

EXAM CRAM™ 2

The Oracle 9i DBA Fundamentals 1 Cram Sheet

This Cram Sheet contains distilled information and key facts likely to be found on the Oracle 9i Fundamentals 1 exam. Review this information immediately before you enter the exam room. Pay special attention to those areas where you feel you have been needing to review the most. Remember that you will be given a piece of paper when you enter the exam room. You can quickly transfer the information from your short-term memory to the piece of paper in the room and retrieve it as needed during the exam.

ORACLE ARCHITECTURAL COMPONENTS

Know and understand the following Oracle 9i structures:

1. Control files track database structures and ensure that data files are synchronized via the log sequence number.
2. Data files make up the physical side of tablespaces. Each tablespace has one or more data file. Data files can belong to exactly one tablespace.
3. Parameter files contain static initialization parameters to tell Oracle how the database and memory structures should be configured.
4. Server parameter files contain dynamic initialization parameters to tell Oracle how the database and memory structures should be configured.
5. Redo log files contain changes made to the data.
6. Data (as in tables and clusters), index, undo, temporary, index-organized tables, and bootstrap are different types of Oracle segments.
7. Blocks are made up of command and variable headers, table directory, row directory, row data, and free space.
8. Block space usage is controlled by INITRANS (initial number of transaction slots), MAXTRANS (maximum number of transaction slots), PCTUSED (space set aside for new inserts), and PCTFREE (space set aside for updates of existing rows). The latter two are primarily relevant for dictionary-managed tablespaces.

STORAGE STRUCTURES

1. Oracle stores data in data blocks, extents, and segments.
2. These storage structures are stored within a tablespace (or tablespaces if they are partitioned).
3. Data blocks are the smallest unit of I/O performed by the database. `DB_BLOCK_SIZE` is the parameter that sizes this unit.
4. A contiguous set of blocks is called an *extent*.
5. A segment can be made up of one or more than one extent.

GETTING STARTED WITH THE ORACLE SERVER

- SQL*Plus is used to perform administrative tasks such as database startup, shutdown, and recovery.
- Oracle Enterprise Manager (OEM) is Oracle's provided management tool that uses a graphical user interface to simplify database management. OEM helps by eliminating the need for memorization of complex commands or maintenance of a script library outside the database.
- Oracle Universal Installer (OUI) is the graphical user interface Oracle provides to assist you in installing the Oracle software.

MANAGING THE ORACLE INSTANCE

1. The System Global Area (SGA) is made up of the database buffer cache, the shared pool, and the log buffer cache.
2. The database buffer cache is where data is stored in memory to improve access time for the data.
3. The shared pool holds the library cache, the data dictionary cache, and control structures.
4. The log buffer cache stores the redo log entries prior to them being written to disk.
5. An instance consists of the SGA and a set of background processes.
6. There are five mandatory background processes:
 - `DBWn` processes (also known as Database Writer) writes out the dirty, or changed, buffers from the database buffer cache to disk.
 - `LGWR` (Log Writer) writes redo log entries from log buffers to the redo log files.
 - `PMON` (Process Monitor) cleans up failed processes by rolling back uncompleted transactions and releasing any locks and resources held by failed processes.
 - `SMON` (System Monitor) cleans up the temporary segments, performs instance recovery, and coalesces contiguous chunks of freespace in dictionary managed data files.
 - `CKPT` (Checkpoint) signals Database Writer at checkpoint time and updates all the data files and control files with the current checkpoint information.

7. Other optional processes include `ARCHn`, `RECO`, `Dnnn`, `Snnn`, `SNPn`, and `QMn`.
8. The most important optional process to be aware of for the exam is `ARCn`, or Archiver. Archiver copies redo log files to an archive destination when the database is running in `ARCHIVELOG` mode.
9. To start up an Oracle instance, you can use the following `STARTUP` commands: `STARTUP NOMOUNT`, `STARTUP MOUNT`, `STARTUP OPEN`, or `STARTUP RESTRICT`.
10. To shut down an Oracle instance, you can use the following `SHUTDOWN` commands: `SHUTDOWN NORMAL`, `SHUTDOWN IMMEDIATE`, `SHUTDOWN TRANSACTIONAL`, or `SHUTDOWN ABORT`.

CREATING A DATABASE

1. Create your database with an optimal `DB_BLOCK_SIZE` setting for the environment you are setting up (OLTP, DSS, or a mixture). The database must be re-created to change this setting.
2. The `SYSTEM` tablespace is a necessary tablespace for the database to be created.
3. In addition to the `SYSTEM` tablespace, you should create tablespaces for temporary segments, undo segments, application data segments, and application index segments.
4. File placement for control files, log files, data files, and archive log files is critical to performance to distribute I/O effectively.
5. Base data dictionary tables are not meant to be accessed by users or by DBAs under normal circumstances. Oracle provides a robust set of data dictionary views created by the `catalog.sql` script to access the data through the views.
6. Most data dictionary views are divided into three categories:
 - `USER_*` views contain information about the objects owned by the logged-in user.
 - `ALL_*` views contain information about objects that a user either owns or has been granted access to.
 - `DBA_*` views contain information about all database objects.
7. `V$` views are also provided by Oracle. These are dynamic performance views and are used for performance monitoring and problem diagnosis.
8. Standard packages provide functionality to users as well as DBAs. These packages are created by the `DBMS_*.SQL` scripts located under the `$ORACLE_HOME/rdbms/admin` directory in Unix and the `%ORACLE_HOME%/rdbms/admin` directory in Windows.

MAINTAINING CONTROL FILES AND REDO LOG FILES

1. Control files are critical components of the Oracle database. Because they are vital for your database's proper working, it is important that they be mirrored across multiple drives at the operating system level and the database level.
2. Redo log files are vital for your database's proper working. It is important that they be mirrored across multiple drives at the operating system level and the database level.

3. Oracle databases must have at least two redo log groups to function. It is usually to a database's advantage to have more redo log groups.
4. A redo log group must have at least one redo log file member. Because they are so important, you should have more than one redo log file member in each group.

TABLESPACES AND DATA FILES

1. Tablespaces are logical structures used for storing data (either permanently or temporarily).
2. Tablespaces are created with the `CREATE TABLESPACE` command and dropped with the `DROP TABLESPACE` command. If they contain segments, they have to be dropped with the additional keywords `INCLUDING CONTENTS`.
3. Tablespaces can be set up as locally managed or dictionary managed. This means that the free space in the tablespace is managed either locally to the data files or managed in the data dictionary.
4. Tablespaces can be allowed to automatically grow using the `AUTOEXTEND` clause, or they can be manually increased in size either by resizing the existing data files or by adding more data files to the tablespace.
5. Tablespaces can be online or offline. They can also be read-only or read-write.
6. Data files are physical representations of a tablespace and are physically located on disk.
7. Tempfiles are physical representations on disk of a temporary tablespace.
8. To add space to a temporary tablespace, you have to use the `ALTER DATABASE` command or the `ALTER TABLESPACE ADD TEMPFILE` command.

UNDO SEGMENTS

Undo segments are used for transaction rollback, read-consistency, and instance recovery. They are stored in the `UNDO` tablespace. When using automatic undo management, they are managed automatically by Oracle.

TABLES, INDEXES, AND CONSTRAINTS

1. Tables and indexes can have the following commands used on them: `DROP`, `CREATE`, `ALTER`, and `TRUNCATE`.
2. `TRUNCATE` removes all rows from a table and lowers the high water mark. It does this without creating rollback information.
3. Indexes can be any of the following types: B-tree, bitmap, reverse key, or function based.
4. Indexes can be on a single column or on multiple columns. Those on multiple columns can be referred to as composite or concatenated. Composite indexes can have up to 32 columns. Composite bitmap indexes can contain only 30 columns.
5. Indexes can be unique or nonunique.
6. Constraints can be enforced at the end of each statement (`INITIALLY IMMEDIATE`) or at the end of the transaction (`INITIALLY DEFERRED`).

SECURITY

1. Users can be created (`CREATE`), altered (`ALTER`), and dropped (`DROP`).
2. Users are granted profiles, roles, and privileges.
3. Profiles limit resource usage. These can also be used to enforce password limitations.
4. Roles group privileges and other roles together.
5. Privileges can be at the system level, table level, or column level.

NATIONAL LANGUAGE SUPPORT

National Language Support (NLS) is the functionality in Oracle databases that allows you to store, process, and retrieve data in languages other than English.

You can specify both a database character set (`CHARACTER SET` clause of the `CREATE DATABASE` statement) and the national character set (using the `NATIONAL CHARACTER SET` clause of the `CREATE DATABASE` statement).

National character set tells Oracle which character set to use when `NCHAR`, `NVARCHAR2`, or `NCLOB` data elements are used in the database.

NLS parameters can be set in one of the following ways:

- Initiation parameters (affects only server-side settings)
- Overridden for the server by setting environment variables at the client
- Overridden at the database level with the `ALTER SESSION` command