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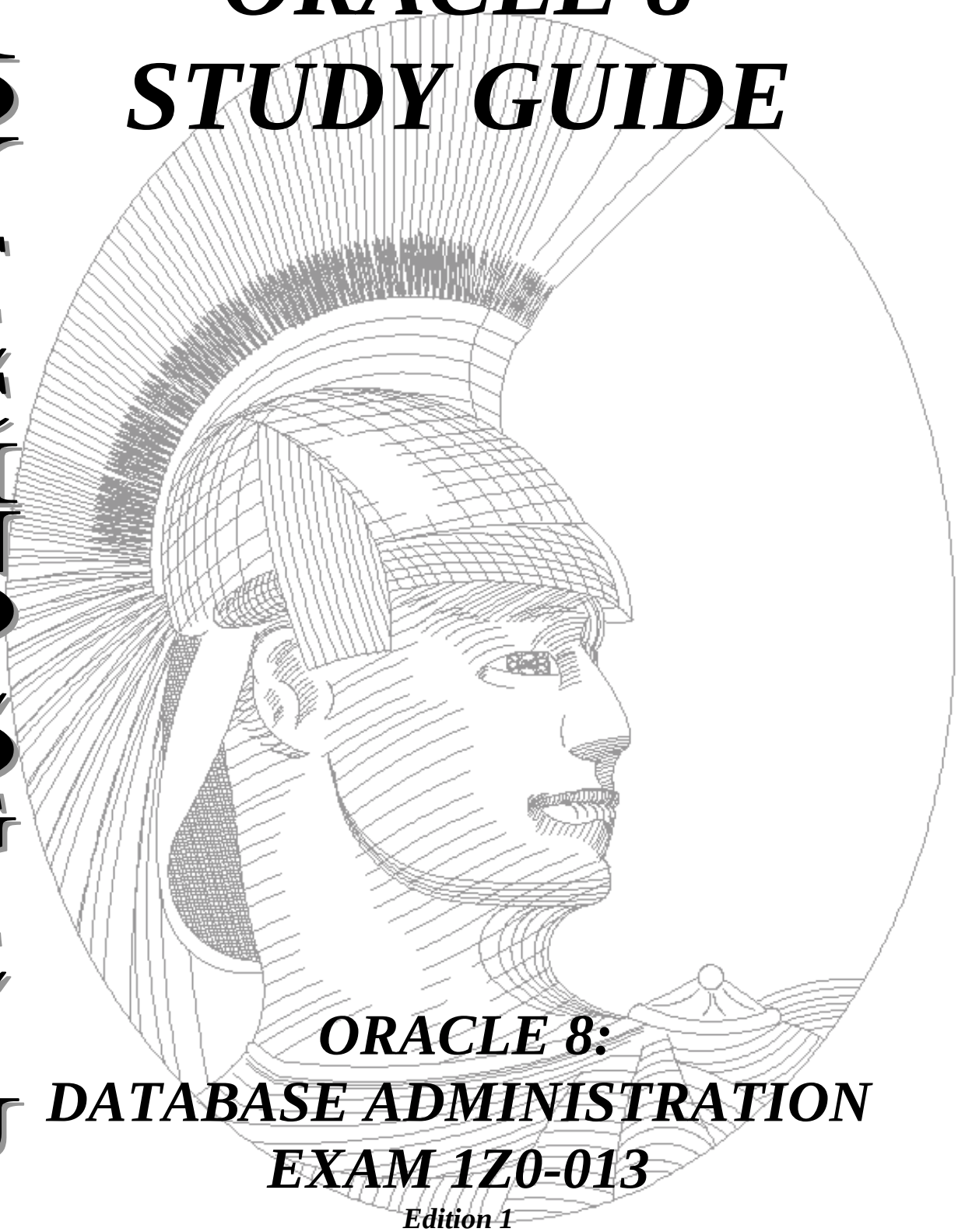
ORACLE 8 STUDY GUIDE



ORACLE 8: DATABASE ADMINISTRATION EXAM 1Z0-013

Edition 1

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Oracle 8 Database Administration Concepts

Oracle Architectural Components

A user can connect to an Oracle server in one of the following ways:

- Logging indirectly to the host.
- Using a two-tiered connection where the machine on which the user is logged in is connected directly to the machine running the Oracle server.
- Using a three-tiered connection where the user's machine communicates to an application or a network server which in turn is connected through a network to a machine running Oracle server.

The database administrators are responsible for maintaining the Oracle server so that the server can process user requests.

CONNECTING TO A DATABASE
The user who needs to interact with the Oracle server needs to establish a database connection.

User Process

- It runs on the client machine.
- It spawns when a tool or an application is invoked.
- Runs the tool or application, e.g. SQL *Plus, Server Manager.
- Includes the user program interface.
- Generates calls to the Oracle server.

Server Process

- When a user logs on to the Oracle server by specifying a username, password and a database, a process is created on the machine that is running the Oracle server. This is called a server process.
- It services a single user process in the dedicated server configuration.
- If using a Multi-Threaded Server (MTS), it is possible for multiple user processes to share server processes.
- Uses an area of memory called Program Global Area (PGA).
- Includes the Oracle Program Interface (OPI).
- Processes calls generated by a client.
- Returns results to the client.

Connection
A connection is a communication pathway between a user process and an Oracle server.

Session
A session is a specific connection of a user to an Oracle server. A session commences when the user is validated by the Oracle server and it ends when the user logs out or there is an abnormal termination.

Oracle server consists of an Oracle instance and an Oracle database. An Oracle instance consists of a memory structure called the System Global Area (SGA) and a background process used by Oracle server to manage a database.

System Global Area

The memory structures of an Oracle instance are contained in a memory region called System Global Area (SGA), which contains data and control information for Oracle server.

- **SHARED POOL:** Used to store information such as most recently executed SQL and most recently used data from data dictionary.
- **DATABASE BUFFER CACHE:** Used to store the most recently used data.
- **REDO LOG BUFFER:** Used to register changes made to database using the instance.

Background Processes

The background processes in an instance perform common functions that are needed to service the requests from several concurrent users without compromising the integrity and performance of the whole system. Every instance comprises five background processes by default.

DATABASE WRITER (DBWR)
Responsible for writing changed data to the database. DBWR writes the dirty buffers from the database buffer cache to the data files. It ensures that a sufficient number of free buffers exist (e.g. the buffers that can be over written when server processes need to read in blocks from the data files).

LOG WRITER (LGWR)
Records changes registered in the redo log buffer into the redo log files.

SYSTEM MONITOR (SMON)
Whose primary function is to check for consistency and initiate recovery of the database when the database is opened.

PROCESS MONITOR (PMON)
Cleans up the resources if one of the processes fails.

CHECKPOINT PROCESS (CKPT)
Responsible for updating the database status information whenever changes in the buffer cache are permanently recorded in the database.

Oracle Database

An Oracle database, identified by DB_NAME, represents the physical structures and is composed of operating system files. An Oracle database consists of following types of files:

DATA FILES
Store the data dictionary, user objects and before-images of data that are modified by current transactions. A database has at least one data file.

REDO LOG FILES
Contains a record of changes made to database to ensure reconstruction of data in case of failure.

CONTROL FILES
Contains the information needed to maintain and verify database integrity.

Apart from database files, Oracle server also uses other files:

PARAMETER FILE
Used to define the characteristics of an Oracle instance.

PASSWORD FILE
Used to authenticate privileged database users.

ARCHIVED REDO LOG FILES
Offline copies of the redo log files that may be necessary to recover from media failures.

Processing A Query

The following are the steps in processing of a query:

1. **PARSE**: In this stage, the user process sends the query to the server process with a request to parse or compile the request.
2. **EXECUTE**: During this phase, in the processing of a query, the server process prepares to retrieve the data.
3. **FETCH**: The rows that are retrieved by the query are returned by the server to the user during this phase.

THE SHARED POOL
The shared pool is a part of SGA that is used during the parse stage. The size of the shared pool is specified by the SHARED_POOL_SIZE in the parameter file.

LIBRARY CACHE
It stores the information of the most recently used SQL statements including the text of the statement, the parse tree that is a compiled version of the statement and the execution plan

which defines the steps to be followed in running the statement as determined by the optimizer.

DATA DICTIONARY CACHE
Also called dictionary cache or row cache. It is a part of the shared pool that stores the most recently used data dictionary information such as tables, column definitions, usernames, passwords and privileges.

DATABASE BUFFER CACHE

- It is an area in the SGA that stores the most recently used data blocks.
- The size of each buffer in the buffer cache is equal to the size of data block and is specified by DB_BLOCK_SIZE parameter.

PROGRAM GLOBAL AREA
It is the memory region that contains data and controls information for a single user server process or a single background process. PGA is an area that is used by only one process.

When using a dedicated server configuration, the PGA contains the sort area, session information, cursor state and stack space.

ROLLBACK SEGMENTS
Before making a change, the server process saves the value into a rollback segment. This image is used to undo the changes if the transaction is rolled back, and to recover the database in case of failure.

REDO LOG BUFFER
The server process records changes made by an instance in the redo log buffer which is a part of SGA. The size in bytes is defined by LOG_BUFFER. It stores redo records.

Using Administration Tools

SERVER MANAGER LINE MODE
A line mode utility is used for administrative tasks like starting up, shutting down or recovering a database. It is useful for performing unattended operations such as running nightly batch jobs and scripts. There are many Server Manager commands available in line mode:

- **SPOOL:** Enables or disables spooling of output to a specified file.
- **DESCRIBE:** Describes a function, package, package body, procedure, table or view.
- **ARCHIVE LOG:** Starts or stops automatic archiving of online redo log files, manually archives specified redo log files, or displays information about redo log files.

ORACLE ENTERPRISE MANAGER (OEM)
GUI to administer, monitor and tune multiple databases. It consists of a centralized console, intelligent agents and a package of standard application that provide database administrators functionality they need to manage database.

OEM Console
An application that permits a database administrator to manage several databases from one machine. It provides a global view of the system and consists of a menu, a launch pallette, a navigator which provides hierarchical view of Oracle services on the network, a map which permits Oracle services to be grouped based on spatial relationships, functions or both, a job that permits remote execution of tasks related to databases, listeners and an event system that monitors and reports on system status. The OEM common services are Repository, Service Directory and Security.

Intelligent Agent
A process that runs on remote nodes in the network. It executes jobs and events sent by the console and communicates results back to console using Net8.

OEM Repository
A set of database tables that holds information used by OEM.

OEM DATABASE ADMINISTRATION TOOLS

- Instance Manager
- Schema Manager
- Security Manager
- Storage Manager
- SQL Worksheet
- Backup Manager
- Data Manager

OEM PERFORMANCE PACK

- Performance Manager
- Top Session Monitor
- Lock Manager
- Advance Events
- Tablespace Manager
- Trace
- Expert

SQL*LOADER
Utility for loading data from external files into Oracle tables.

EXPORT OR IMPORT UTILITY
Utility for importing and exporting data in Oracle format.

PASSWORD FILE UTILITY
Utility for creating database password files.

Managing an Oracle Instance

During a database startup, the following events occur that take the Oracle database through the various stages of starting up of an instance, mounting the database and opening the database.

If an instance is started or a database is open, you can follow these steps to shut down the database:

1. Close the database.
2. Dismount the database.
3. Shutdown the instance.

DATABASE ADMINISTRATOR USERS
The two database administrator users SYS and SYSTEM are automatically created and granted the DBA role.

SYS has the password change_on_install and is the owner of database data dictionary.

SYSTEM has password manager and is the owner of additional internal tables used by Oracle tools.

Operating System Authentication

- Set up the user to be authenticated by the OS.
- Set REMOTE_LOGIN_PASSWORD_FILE to NONE.
- Use the commands of CONNECT / AS SYSDBA and CONNECT / AS SYSOPER.

Password File Authentication

- Create the password file using the password utility.
- Set REMOTE_LOGIN_PASSWORD to EXCLUSIVE or SHARED.
- Use the command CONNECT INTERNAL/ADMIN t connect to database.

THE INITIALIZATION PARAMETER FILE
The parameter file referred to as init<SID>.ora file is a text file that is located in $ORACLE_HOME/dbs directory on UNIX and in the %ORACLE_HOME%\ database directory on NT.

Parameter	Description
BACKGROUND_DUMP_DEST	Location where background process trace files are written.
DB_BLOCK_BUFFERS	Number of block cached in the SGA. Minimum is 50 buffers.
DB_NAME	Database SID identifier of eight characters of fewer.
SHARED_POOL_SIZE	Size in bytes of shared pool. The default is 3,500,000.

USER_DUMP_DEST	Location where user trace files are created.
LOG_BUFFER	Number of bytes allocated to the redo log buffer in the SGA.
MAX_DUMP_FILE_SIZE	Maximum size of the trace files, specified as number of operating system blocks.
SQL_TRACE	Enables or disables the SQL trace facility for every user session.

STARTING THE INSTANCE

Includes the following tasks:

- Reading the parameter file init<SID>.ora.
- Allocating the SGA.
- Starting the background processes.
- Opening the trace and alert files.

MOUNTING THE DATABASE

Mounting includes the following tasks:

- Associating a database with a previously started instance.
- Locating and opening the control files.
- Reading the control files.

OPENING THE DATABASE

Opening the database includes the following tasks:

- Opening the online data files.
- Opening the online redo log files.

INSTANCE RECOVERY

Occurs when the instance cannot continue to work (e.g. in case of operating system crash, etc.). It includes the following steps:

- Rolling forward to recover data that has not been recorded in the data files but in the online redo log files.
- Opening the database.
- Rolling back uncommitted transactions by SMON and by individual server processes as they access locked data.

SHUTTING DOWN THE INSTANCE

It includes the following steps:

- Closing the database.
- Dismounting a database.
- Shutting down the instance.

Shutting Down the database can be Normal, Transactional, Immediate and Abort.

DYNAMIC PERFORMANCE VIEWS

These views are called so because they are continuously updated while a database is open and is in use. These are maintained by Oracle server, contain data on disk and memory structures, contain data that is useful for performance tuning and have public synonyms with the prefix V$.

View	Description
V$PARAMETER	Contains information about the initialization parameter.
V$PROCESS	Contains information about the currently active process.
V$VERSION	Lists the version number and the components.
V$CONTROLFILE	Lists the number of control files.
V$DATAFILE	Contains the data file information from the control file.
V$LOGFILE	Contains the information about the online redo log files.

RESTRICTED SESSION

A restricted session is useful when you perform structure maintenance or database export and import.

TRACE FILES

- They can be written by server and background processes.
- Oracle dumps information about errors in the trace files.
- The ALERT file consists of a chronological log of messages and errors.
- Server process tracing can be enabled by the ALTER SESSION command and disabled by the parameter SQL_TRACE.

The trace files are controlled by following commands:

Command	Description
BACKGROUND_DUMP_DEST	Defines the location of background trace file and ALERT file.
USER_DUMP_DEST	Defines when the trace file will be created at the request of users.
MAX_DUMP_FILE_SIZE	Specified in O/S blocks. Limits the size of user trace files.

Creating A Database

CREATION PREREQUISITES

- A privileged account is authenticated either by the operating system or by using a password file.
- There should be enough memory to start the instance.
- There should be sufficient disk space for the planned database.

DATABASE FILE LOCATIONS

- There should be at least two active copies of database control file on at least two different devices.
- Multiplex the redo log files and put group members on different disks.
- There should be separate data files whose data will participate in disk resource contention across different physical disk resources, have different life spans and have different administrative characteristics.

On UNIX, the database is created automatically during installation or created manually after installation.

On NT, the database is created using Oracle Database Assistant or created manually.

- Create the new init<SID>.ora.
- For starting the instance connect as SYSDBA and start the instance in NOMOUNT stage.
- Creation of a database fails if there are syntax errors in the SQL script, files that should be created already exist or if there are operating system errors.

After creation of a database, the database contains:

- Data files that make up the SYSTEM tablespace.
- Control files and redo log files.
- User SYS/change_on_install.
- User SYSTEM/manager.
- Rollback segment SYSTEM.
- Internal tables but no data dictionary views.

Creating Data Dictionary Views and Standard Packages

The data dictionary provides information about logical and physical database structure, names, definitions and space allocation of schema objects, integrity constraints, database users and privileges and auditing.

The data dictionary located in the SYSTEM tablespace and owned by the user SYS contains base tables and data dictionary views.

DATA DICTIONARY VIEWS CATEGORIES

The prefix USER refers to the objects owned by the user.

The prefix ALL refers to views accessible by any user and usually includes the column OWNER.

The prefix DBA refers to the views that give information on all the objects in the database and usually include the column OWNER.

The data dictionary views DBA_EXTENTS, DBA_FREE_SPACE and DBA_SEGMENTS provide space allocation for database objects.

The data dictionary views DBA_ROLLBACK_SEGS, DBA_DATA_FILES and DBA_TABLESPACE are general database structures.

The data dictionary views DBA_AUDIT_TRAIL, DBA_AUDIT_OBJECTS and DBA_AUDIT_OBJ_OPTS give auditing information.

The commonly used data dictionary views are created by catalog.sql script.

The stored procedures are functions or procedures that are stored in data dictionary, can be used by many users, can accept and return parameters and can be used in SQL functions.

The Packages are group logically related PL/SQL types, items and subprograms that have two parts a specification and a body and allow Oracle to read multiple objects into memory at once.

Supplied Oracle packages include:

Package	Description
DBMS_LOB	Provides routines for operations on BLOB and CLOB datatypes.
DBMS_SESSION	Generates SQL commands like ALTER SESSION or SET ROLE.
DBMS_UTILITY	Provides various utility routines.

Maintaining the Control File

The control file is a binary file for the database to start and operate successfully. Every time an instance mounts an Oracle database, it reads the control file to locate the data files and online redo log files. The control file contains the information of database name and location, the names and locations of the data files and redo log files, the names of the tablespace, the time stamp of the database creation, the current log sequence number, checkpoint information, log history and backup information of the recovery manager utility. You can create a database with multiple control files by specifying up to eight fully qualified control file names using the parameter CONTROL_FILES.

Maintaining Redo Log Files

The Oracle server maintains the redo log files to minimize the loss of data in the database. A set of identical copies of online redo log files is called an online redo log group. The redo log buffer is used in a circular manner. The redo entries are written to one of the online redo log groups called the current online redo log group by the LGWR process. The possible LGWR errors are that one member of a group of two or more is not available, all the members of the next group are not available or all the members of the current group are not available.

Maintaining Tablespaces and Data Files

The database architecture includes the logical and physical structures that makeup the database. The physical structure consists of control files, online redo log files and data files. The logical database structure includes tablespaces, segments, extents and data blocks.

TABLESPACES

- It can belong to only one database.
- It consists of one or more operating system files.
- Tablespaces can be switched between read-write and read-only status.
- A tablespace is created by CREATE TABLESPACE command.

SEGMENTS

- A segment is a space allocated for a specific type of logical storage structure within a tablespace.
- It can be Table Segment, Index Segment, Temporary Segment or Rollback Segment.

EXTENTS

- The next level of logical database is called extent.
- Each type of database is consists of one or more extents.

TYPES OF TABLESPACES

A SYSTEM tablespace contains data dictionary information and SYSTEM rollback information.

A NON-SYSTEM tablespace contains Rollback Segments, Temporary Segments, Application Data and Application Indexes.

A temporary tablespace is created by database administrator to be used for sort segments and can not contain any permanent objects.

You can add a data file to a tablespace to increase the total amount of disk space allocated for the tablespace by the ALTER TABLESPACE ADD DATAFILE command.

You can alter the data file by either automatically using the AUTOEXTEND command or by manually using the ALTER DATABASE command.

The ALTER DATABASE command is used to manually increase or decrease the size of data file.

To make the tablespace read-only, the tablespace must be online, there should be no active transactions, the tablespace should not contain any active rollback segments and the database must not currently be involved in an online backup.

Storage Structure and Relationships

DATABASE STORAGE HIERARCHY

- A database is logically grouped into tablespaces.
- A tablespace may consist of one or more segments.
- When a segment is created it consist of at least one extent.
- An extent is a contiguous set of blocks.
- A block is the smallest unit used for read-write operations.

TYPES OF SEGMENTS

These are Table, Table Partition, Cluster and Index. Others include Index-Organized Table, Index Partition, Rollback and Temporary Segment, LOB Segment, LOB Index, Nested Table and Bootstrap Segment.

EXTENT ALLOCATION AND DEALLOCATION

Allocated when the segment is created, extended or altered and is deallocated when the segment is dropped, altered, truncated or automatically resized.

DATABASE BLOCK

- Minimum unit of I/O.
- Consists of one or more O/S blocks.
- Set by DB_BLOCK_SIZE.
- Set at database creation.

PCTFREE

PCTFREE for a data segment specifies the percentage of space in each data block reserved for growth resulting from updates to rows in the block. The default for PCTFREE is 10 percent. The default for PCTUSED is 40 percent.

Managing Rollback Segments

A Rollback Segment is used to save the old value when a process is making changes to the data in the database. The purpose of Rollback Segment is transaction rollback, transaction recovery and read consistency. The types of rollback segment are SYSTEM and NON-SYSTEM and can be private and public.

When planning rollback segments number it can be OLTP or Batch.

The rollback segments can have the problems of insufficient space for transactions, read-consistency error, blocking transaction or errors in taking the tablespace offline.

Managing Temporary Segments

- Temporary segments may be created either in a PERMANENT tablespace or in a TEMPORARY tablespace.

- A TEMPORARY tablespace is used exclusively for temporary segments and can not have any other type of segment.
- Temporary segments in permanent tablespace are created when needed on a per transaction basis or reclaimed by SMON when the statement completes execution.
- Temporary segments in a temporary tablespace are known as Sort Segments. There is only one segment per tablespace per instance. It is reused by several transactions based on information in the Sort Extent Pool and is released on instance shutdown.
- The views used to obtain information about temporary segments and their usage are:
    - DBA_SEGMENTS query this view to get information on both types of temporary segments.
    - V$SORT_SEGMENT this view gives the status of the sort extent pool used by instance.
    - V$SORT_USAGE this view only shows currently active sorts for an instance.

Managing Tables

- The user data is stored in the Regular table, Partitioned table, Index-Organized table and Clustered table.
- Row data is stored in database blocks as variable length records.
- The data types can be user-defined and built-in.
- The built-in data type stores scalar data, collections and relationships.
- ROWID data type is a unique identifier for a row and is used to locate a row. Restricted ROWID can identify rows within a segment and needs less space.

COLLECTION

- These are the objects that contain objects.
- VARRAYs are ordered sets of elements containing a count and a limit.
- Nested tables are tables with a column or variable of a TABLE data type.

When creating a table, use a few standard extent sizes for tables to reduce tablespace fragmentation and use the CACHE clause for frequently used small tables. A table may be blocked if it is no longer needed or if it is to be organized.

Managing Indexes

An index is a tree that allows direct access to a row in the table.

1. Logical index consists of single column or concatenated and UNIQUE or NON-UNIQUE.
2. Physical index can be partitioned or non-partitioned and B-Tree or bitmap.

B-TREE INDEX

At the top of the index is the root. At the next level are branch blocks which in turn point to blocks at the next level in the index. At the lowest level are the leaf nodes.

BITMAP INDEX
These are more advantageous than B-Tree when a table has millions of rows and keys, the key columns have low cardinality, and when there is read-only or low update activity on key columns.

Some of the storage parameters and block utilization parameters can be modified by using the ALTER INDEX command. Drop and re-create an index before bulk loads.

Maintaining Data Integrity

- Data integrity guarantees that data in a database adheres to business rules and it can be maintained by the Application code, Database triggers and Declarative integrity constraints.
- The types of constraints are NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY and CHECK.
- An integrity constraint can be in the state of disabled, enabled, non-validated or enforced and enabled validate.
- DBA_CONSTRAINTS gives the constraint information.

Using Clusters and Index-Organized Tables

A cluster can be used to store related sets of rows within the same Oracle server block. A cluster has the following characteristics:

- Clusters have cluster key.
- The cluster key may consist of one or more columns.
- Tables in a cluster have columns that correspond to cluster key.
- Clustering is a mechanism that is transparent to the application using the tables. Data in a clustered table can be manipulated as though it was stored in a regular table.
- Updating one of the columns in the cluster key may entail physically relocating the row.
- The cluster key is independent of primary key.
- Clusters are usually created to improve performance.
- There are two types of clusters INDEX CLUSTER and HASH CLUSTER.
- A large row in an index-organized table might destroy the dense storage of rows in the index.

Loading and Reorganizing Data

- The methods available for loading data into tables in Oracle database are Direct-load insert, SQL*Loader and Export and Import utilities.
- SQL*Loader provides two methods for loading data: Conventional Path and Direct Path.
- The log file contains the header information, global information, table information, data file information, table load information and summary statistics.
- In SQL*Loader, other output files are bad file and discard file.

- Import can be invoked using command line, interactive mode and graphical interface.
- Use direct load insert to copy tables.
- Use SQL*Loader to migrate from other applications.
- Use Export And Import utilities to reorganize data.

Managing Users

- A security domain defines the settings that apply to the user. The database administrator defines the names of the users allowed to access database.
- A user needs access to the database and can be authenticated by the Operating system and Network databases.
- A schema is a named collection of objects such as tables, views, clusters, procedures and packages associated with a particular user.
- A user can be created by the CREATE USER command.
- You can use ALTER USER command to change password and account locking.
- You may need to modify tablespace quota when tables owned by a user exhibit unanticipated growth, when an application is enhanced and requires additional tables or indexes, and when objects are reorganized and placed in different tablespaces.

Managing Profiles

- Profiles are named sets of resources and password limits.
- These are assigned to users by the CREATE/ALTER USER command.
- Can be enabled or disabled.
- Can relate to the DEFAULT profile.
- Can limit system resources on session or call level.
- To manage the resources with profiles create profiles, assign profiles to the user and enable resource limits.
- Set the initialization parameter RESOURCE_LIMIT to TRUE or enforce the resource limits by enabling the parameter with the ALTER SYSTEM command.
- DBA_USERS gives the profile information and username while the DBA_PROFILES gives the information about profile, RESOURCE_NAME, RESOURCE_TYPE and limit.

PASSWORD MANAGEMENT

The available password management features are:

- Account Locking.
- Password aging and expiry.
- Password history.
- Password complexity verification.

Set up the password management by using profiles and assigning them to users. Lock, unlock and expire accounts using the CREATE USER or ALTER USER command. Password limits are always enforced even if RESOURCE_LIMIT for an instance is set to FALSE.

Parameter	Description
FAILED_LOGIN_ATTEMPTS	Gives the number of failed login attempts before lockout of the account.
PASSWORD_LIFE_TIME	Lifetime of the password in days after which the password expires.
VERIFY_FUNCTION	The minimum length is four characters. The password should not be equal to username, password should have at least one alpha, one numeric and one special character and the password should differ from the previous password by at least three letters.

MANAGING PRIVILEGES

There are two types of privileges:

- SYSTEM that enables users to perform particular actions in the database.
- OBJECT that enables users to access and manipulate a specific object.

SYSTEM PRIVILEGES

There are about 80 percent system privileges. The ANY keyword signifies that the users have privileges in every schema. The GRANT command adds a privilege to a user or a group of users. The REVOKE command deletes the privileges.

PASSWORD FILE AUTHENTICATION

- Create the password file and set the REMOTE_LOGIN_PASSWORD_FILE parameter.
- Set REMOTE_LOGIN_PASSWORD_FILE=EXCLUSIVE
- Grant SYSOPER and SYSDBA privileges to users.

Managing Roles

Oracle provides easy and controlled privilege management through roles. The role has following characteristics:

- Granted to and revoked from users with the same commands used to grant and revoke system privileges.
- May be granted to any user or role except to itself.
- Can consist of both SYSTEM and OBJECT privileges.
- May be enabled or disabled for each user granted the role.
- Can require a password to enable.
- Have their description stored in data dictionary.

BENEFITS OF ROLES

- The roles have the benefit of reduced granting of privileges.
- There is dynamic privilege management.
- Selective availability of privileges.
- Granted through OS.
- Improved performance.

The two roles that are provided are RESOURCE and CONNECT. Disable a role to temporarily revoke the role from a user, enable a role to temporarily grant it. The SET ROLE command enables and disables roles, default roles are enabled for a user at login and a password may be required to enable a role.

Attribute	Description
DBA_ROLES	Shows all roles that exist in database.
DBA_ROLES_PRIVS	Roles granted to users and roles.
DBA_SYS_PRIVS	System privileges granted to users and roles.

Auditing

The categories of auditing are:

- Auditing privileged operations
  - Always audited.
  - Startup, shutdown and SYSDBA connections.

- Database auditing
  - Enabled by DBA.
  - Can not record column values.

- Value-based or application auditing
  - Implemented through code.
  - Can record column values.
  - Used to track changes to tables.

Audit Parameters	Description
ALL_DEF_AUDIT_OPTS	Are default audit options.
DBA_STMT_AUDIT_OPTS	Are statement auditing options.
DBA_PRIV_AUDIT_OPTS	Privilege auditing options.

AUDIT TRAIL

- Stores the records generated by statement, privilege and object auditing.
- The audit records are stored in the SYS.AUD$ data dictionary table or in the OS audit trail.
- Each record in the audit trail includes the user who executed the statement, the action code, any system or privilege used, the object referenced in the statement and the data and time the statement was issued.

Using National Language Support

The features of NLS are:

- Language support
- Territory support

- Character set support
- Linguistic sorting
- Message support
- Date and time format
- Numeric formats
- Monetary formats

Encoding schemes include:

- Single byte character sets that can be 7-bit and 8-bit.
- Varying-width multi byte character set.
- Fixed-width multi byte character set.
- Unicode (UTF8, AL24UTFFSS)

There are three ways to specify the NLS parameters:

1. Initialization parameter.
2. Environment variables.
3. ALTER SESSION command.

Oracle 8 Database Administration Practice Exam

1. At what point in the commit process can the Oracle server guarantee that the changes will not be lost in case of an instance failure?

A: After all the entries in the redo log buffer are written to the redo log files.

2. Which three situations cause the database writer (DBWR) process to write to disk? (Choose three.)

A: The dirty list reaches a threshold length.
Process scans a specified number of buffers in the LRU list without finding a free buffer.
A time-out occurs.

3. What are the two main reasons why Oracle uses rollback segments? (Choose two.)

A: In case a user decides to rollback his transaction.
To provide a read consistent view of data in the process of being changed.

4. Which of the following is always true?

A: The database has at least two groups of redo log files.

5. A coworker, connected as the system user, created a table with a primary key, a foreign key, and two unique constraints. Later, you connected a SYSDBA to verify that the table was created correctly. Which data dictionary view could you query to find the names of the constraint your coworker created?

A: USER_CONSTRAINTS

6. Which constraint is not a valid type of integrity constraint?

A: NON-UNIQUE.

7. As the DBA, you must monitor objects created by users. Which data dictionary view could you query to display a list of clusters, the tables in each cluster, and the matching column names for clusters owned by user LYNN?

A: DBA_CLU_COLUMNS

8. You created the ORD_CLU index cluster to store the ORD_TRANS and ORD_SALE tables. Which data dictionary view could you query to display the key size of ORD_CLU?

A: DBA_CLUSTERS

9. The RESOURCE tablespace is read-only. What effect will this have on the TRAN_DATA table, contained within the RESOURCE tablespace?

A: The table can be dropped.

10. Which data dictionary view would you query to display the size of the datafile you created with CREATE TABLESPACE command?

A: DBA_DATA_FILES.

11. What are the proper steps to relocate the SYSTEM tablespace?

A: Shut down the database, use the operating system to move the files, mount the database, and use the ALTER DATABASE RENAME FILE command.

12. Users of the Order Entry application are getting errors because the PROD tables space has used all the allocated disk space. How would you increase the size of the tablespace by adding new data file?

A: Use the ALTER TABLESPACE ADD DATAFILE command.

13. You are attempting to create a new tablespace when you receive this error:

ORA-1118: Cannot add any more database files: Limit of 100 Exceeded.

What is the quickest why to solve this problem?

A: Recreate the Control Files.

14. How can you implement values-based auditing to gather information about records before and after an update?

A: Use Database triggers.

15. Which data dictionary view would you query to display the temporary tablespace assigned to user APPL_Hr?

A: DBA_USERS

16. What happens if you attempt to issue the DROP USER command to remove a user with an active session?

A: The DROP USER command will fail.

17. What is the relationship between the username of a user and her corresponding schema?

A: A unique username and schema must be specified when the user is created. They can be same or different.

18. Which Server Manager line mode command will display the current log sequence number?

A: ARCHIVE LOG LIST.

19. When monitoring the alert file, you notice that LGWR frequently has to wait for a group because a checkpoint has not completed. What should you do?

A: Add redo log groups.

20. The PROD database has two log files with two members in each group. A redo log file is corrupt in all members of one group. As the DBA, what could you do?

A: Reinitialize the group by using the ALTER DATABASE CLEAR LOGFILE command.

21. The REF database does not have any DML or DDL activity. To reduce resource contention, you want to eliminate time-based checkpoints. How would you disable time-based checkpoints?

A: Set the LOG_CHECKPOINT_TIMEOUT initialization parameter to "0".

22. You queried the V$LOGFILE view and the status of group two is STALE. What does status "STALE" mean?

A: The contents of the file are incomplete.

23. How can you create a Password file?

A: Use the external Oracle password utility.

24. How can a DBA enable the writing of error messages to trace files by server and background processes?

A: No activation is necessary – it is the default setting.

25. Where could you find the date and time that the PROD database was last shut down?

A: ALERT.LOG.

26. Which three init.ora parameters can be modified for an existing database by changing the value and restarting the instance? (Choose three.)

A: BACKGROUND_DUMP_DEST.
SHARED_POOL_SIZE.
LOG_BUFFERS.

27. You need to add two additional control files to the PROD database. How would you specify their location?

A: Shut down the instance, change the parameter file, and restart the database.

28. You grant John the ALTER USER privilege so he can set up default roles for users in his department. What will happen to the default role for these users if you drop John with the CASCADE option?

A: Dropping John will have no effect on the user's default roles.

29. You dropped several tables in the HR_DATA tablespace. The HR_APPL_PKG package is based on tables in HR_DATA tablespace. Using Server Manager, how would you check to see if the package is now invalid?

A: Query the DBA_OBJECTS data dictionary view.

30. What is shown by data dictionary views that begin with USER_?

A: Objects owned by the user.

31. In the Orders Tables, you want to point to the PRODUCT_ID value in Products table rather than store the NUMBER value. Which data type would you use for the pointer?

A: REF.

32. You ran the analyze command on the employee table owned by user APPL_HR. You need to determine the number of empty blocks in the table. Which data dictionary view would you query to display the value?

A: DBA_TABLES

33. You analyzed the EMP table to generate statistics based on a sample. Which data dictionary view would you query to display the number of chained or migrated rows?

A: DBA_AUDIT_OBJECTS

34. You are creating a reference table for the inventory application. The initial data will not be updated, but the table will experience an occasional insert. Which space utilization parameter would be most appropriate for this table?

A: Low PCTFREE

35. Which data dictionary view would you query to display the tables and columns associated with indexes owned by user APPL_HR?

A: DBA_IND_COLUMNS

36. You are creating a large index on the EMP table. This index will have a high number of inserts. What could you do to speed up creation of the index?

A: Use the NOLOGGING clause in the CREATE INDEX command.

37. In which three cases might a bitmap index by appropriate? (Choose three.)

A: Table has many rows.
Column has few distinct values.
Table is part of a data warehousing application.

38. Which three characteristics correctly describe index structures? (Choose three.)

A: Can be created UNRECOVERABLE.
Typically smaller than the indexed table.
Has its own segment structure.

39. For which task would you use the OEM console Job System?

A: View the spatial relationships between Oracle Services.

40. You are resizing the TEMP tablespace and need to prove for segments and their usage. Which dynamic performance view would you query to display the number of extents allocated to currently active sorts in the instance?

A: V$SORT_SEGMENT

41. When would a temporary segment be created in a temporary tablespace?

A: When the first statement that uses a temporary tablespace for sorting, after startup, is issued.

42. You are documenting the Order Entry Application. The application grants users the SALES_CLERK role to insert new orders. You need to know if the role requires a password. Which data dictionary view could you query to display this information?

A: DBA_ROLES.

43. Who owns a role?

A: Nobody.

44. Which data dictionary view would you query to display the number of bytes available in the USERS tables?

A: DBA_FREE_SPACE.

45. Which storage parameter affects space usage within an Oracle block?

A: INITIAL.

46. You anticipate the TRANS table in the order Entry application to be very large. Which segment type would you use for better manageability of the table?

A: table partition..

47. You altered the NLS_SORT parameter using the ALTER SESSION command. Which data dictionary view would you query to display the current NLS_SORT parameter value?

A: NLS_SESSION_PARAMETERS

48. You are determining initialization parameter values for the PROD database. Which initialization parameter determines the local currency symbols?

A: NLS_TERRITORY

49. You are determining the correct character coding scheme for the TECH database. Which encoding scheme represents all characters for computer usage?

A: Unicode.

50. You are exporting and importing data to reorganize data in the EMP table. Which command line parameter would you use during the export to create an initial extent the size of the current segment during the import?

A: COMPRESS

51. You need to migrate your Oracle7.3 database to Oracle8. Which method would you use to upgrade the database?

A: Export and Import utilities

52. When using SQL Loader conventional path loading, where is the column definitional?

A: Control file.

53. You are going to insert data from OLD_EMP table into New_EMP table using Direct Path load. The NEW_EMP table has had a lot of rows deleted. How will the data be inserted into the NEW_EMP table?

A: Above the high-water-mark, wasting space.

54. When creating a new database, what are the minimum number of online redo log file groups, and how many files must each contain?

A: redo log groups: 2 files in each groups: 1

55. You are creating the PROD database and altering the parameter file. Why is it so important to be accurate when specifying the database block size at database creation?

A: You must recreate the database to alter the database block size.

56. Which file is opened at the mount stage of the database?

A: Control file.

57. Which information is stored in the control file?

A: Time stamp of database creation

58. You need to check to see if rollback segment RBS is offline before you drop it. Which data dictionary view would you query to display the status of the rollback segment?

A: DBA_ROLLBACK_SEGS

59. How would you shrink a rollback segment?

A: Use the ALTER ROLLBACK command to specify to SHRINK size.

60. The high-water-mark size for the RBS rollback segment is larger than its actual size. What might have caused this?

A: The rollback segment has grown and then shrunk.

61. What must you do to enforce the use of profiles?

A: Set the RESOURCE_LIMIT parameter in init.ora to TRUE.

62. A user is inadvertently starting up five or more concurrent sessions. You need to limit his concurrent sessions to two and have never before used resource limits. How would you create and assign a restriction on the number of concurrent sessions for a single user?

A: Use the CREATE PROFILE command to create a profile, use the ALTER USER command to assign the profile, and use the ALTER SYSTEM command to enforce the resource limits.

63. How can you view information on all the system privileges granted to all users?

A: In the DBA_SYS_PRIVS dictionary view.

64. You are monitoring space allocated to rollback segment RBS2. Which dynamic performance view would you query to display the number of extents allocated to a rollback segment?

A: V$ROLLSTAT.

65. Which three characteristics correctly describe a rollback segment? (Choose three.)

A: Holds data to rollback a transaction.
Allows for read consistent queries.
Used to rollback uncommitted transactions after an instance failure.

66. For a rollback segment to be dropped, what state should it be in?

A: OFFLINE..

67. The current redo log group has a corrupt member. You need to force a log switch to drop the group and recreate it. Which SQL command would you use?

A: ALTER SYSTEM SWITCH LOGFILE.

68. You need to increase the number of online redo log groups to six. Which two dynamic performance views could you query to display the number of current online redo log groups and the current log group? (CHOOSE TWO)

A: V$LOG.
V$INSTANCE.

69. You are preparing the operating system for database creation and are planning for redo log files. The database will have archiving enabled. Which three situations might effect the size of your redo log files? (Choose three.)

A: Number of log switches and checkpoints.
Number and amount of redo log entries.
Amount of space on the storage medium.

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70. Which startup mode should you use prior to database creation?

A: Mount

71. You need to shut down the database to increase the size of the SGA. You query the data dictionary and discover that ten users are currently connected and that there are five pending transactions. You do not want additional users to sign on and do not want to wait until the current users disconnect, but you do not want to rollback the active transactions when you shut down. Which shutdown mode should you use?

A: Transactional.

72. You use OEM to store startup configurations of multiple databases. Where would these configurations be stored through OEM?

A: On each server that contains a database.

73. You are using Server Manager in line mode and connected as SYSDBA. You need to reorganize tables and indexes in several tablespaces. Which startup command would be most appropriate for this task?

A: STARTUP RESTRICT PFILE=init.ora.

74. What characterizes a temporary segment created in a temporary tablespace?

A: Temporary segment are created by the first sort after startup.

75. When creating a tablespace for temporary segments, which guideline would you use to specify DEFAULT STORAGE?

A: Set INITIAL=next= (multiple of SORT_AREA_SIZE) + DB_BLOCK_SIZE and pctincrease=0.

76. You run the ANALYZE command and compare the data to the statistics generated three weeks ago. The number of index entries has dropped considerably. What should you do to the index?

A: Deallocate the unused extents.

77. In which case would a bitmap index be appropriate?

A: Tables are large, with low degree of cardinality on the indexed columns.

78. You are encoding to run the script to create the data dictionary views. Which user should you connect as to execute the script?

A: SYS.

79. What is shown by data dictionary views that begin with ALL _?

A: Objects to which user has access.

80. Which data dictionary view would you query to display the NLS_CURRENCY value initialized a startup?

A: NLS_SESSION_PARAMETERS.

81. You are determining the correct character coding scheme for the PROD database. Under which encoding scheme is the ASCII standard?

A: single byte 7-bit.

82. You are determining initialization parameter values for the PROD database. Which initialization parameter determines the language for day and month names?

A: NLS_LANGUAGE.

83. You created the SALE_CLU hash cluster to store data from the SALE_DATA and SALE_TRAN tables based on a key value. Which data dictionary view could you query to display the function used to calculate the location of the rows for SALE_CLU?

A: DBA_CLUSTERS.

84. You are monitoring the space requirements of the Resources application. Which data dictionary view would you query to display the amount of space granted to the user APPL_HR on the HR tablespace?

A: DBA_TS_QUOTAS.

85. You created some tables on which other entry users will perform DML operations. What quota allocation should each order entry user be assigned on the tablespace that contains the rollback segments?

A: Enough to accommodate the size of the largest transaction.

86. You are exporting and importing data to reclaim wasted space. What is the order of import when table objects are read from the export file?

A: Table definitions; table data; indexes on the table; integrity constraints; triggers; and bitmap indexes.

87. You need to move the tables created by user LANE before you remove the username from database. How would you move the data?

A: Export and Import utilities.

88. You need to export and import two tables and the triggers associated with the tables from user LANE to user LONN. Which parameter would you specify when exporting the data using command line?

A: Tables.

89. You moved the data files for the PROD database. You are going to restart the instance and need to specify the new location of the data files. How would you rename a data file?

A: Mount the database, then use the ALTER DATABASE command to update the control file.

90. You need to backup the control files after you shut down the instance. Which two dynamic performance views could you query to display the location and names of the control files? (Choose two.)

A: V$CONTROLFILE.
V$PARAMETER.

91. You created the profile IDLE_TIME_PROF and need to assign it to users who have been granted the DEVELOPER role. How would you assign the profile to members of a role?

A: Use the ALTER USER PROFILE command to assign it to each member of DEVELOPER.

92. Which three resources can be controlled through the use of profiles? (Choose three.)

A: CPU time.
Connect time.
Number of block reads.

93. You are creating the PROD database and preparing the parameter file before starting up an instance. For which three parameters, at least, should you specify a value rather than using the default value? (Choose three.)

A: CONTROL_FILES.
DB_BLOCK_SIZE.
DB_NAME.

94. You are creating users and assigning roles. Which predefined role will allow the user to query the data dictionary views?

A: SELECT_CATALOG_ROLE.

95. Which data dictionary view could you query to display the roles that are currently enabled?

A: SESSION_ROLES.

96. You are creating a reference table that will experience very few inserts or deletes. It will have a high number of updates to a column that will contain null values when it is created. Which space utilization parameter would be most appropriate for this table?

A: High PCTFREE.

97. You need to check for row migration in the DEPT table. Since it is not a large table, you want to generate statistics based on a full table scan. Which command could you use to generate the statistics?

A: ANALYZE TABLE DEPT COMPUTE STATISTICS.

98. By default, if you create a table omitting the NOLOGGING clause. Where will the table determine if redo logging should occur for the table during certain data loads?

A: tablespace parameters.

99. Rather than creating a PHONE_NUMBER table, you want to store multiple telephone number for customers as an ordered set of data elements in the customer table. Which data type would you use for the telephone number values?

A: VARRAY.

100. You need to determine the physical location of the rows in the EMP table. Which DBMS_ROWID package function would you use to convert the ROWID values in the EMP table into the block number with in the relative file?

A: ROWID_BLOCK_NUMBER.

101. Your OLTP system commits multiple transactions every second. Why are the changes made by these transactions not written to the data files simultaneously?

A: Writes are deferred to optimize performance.

102. Relative to a COMMIT, when are dirty buffers flushed to the data file?

A: Independent of the COMMIT.

103. Using Server Manager in line mode, what is the best way to determine the size of the database buffer cache for the current instance?

A: Use the SHOW SGA command.

104. When you created the DATA_3 tablespace, you set the AUTOEXTEND option to ON with no MAXSIZE value. What would cause the datafile to reach the maximum number of bytes?

A: Available space on the file's disk.

105. Uses of the Human Resources application are receiving errors because the HR_DATA tablespace has used all the allocated disk space. How would you manually increase the size of the data files?

A: Use the ALTER DATABASE DATAFILE command with the RESIZE option.

106. Which storage structure's size is specified by an initialization parameter when the database is created?

A: Oracle block

107. An application is reporting a PRIMARY _FOREIGN KEY relationship error. How could you determine the exact relationship between the tables?

A: Write a query of the DBA_CONSTRAINTS data dictionary view.

108. You are attempting to organize the tablespaces in the PROD database based on fragmentation propensity. Which tablespace has the highest propensity for fragmentation?

A: The one which contains rollback segments.

109. You are the DBA for a movie production company. You need to store sales information and video clips for each movie. Which two segments would you use? (Choose two.)

A: LOB Segment.
Table.

110. Which data dictionary view could you query to display the number of extents allocated to the employee table?

A: DBA_EXTENTS.

111. You are administering the database locally on the same machine. Since your network require a login for file and icon specifications, you want to use this icon for authentication to perform maintenance operations, such as starting up an instance to renaming a datafile. How could you setup an operating system password file authentication machine?

A: Create password file using the password utility.
Set the REMOTE_LOGIN_PASSWORD to "EXCLUSIVE" and use "Connect as SYSDBA" to connect to database.

112. The PROD01 instance has two groups of online redo log files and each group has three members. How would you add a third online redo log with three members?

A: Use the ALTER DATABASE ADD LOGFILE command to create the group and ALTER DATABASE LOGFILE ADD MEMBER command to add three groups to member.

113. What happens if you attempt to issue the DROP USER command to remove a user whose schema contains objects?

A: The DROP USER command will fail unless it contains the CASCADE clause.

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