Oracle8 DBA – CramNotes

ORACLE ARCHITECTURE

- Know these Oracle structures:
  o **Alert log**   Contains informational and error messages concerning the Oracle system and processes. It should be checked frequently, at least daily.
  o **Control files**   Track databases structures and ensure synchronicity of all databases files via the system change number (SCN).
  o **Database datafiles**   Make up the physical side of the tablespaces. There are one or more dataflies per tablespce.
  o **Parameter file**   Contains the initialization parameters that tell the Oracle server how to configure memory and internal resources as well as external file locations and process configurations.
  o **Redo log files**   Contain the transaction journals; they are critical for database recovery. Redo log files are copied to the archive logs if archive logging is enabled.
  o **Trace files**   Generated by all background processes an. If tracing is enabled, by each session. Trace files contain statistics for the process and log process messages and errors.

ADMINISTRATION TOOLS

Server Manger is used to perform database administration tasks. Database startup, shutdown, and recovery are Server Manager's major functions.

- Oracle Enterprise Manager (OEM) is Oracles's new management tool. It uses a graphical user interface (GUI) to simplify database management by eliminating the need to memorize all the syntax for DBA tasks. OEM can be used to manage all the Oracle databases within an enterprise globally from a single computer.
- OEM provides the following set of GUI tools to aid in administration:
  o **Backup Manager**   Used to administer backup and recovery.
  o **Data Manager**   Used to export, import, and load data.
  o **Instance Manager**   Used to start up, shut down, change archive mode, change and manage initialization parameters, and get user session information.
  o **Schema Manager**   Used to create, edit, and display schema objects.
  o **Security Manager**   Used to create, alter, and drop users, roles, and profiles.
  o **Storage Manager**   Used to create or alter tablespaces, rollback segments, and datafiles.

THE ORACLE INSTANCE

- The system global area (SGA) is made up of the database buffers, shared pool, and log buffers (as well as the request and response queues in the multithreaded server [MTS] configuration).

- The data buffer cache is where all data must pass through to get to users and back to the database. It often makes up the majority of the SGA size.
- The shared pool stores the library cache (shared SQL area, PL/SQL procedures, and control structures), dictionary cache, and control structures.
- The log buffers are used to store redo log entries prior to their being written to disk and usually make up the third largest section of the SGA.
- An instance is made up of the SGA and a set of processes. The base set of processes consists of DBWn, LGWR, SMON, PMON, CKPT, ACRH, and RECO.
- The DBWn process, known as the database writer, writes dirty (used or changes) buffers from the SGA databases buffers to the disk.
- The LGWR process, known as the log writer, writes redo log entries from the log buffers to the redo logs.
- The SMON process, known as the system monitor, cleans up sort memory areas and recovers instances after instance failures as well as coalesces contiguous chunks of tree space in datafiles.
- The PMON process, known as the process monitor, cleans up after failed processes.
- The CKPT process, known as the checkpoint process, signals the DBWn at the checkpoints and updates all the datafiles and control files with the current checkpoint information.
- The ARCH process, known as the archiver, copies the online redo log files to the location where archives files are written.
- The RECO process, known as recoverer, recovers failed distributed transactions.
- An instance can have several optional processes: Dnnn, LCKn, SNPn, and QMNn.
- The Dnnn processes, known as the dispatcher processes, monitor connections in the MTS environment and distribute them to shared server (Snnn) processes.
- The LCKn Processes, known as the lock processes, perform inter-instance locking in an Oracle Parallel Server Environment.
- The SNPn process, known as the snapshot process, is only set up if the **JOB_QUEUE** parameter is set to non-zero value. The SNPn process (up to nine) wake up at specified intervals, check the job tables, and, if a job is due, run it.
- The QMNn processes, known as the queue monitor, monitor the messages queues for Oracle Advanced Queuing. You can have up to 10 QMNn processes.

ORACLE STARTUP AND SHUTDOWN

- To start up an Oracle instance, the general procedure is:
o   Start Server Manager (for example, on Unix: **svrmgrl**).
o   Issue the **CONNECT INTERVAL** connection command.
o   Issue the **STARTUP** command with the appropriate option:
▪   **OPEN**   Does **NOMOUNT, MOUNT,** and **OPEN EXCLUSIVE** (default).
▪   **MOUNT**   Starts instance processes but doesn't open the database for use.
▪   **NOMOUNT**   Used only for database and control file creation.
▪   **SHARED** or **PARALLEL**   Used only if the database has the parallel option installed. Allows more than one instances to access the same database files.
o   Start up proceeds from **NOMOUNT** to **MOUNT** to **OPEN** status.
- To shut down an Oracle instance, the usual procedure is:
o   Start Server Manager

o   Issue the **CONNECT INTERNAL** connection command.

o   Issue the **SHUTDOWN** command with the appropriate option:

▪   **NORMAL** Waits for all users to exit, then shuts down.

▪   **IMMEDIATE** Disconnects statements that are being processed and rolls back uncommitted transactions. Sessions waiting for results are allowed to complete before being disconnected. After all users are disconnected, the database shuts down.

▪   **TRANSACTIONAL** Allows transactions to commit, logs out users, then shut down.

▪   **ABORT** Shuts down regardless of logins.

DATA DICTIONARY

•   The data dictionary consists at the lowest level of **X$** and **K$** C structures, not normally viewable or used by the DBA.

•   The data dictionary has **V$** virtual views, which contain variable data, such as statistics.

•   The data dictionary has dollar tables ($), which contain database metadata about tables, views, indexes, and other database structures.

•   At eh uppermost layer, the data dictionary has **DBA** views about all objects, **ALL** views about all objects a user can access, and **USER** views about all objects a user owns.

USERS AND GRANTS

•   Users can be created, altered, and dropped using the **CREATE, ALTER,** and **DROP** commands.

•   Users are granted profiles, roles, and privileges.

•   Profiles are used to limit resource usage.

•   Roles are used to group a collection of privileges, roles, and grants that then can be granted en masse to a user or another role.

•   Grants are privileges are given at the system-, table-, or column-level.

•   The following special roles are automatically created:

o   **CONNECT** Grants the following privileges: **CREATE/ALTER SESSION, CREATE TABLE, VIEW, SYNONYM, SEQUENCE, CLUSTER,** and **DATABASE LINK.**

o   **DBA** Grants all system privileges with **ADMIN OPTION.**

o   **OSDBA** Grants all system privileges with **ADMIN OPTION, OSOPER,** and the right to create a database.

o   **OSOPER** Grants the following privileges: **STARTUP, SHUTDOWN, ALTER DATABASE OPEN/MOUNT, ALTER DATABASE BACKUP, ARCHIVE LOG, RECOVER DATABASE,** and **RESTRICTED SESSION.**

o   **RESOURCE** Grants the following privileges: **CREATE CLUSTER, PROCEDURE, SEQUENCE, TABLE, TRIGGER**, and **TYPE.**

DATABASE CREATION

•   File placement (control, log, archive, and datafiles) is critical to performance. Distribute I/O evenly. Use operating system tools to check for contention between Oracle and non-Oracle activities.

•   Avoid chaining—create your database with a **DB_BLOCK_SIZE** parameter that fits your largest row. The database must be re-created to change block size.

- In addition to the **SYSTEM** tablespace, create tablespaces for temporary segments, rollback segments, data segments, and index segments.
- Make sure the global database name is unique.

ROLLBACK SEGMENTS

- Rollback segments store undo information. Rollback segments as before-image journals and are critical for rollback operation, instance recovery, and read-consistency.
- Rollback segments should be stored in their own tablespace, not with other objects.
- Size rollback segments with **INITIAL**=**NEXT** and a **PCTINCREASE** of 0. The **INITIAL** size is your average transaction size. The **OPTIMAL** storage parameter is set to allow rollback segments to shrink back to an optimal size after they are caused to grow by large transactions. Set **OPTIMAL** to **MINEXTENTS*INITIAL** or to some multiple of this value.
- For systems with large batch transactions, create an offline large rollback segment that can be put online and used when batch operations occur.
- Rollback segments should have enough extents to allow each expected concurrent data manipulation language (**DML**) transaction to have its own extent.
- Determine if you have the proper size of rollback segment extents by monitoring the **V$ROLLSTAT** view for shrinks and wraps.
- Monitor the **V$ROLLSTAT** and **V$WAITSTAT** views for rollback (listed as **UNDO**) statistics.
- If **V$ROLLSTAT** shows **WAITS**, you need more rollback extents allocated.

LOADING DATA

- The Oracle SQL*Loader utility is used to load data from external files into an Oracle database. Date can be loaded via a conventional or direct path load:
  o A conventional path load uses the SQL engine to load data. This is the slower method due to the use of SQL and space management overhead as rows are inserted.
  o A direct path load writes directly to the database files above the high watermark (HWM) and is very fast because there is no database overhead.
- SQL*Loader has five files types associated with it:
  o **Control file**   Contains control information on how to load the data.
  o **Log file**   Contains detailed information about the load.
  o **Bad file**   Contains records that are rejected by SQL*Loader.
  o **Discard file**   Contains records that did not match the selection criteria in the control file.
  o **Data file**   Contains the data to be loaded.

EXPORT AND IMPORT

- The Oracle export and import utilities re used to ad flexibility to your backup strategy. An export is logical backup of the objects in the database. The export and import utilities backup and restore database objects selectively. The export and import utilities are used also to reorganize data or move database objects from one schema to another. Objects can be exported or imported in table mode, user mode, or full database mode.

TABLES AND INDEXES

• Tables and indexes are managed via the **CREATE, ALTER, DROP, TRUNCATE,** and **ANALYZE** commands. The **TRUNCATE** command removes all the rows from a table without creating any rollback information. It can be used to drop allocated storage and move the HWM or to reuse storage and keep the HWM the same. **TRUNCATE** performs much faster but cannot be rolled back. The **ANALYZE** command is used to gather statistics that can be used by the cost-based optimizer in determining the optimal execution path for SQL statements.

INTEGRITY CONSTRAINTS

• Data integrity can be maintained through application code triggers or declared integrity constraints. The declared integrity constraints are:

o **CHECK**   Requires a specified condition to be true or unknown for every row of the table.

o **FOREIGN KEY**   Specifies the column or set of columns included in the definition of the referential integrity constraints. The foreign key column(s) can't be inserted or changed unless the primary key on the referenced tables has the same key value(s).

o **NOT NULL**   Requires every row to have a value

o **PRIMARY KEY**   Requires that no columns in the key have a null value and that the column(s) be unique in the table.

UNIQUE KEY   Requires the column(s) in the key to not be duplicated in the table.