# ***DATABASE ADMINISTRATION***

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Q1. Describe oracle memory structures and background processes?

Oracle Memory Structures and Background Processes: A Breakdown

Oracle utilizes memory in a specific way to optimize database performance. This involves two main aspects: memory structures that hold various information, and background processes that manage those structures and perform essential tasks.

Memory Structures:

The basic memory structures associated with Oracle include:

A system global area (SGA) is a group of shared memory structures that contain data and control information for one Oracle database instance. If multiple users are concurrently connected to the same instance, then the data in the instance's SGA is shared among the users. Consequently, the SGA is sometimes called the shared global area.

An SGA and Oracle processes constitute an Oracle instance. Oracle automatically allocates memory for an SGA when you start an instance, and the operating system reclaims the memory when you shut down the instance. Each instance has its own SGA.

The SGA is read/write. All users connected to a multiple-process database instance can read information contained within the instance's SGA, and several processes write to the SGA during execution of Oracle.

The SGA contains the following data structures:

1. **Database Buffer Cache**: Stores frequently accessed data blocks from disk, allowing faster retrieval.
2. **Redo Log Buffer**: Holds redo entries, which track database changes for recovery purposes.
3. **Shared Pool**: Stores frequently used SQL statements, library cache, and dictionary information.
4. **Large Pool**: Allocates memory for large objects like LOBs and CLOBs.
5. **Stream Pool**: Used for buffering data during bulk operations.
6. **Program Global Areas (PGA):** Private memory areas for individual user sessions. They contain:
7. **Stack Area:** Holds temporary data used during query execution.
8. **Data Area**: Stores session-specific information like cursors and private temporary tables.
9. **Sort Areas**: Dedicated memory used for sorting operations during queries.

**Background Processes:**

These are independent threads responsible for various database tasks, continuously running in the background. Some key processes include:

1. **Server Process (SMON):** Starts other background processes and performs instance recovery if needed.
2. **Database Writer (DBWn):** Writes dirty buffers from the SGA to disk.
3. **Log Writer (LGWR):** Writes redo entries from the redo log buffer to disk.
4. **Checkpoint Process (CKPT):** Periodically writes control file changes to disk.
5. **Archiver Process (ARCn):** Copies redo logs to archive storage.
6. **Recovery Manager (RMAN):** Performs backups, restores, and disaster recovery tasks.

Q2. Describe oracle logical and physical storage structure

Oracle employs a layered approach to data storage, separating the logical organization of data from its physical location on disk. Let's break down both aspects:

**Logical Storage Structures:**

Oracle Database allocates logical space for all data in the database.

The logical units of database space allocation are data blocks, extents, segments, and tablespaces.

These define how data is logically grouped and accessed within the database, independent of the underlying physical storage. The key elements are:

From the lowest level of granularity to the highest, Oracle Database stores data

**-A data block** is the smallest logical unit of data storage in Oracle Database.

One logical data block corresponds to a specific number of bytes of physical disk space, for example, 2 KB. Data blocks are the smallest units of storage that Oracle Database can use or allocate.

**-An extent** is a set of logically contiguous data blocks allocated for storing a specific type of information

In the preceding graphic, the 24 KB extent has 12 data blocks, while the 72 KB extent has 36 data blocks.

**-A segment** is a set of extents allocated for a specific database object, such as a table.

For example, the data for the employees table is stored in its own data segment, whereas each index for employees is stored in its own index segment. Every database object that consumes storage consists of a single segment.

**-A tablespace** is a database storage unit that contains one or more segments.

**Physical Storage Structures:**

At a physical level, the data is stored in data files on disk. The data in the data files is stored in operating system blocks.

It consists of:

**.Data Files**: Operating system files storing data blocks in tablespaces.

**.Control File:** Stores vital information about the database, including tablespace locations and recovery information.

**.Redo Logs:** Files recording database changes for recovery purposes.

.Archive Files: Optional files storing historical redo logs for long-term recovery.