**ITLAD601 : DATABASE ADMINISTRATION GROUP ASSIGNMENT**

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### Questions

### Describe memory structure and background processes

### Describe oracle logical and physical storage

### A1.

### Memory Structure:

* **System Global Area (SGA):**
  + **SGA** is a shared memory region that holds data and control information for an Oracle instance.
  + It consists of several components:
  + **Database Buffer Cache**: Stores copies of data blocks read from data files to minimize physical I/O.
  + **Shared Pool:** Contains shared memory areas such as the library cache (SQL statements, parsed execution plans) and the data dictionary cache (metadata).
  + **Large Pool (Optional):** Used for large memory allocations such as parallel query operations, backup, and recovery.
  + **Java Pool (Optional):** Stores session-specific Java code and data.
  + **Streams Pool (Optional):** Used for Oracle Streams, a feature for data replication and integration.
* **Program Global Area (PGA):**
  + PGA is a private memory region for each Oracle session or process.
  + It includes variables and data structures that are not shared among multiple sessions.
  + It holds session-specific information like bind variables, sort areas, and session-related control structures.

### Background Processes:

* **System Monitor Process (SMON):**
  + Performs crash recovery when an instance fails.
  + Cleans up temporary segments and frees resources after a transaction aborts.
* **Process Monitor Process (PMON):**
* Performs process recovery by cleaning up after failed user processes.
* Reclaims resources such as locks and memory held by terminated sessions.
* **Database Writer Process (DBW):**
  + Writes modified buffers from the buffer cache to data files.
  + Helps ensure changes are permanently saved to disk.
* **Log Writer Process (LGWR):**
  + Writes redo log entries from the redo log buffer to the redo log files.
  + Ensures transactional durability and recoverability.
* **Checkpoint Process (CKPT):**
  + Signals DBW to write dirty buffers to data files during a checkpoint.
  + Helps ensure recovery time is minimized in the event of an instance failure.
* **Archiver Process (ARC):**
  + Copies online redo log files to archival storage (e.g., tape) for backup and recovery purposes.
  + Crucial for maintaining a complete set of redo logs for recovery.
* **Listener Process (Listener):**
  + Listens for incoming connection requests from clients and establishes network sessions.
  + Routes client requests to the appropriate Oracle instance.
* **Dispatcher Processes (Optional - Shared Server Configuration):**
  + Handle multiple user connections concurrently in a shared server configuration.
  + Improve resource utilization by sharing server processes among multiple clients.

### A 2.

* **Logical Storage**
  + **Tablespaces:** Logical storage in Oracle is primarily organized into tablespaces. A tablespace is a logical container for storing data objects like tables, indexes, and other database structures.
  + **Segments:** Within a tablespace, data is further organized into segments. A segment is a logical storage structure that contains data for a specific database object, such as a table or an index.
  + **Extents:** Segments are divided into extents, which are contiguous blocks of data allocated for storing specific data objects. Extents are the basic unit of storage allocation within a tablespace.
  + **Blocks:** Extents, in turn, consist of Oracle database blocks, which are the smallest unit of storage allocation within the database. These blocks typically have a fixed size, such as 8 KB.
* **Physical Storage:**
  + **Datafiles:** Physical storage in Oracle is managed through datafiles, which are actual files on the disk where the database's data is stored. Each tablespace is made up of one or more datafiles.
  + **Control Files:** Control files are essential to the functioning of an Oracle database. They contain metadata about the physical structure of the database, including datafile information, tablespace mappings, and the database's log sequence number.
  + **Redo Log Files:** Redo log files are another critical component of Oracle's physical storage. They record all changes made to the database and are crucial for database recovery and transaction management.
  + **Archived Redo Logs:** Archived redo logs are copies of redo log files that have been archived to secondary storage. They are used for database recovery and backup purposes.