Introduction

The purpose of this book is to assist you with preparing for the IBM® DB2® 10 for z/OS® Certified Database Administrator (DBA) exam. This book covers all the topics on the exam and is written by two members of the team who participated in the actual writing of the exam.

In addition to covering all the topics on the test, this book covers much more. It gives you a thorough introduction to the new features of DB2 10 for both database and application development.

Below, we briefly describe the objective of the certification exams and identify the topics that will be covered.

IBM DB2 10 for z/OS Certified Database Administrator

To become a DB2 10 for z/OS Certified DBA you must pass two exams: DB2 10 Family Fundamentals (Exam 610) and DB2 10 for z/OS Database Administration (Exam 612).

This book covers 100 percent of the information needed for the 612 exam. The two tests are described here in terms of what the objectives are for each.

Note: *For more information about the DB2 Family Fundamentals exam, see* DB2 9 Fundamentals Certification Study Guide *(MC Press, 2007) and the forthcoming* DB2 10 Fundamentals Certification Study Guide *(also from MC Press).*

Exam 610 Objectives – Family Fundamentals

Section 1 – Planning (14%)
- Knowledge of restricting data access
- Knowledge of the features or functions available in the tools that come with the DB2 product (configuration advisor, configuration assistant, command line processor, and so on)
- Knowledge of database workloads (OLTP versus warehousing)
- Knowledge of non-relational data concepts (extenders)
- Knowledge of XML data implications (non-shredding)

Section 2 – Security (11%)
- Knowledge of DB2 products (client, server, and so on)
- Knowledge of different privileges and authorities
- Knowledge of encryption options (data and network)
- Given a DDL SQL statement, knowledge to identify results (grant/revoke/connect statements)

Section 3 – Databases and Database Objects (17%)
- Ability to identify and connect to DB2 servers and databases
- Ability to identify DB2 objects
- Knowledge of basic characteristics and properties of DB2 objects
- Given a DDL SQL statement, knowledge to identify results (ability to create objects)

Section 4 – Using SQL (23.5%)
- Given a DML SQL statement, knowledge to identify results
- Ability to use SQL to SELECT data from tables
- Ability to use SQL to SORT or GROUP data
- Ability to use SQL to UPDATE, DELETE, or INSERT data
- Knowledge of transactions (i.e., commit/rollback and transaction boundaries)
- Ability to call a procedure or invoke a user-defined function
- Given an XQuery statement, knowledge to identify results

Section 5 – Tables, Views, and Indexes (23.5%)
- Ability to demonstrate usage of DB2 data types
- Given a situation, ability to create a table
- Knowledge to identify when referential integrity should be used

- Knowledge to identify methods of data constraint
- Knowledge to identify characteristics of a table, view, or index
- Knowledge to identify when triggers should be used
- Knowledge of schemas
- Knowledge of data type options for storing XML data

Section 6 – Data Concurrency (11%)
- Knowledge to identify factors that influence locking
- Ability to list objects on which locks can be obtained
- Knowledge to identify characteristics of DB2 locks
- Given a situation, knowledge to identify the isolation levels that should be used

Exam 612 Objectives

Section 1 – Database Design and Implementation (30.5%)
- Design tables and views
  - » Data types
  - » LOBs
  - » XML
  - » User-defined data types
  - » Temporary tables
  - » Clone tables
  - » Materialized query tables
  - » Temporal tables
- Explain the different performance implications of
  - » Identity columns
  - » Row ID
  - » Sequence objects
  - » Reordered row format
  - » Hash access
- Design indexes
  - » Structures and types
  - » Page sizes
  - » Column order
  - » Index on expression
  - » Include column

- Create and alter objects
  - » Design table spaces
  - » Determine space attributes
- Perform table space and index partitioning
- Normalize data and translate data model into physical model
- Implement user-defined integrity rules
  - » Referential integrity
  - » User-defined functions
  - » Check constraints
  - » Triggers
- Use the appropriate method to create and alter DB2 objects
- Understand encoding schemes

Section 2 – Operation and Recovery (29%)

- Issue database-oriented commands for normal operational conditions
  - » START, STOP, DISPLAY
- Issue database-oriented commands and utility control statements for use in abnormal conditions
  - » RECOVER, RESTART
- Identify and perform actions that are needed to protect databases from planned and unplanned outages and ensure that timely image copies are taken periodically
- Load and unload data into and from the created tables
- Reorganize objects when necessary
- Monitor the object by collecting statistics
- Monitor threads
- Identify and respond to advisory/restrictive statuses on objects
- Establish timely checkpoints
- Identify and perform problem determination
  - » Traces and other utilities
- Perform health checks
  - » Maintenance
  - » Check utilities
  - » Offline utilities
  - » Queries
- Develop backup scenarios
  - » Table spaces, indexes
  - » Roll forward, roll back, current point in time, prior point in time

- » System point in time copy and restore
- » Copies: full, incremental, system, FlashCopy®, hardware
- » Catalog and directory
- Understand special considerations for availability in a data sharing environment
  - » Recovery using LRSNs
  - » Rebuild of structures in coupling facility
  - » Concepts of virtual storage constraints and limitations (threads, open data sets, and so on)

Section 3 – Security and Auditing (7%)

- Protect DB2 objects
  - » Establish security profile
  - » Define authorization roles
  - » Identify the appropriate DB2 privileges required for access to DB2 resources
  - » Define and implement authorization and privileges on user and system database objects (grants and revokes)
- Protect connection to DB2
  - » Describe access to the DB2 subsystem (local request, remote request)
  - » Understand the options available and the differences
- Audit DB2 activity and resources and identify primary audit techniques
  - » Identify and respond appropriately to symptoms from trace output or error messages that signify security problems
- Create and maintain roles and trusted contexts
- Implement row- and column-level authorizations

Section 4 – Performance (29%)

- Plan for performance monitoring by setting up and running monitoring procedures
  - » Continuous, detailed, periodic, exception
- Analyze performance
  - » Manage and tune CPU requirements, memory, I/O, locks, response time, index and table compression
- Analyze and respond to RUNSTATS statistics analysis
- Determine when and how to run the REORG utility
- Understand and implement real-time statistics and DSNACCOR(X)
- Analyze cache
  - » Buffer pool tuning — sizes and thresholds
  - » Sort pool, RID pool, EDM pool — contents and performance

- Evaluate and set appropriately the performance parameters for different utilities
- Describe the performance concerns for the distributed environment
  » DDF
  » DBAT threads
  » Thread pooling
  » Connection pooling
- Describe DB2 interaction with WLM
- Interpret traces (statistics, accounting, performance) and explain the performance impact of different DB2 traces
- Identify and respond to critical performance thresholds
  » Excessive I/O wait times
  » Lock-latch waits and CPU waits
  » Deadlocks and timeouts
- Review and tune SQL
  » Interpret EXPLAIN output
  » Analyze access paths
  » Query parallelism
  » Indexable, stage 1, and stage 2 predicate types
  » Join methods
  » Block fetching
- Understand dynamic SQL performance
- Understand performance features
  » Hash access
  » Clustering
  » Inline LOBs
  » Include columns

Section 5 – Installation and Migration/Upgrade (4.5%)
- Run catalog health checks using queries and utilities
- Identify the critical DSNZPARMs
- Identify the migration/upgrade modes
- Identify and explain data sharing components and concepts such as
  » Coupling facility structures
  » GBP-dependent data sets