

Course 50068A: Microsoft SQL Server 2008 for the Experienced Oracle Database Administrator

Prerequisites

Before attending this course, students must have:

- Oracle DBA experience
- Familiarity with Microsoft Windows platforms
- Understanding of operating system fundamentals

Module 1: Database and Instance

This module provides an understanding of the two major components of a database system. The database constitutes the files that store data, and the instance is the collection of server resources that provide a powerful, high performance interface to the data. It also illustrates how the two interact to provide data requested by the clients. Viewing the database and the instance as two separate interactive components of the RDBMS helps us to divide-and-conquer the vast set of topics covered in this workshop.

Lessons

- Defining a Database and an Instance
- Introducing Microsoft's and Oracle's implementation of a database and an instance
- Understanding client interaction
- Key database and instance limitations

Module 2: Database Architecture

This module goes in-depth into structure, components, and contents of the files that constitute the database. To be able to manage hundreds of gigabytes, terabytes, or even *petabytes* of data, it is important to learn the techniques by which storage is viewed (physical and logical) and allocated. Databases use various hierarchies of storage structures such as blocks, extents, segments, and *tablespaces* to control storage allocation. The definition of schema and the objects that comprise the schema are introduced here. SQL Server uses similar techniques as Oracle; however, the differentiation from Oracle is in the functionality.

Lessons

- Schema and Data Structure (Objects)
- Storage Architecture
- Logging Model
- Data Dictionary

Lab : Database Architecture

- Working with Filegroups and Data Structures

Module 3: Instance Architecture

This module discusses the memory and process architectures that are key to a database's performance. The module goes into the details of the hierarchy of memory areas of an instance and its configuration. This module also describes how the various functions of the RDBMS are accomplished by the different processes running in the background. Finally, in this module, we look at the changes Oracle has made in its internal architecture on Microsoft Windows platform between 9i and 10g to exploit the advantages offered by the operating system mechanisms and how they compare to SQL Server's implementation.

Lessons

- Configure a Database server
- Memory Architecture Overview
- Memory Areas and Their Functions
- Process and Thread Architecture
- Controlling Resources in SQL Server 2008
- Client and RDBMS Interactions
- Background Processes/Threads and Their Functions

Lab : Instance Architecture

- Using the Resource Governor

- View Multi-Instances Shared Resources

Module 4: Data Objects

This module examines in greater detail the schema objects introduced in Module 2. While all schema objects are mentioned, of particular interest are tables, the type of data they can hold, and their storage layout. A proper understanding of data types and storage architecture of tables and indexes is useful in many aspects of database design and administration, such as fragmentation, capacity planning, and so on. A mapping of the native data types from Oracle to SQL Server provides the student with a very good reference on what data types are compatible and what are not.

Lessons

- Tables are the main objects that store data
- Indexes, views, stored programs, and other objects are the support structures
- Various table types compared based on data organization
- Various index types compared
- Native and non-native data type support
- Block-level storage architecture

Lab : Data Objects

- Create Partitioned Table
- Constraints and Triggers

Module 5: Data Access

This module focuses on how data is accessed and manipulated by the clients. Important concepts such as transaction, session, and so on are discussed here. This module describes the various commands available through SQL for manipulating data, metadata, transactions, sessions, and instances. An overview of procedural extensions to the SQL language available in Oracle (PL/SQL) and SQL Server (Transact-SQL) is given in this module. Cursors, which are data structures used to convey results of user transactions, are discussed as well to provide insight into what SQL Server supports and how they are used compared to Oracle.

Lessons

- Introduce database components involved in data access
- Introduce concepts of Transact-SQL and Procedural SQL as tools to access and manipulate data
- Discuss transactional management concepts

Lab : Data Access

- Generate queries with a GUI utility
- Concatenation and SQL Injection
- Stored Procedures
- Cursors

Module 6: Data Protection

This module fulfills the twin tasks of protecting data against unauthorized access (database security) and also from the destructive interaction between authorized users working concurrently (concurrency control). Under security, the various features for securing and auditing the database are discussed. Under concurrency control, the most important topic is locking. Understanding the differences in the concurrency models utilized by Oracle and SQL Server is important in order to design and manage systems that can support a large user population, great performance, and scalability.

Lessons

- Protecting data from unauthorized users and authorized users
- Using locking modes to achieve concurrency and consistency
- Implementing database security features
- Using auditing features to monitor database activity

Lab : Data Protection

- Working with SQL Server security

Module 7: Basic Administration

This module contains discussion on planning and installation of SQL Server. While basic duties such as creating,

starting, and shutting down a database are common to all databases, the options available for these functions are the key differences. True to the words "Knowledge is Power," familiarity with the data dictionary and the different ways a SQL Server DBA uses it compared to an Oracle DBA is an invaluable skill for any database administrator.

Lessons

- Planning and preparatory steps for a SQL Server environment
- Creation and configuration of an instance of SQL Server and databases
- Characteristics of a database
- Basic database maintenance tasks

Lab: Creating Database

- Define a user database
- Setting configuration parameters

Module 8: Server Management

This module discusses the administration of various types of resources such as system resources (such as memory, processes, storage, and so on) as well as low-level database resources (such as lock, latches, queues, and so on). As these resources are consumed by transactions, it is pertinent to be able to relate user sessions to the transactions they are running and to the resources they are consuming or requesting. Given the significant difference in how resources are managed and utilized in SQL Server compared to Oracle, it is important for the Oracle DBA to get a firm understanding of what is under the SQL Server hood in order to appreciate and best leverage the technology.

Lessons

- Server-level and instance-level resources such as memory and processes
- Database-level resources
- User sessions and their activity
- Concurrency structures

Lab: Resource Utilization

- Understanding threads
- Filegroups maintenance

Module 9: Managing Schema Objects

This module provides the administrative aspect of schema objects described in Module 4. The discussion covers planning, creation, and maintenance of many key schema objects. Choices in terms of table and index types, column types, and storage greatly influence the database growth, scalability, performance, and maintainability.

Lessons

- Naming guidelines for identifiers in schema object definitions
- Storage and structure of schema objects
- Implementing data integrity using constraints
- Implementing business rules at the database level

Lab: Managing Schema Objects

- Creating tables and associated objects
- Maintaining tables and indexes
- Creating indexed views

Module 10: Database Security

This module continues the discussion of data protection initiated in Module 6. This module examines the various features available for providing security such as logins, roles, profiles, and privileges. The topics such as encryption and auditing are also briefly discussed in this module.

Lessons

- Manage access to database through user accounts
- Control access to data through privileges and roles
- Manage access to server using login accounts

Lab : Database Security

- Create logins and users

- Grant permissions
- Revoke permissions

Module 11: Data Transport

This module examines the non-transactional mechanisms for moving data into and out of a database. The functionality varies based on homogeneous and heterogeneous databases. One key feature in SQL Server is SQL Server Integration Services (SSIS). SSIS provides users with the capabilities beyond complex ETL and high performance data movement from heterogeneous data sources. It also adds data mining capability to the process and more, all of which will be discussed in this module. Other approaches to bulk data movement will also be covered in this module and guidelines will be provided on which tools are appropriate for what scenarios.

Lessons

- Tools and functionality in Oracle and their equivalents in SQL Server in data transport out and into the database
- Tools and functionality in SQL Server for data transport within SQL Server and across multiple data sources and destinations

Lab : Transferring Data

- Use SQL Server Integration Services (SSIS) to migrate data into a flat file
- Use SQL Server Integration Services (SSIS) to import data from a business partner's flat file

Module 12: Backup and Recovery

This module lists the types of errors encountered in a database and the various mechanisms that are available to safeguard against these errors. This module discusses various types of backups and recovery methods available. This module also covers Oracle's Recovery Manager (RMAN) and the equivalent functionality available in SQL Server Management Studio.

Lessons

- Backup and recovery methods available in Oracle and SQL Server 2008
- Types of failure
- Types of recovery

Lab : Create and Execute a Maintenance Plan for Backup

- Create and execute a maintenance plan for backup
- Modify, Back up, and Restore a database

Module 13: Performance Tuning

This module is divided into two sections: tuning an instance and tuning an application. Tuning the instance involves taking steps to ensure that system resources such as memory, CPU, and I/O are used efficiently. Tuning an application starts with the design and architecture of the application and involves tuning database operations and access paths.

Lessons

- Performance tuning methodologies
- Tools and techniques for performance analysis and tuning

Module 14: Scalability and High Availability

This module provides a high-level overview of the scalability and high availability features available in each RDBMS. Oracle and SQL Server are both enterprise class RDBMS, therefore the topics of scalability and high availability are deemed important. However, due to the scope of the course the discussion here is at a conceptual level and does not go beyond the concepts. The features discussed include parallel query, replication, clustering, table partitioning, database mirroring, and database snapshots.

Lessons

- Key high availability features available in Oracle and SQL Server
- Key scalability features available in Oracle and SQL Server
- Compare scalability features in Oracle and SQL Server.

Module 15: Monitoring

This module shows the mechanisms by which the database can be monitored for availability, errors, and performance. Statistics that can be captured for both proactive and reactive administration of the databases are reviewed here.

Lessons

- Formulate requirements and identify resources to monitor database
- Types of monitoring
- Tools for monitoring

Lab : Integrating Performance Monitor Data in SQL Profiler

- Consolidating performance data and trace data for monitoring activity

Module 16: SQL Server Migration Assistant (SSMA)

This module focuses on automating the process of migrating from Oracle to SQL Server. This module presents an overview of the SSMA and will cover schema conversion, data migration, business logic conversion, validation, integration, and performance analysis.

Lessons

- Assessing tasks
- Converting codes
- Migrating data
- Testing
- Deployment