lock related diagnostics
- Set database configuration options to control locking event capture

Security

- Use Db2 access control mechanisms to implement security within the database
- Explain the tasks performed by the SYSADM user, the SECADM user and a DBADM user
- Compare the use of database roles to user groups for security
- Describe privileges required for binding and executing an application package
- Describe the difference between explicit privileges and implicit privileges
- List the methods for implementing encryption for database connections
- List the advantages of creating a Trusted Context for a three-tier application system

Database rebuild support

- Review the considerations of using standard Db2 database recovery options
- Explain the capabilities of the REBUILD option for the RESTORE command
- List the types of information included in each Db2 backup image and describe how it is used to support rebuilding a database

- Plan for supporting database and disaster recovery scenarios using Db2 database and table space backups using the RESTORE command with a REBUILD option
- Utilize LIST UTILITIES SHOW DETAIL to monitor progress of a RESTORE utility during database rebuilding

Db2 Database and tablespace relocation

- Explain the facility of the Db2 RESTORE command to recover table spaces to different containers
- Use the SET TABLESPACE CONTAINERS command to define new containers during a redirected restore
- Utilize the SET STOGROUP PATHS command to change the storage paths for automatic storage tablespaces in storage groups
- Plan the use of redirected restore as part of a disaster recovery
- Describe two methods that can be used to convert a DMS table space to utilize Automatic Storage
- Use the GENERATE SCRIPT option of RESTORE to set up a command script for a redirected restore operation
- Copy schemas from one database to another using the TRANSPORT option of the RESTORE utility
- Use db2relocatedb when moving or copying Db2 databases with non-Db2 utilities

Using Explain tools

- Use the IBM Data Server Manager Explain tool to review access plans
- Examine access plan detailed information using the db2exfmt reports
- Create a set of Explain tables used by Visual Explain tools and db2exfmt
- Set the Explain mode special register to capture the Explain data for analysis of dynamic SQL statements



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- Use the db2expln report to analyze access plans for dynamic or static SQL statements
- Utilize the Activities Event monitor to create Explain reports that include estimated and actual row counts

Using Indexes for performance

- Describe the Indexing options that can be used to improve performance:
 - Index Only Access
 - Clustered Index
 - Reverse Scans
 - Include Columns
 - Index Freespace
- Describe the Block Indexing capability for MDC tables
- Monitor index usage using the MON_GET_INDEX function and db2pd commands
- Explain how multiple indexes can be combined using Index ORing and Dynamic Bitmap Index ANDing
- Use the Design Advisor to predict performance gains from adding new indexes or using MDC tables

Advanced monitoring

- Describe the infrastructure used to support monitoring
- Configure a database to collect the activity, request and object metrics returned by the Monitoring Table functions
- Investigate current application activity that might indicate performance problems using SQL statements
- Use the Db2-provided views and functions in SQL to evaluate efficient use of database memory for locks, sorting and database buffer pools
- Check database health indicators, like log space available and table space utilization using CLP queries using Monitor functions and views