

## Q1. Describe oracle memory structure and background processes

**Answers:**

### **Memory structures:**

- **System Global Area (SGA):** This shared memory segment holds frequently accessed data like:
  - Database Buffer Cache: Stores recently used data blocks, enabling faster retrieval.
  - Redo Buffers: Hold redo entries, essential for ensuring data consistency after crashes.
  - Shared Pool: Stores SQL statements, dictionary cache, and other commonly used data structures.
  - Large Pool: Manages memory for large objects and LOBs (Long Objects).
  - Java Pool: Used for Java Virtual Machine allocations in the database.
- **Program Global Area (PGA):** Private memory area for each session, containing:
  - Stack Area: Holds function call information and temporary data.
  - Data Area: Stores session-specific information like cursors and private temporary tables.
- **Sort Areas:** Temporary memory allocated for sorting operations during queries.

### **Background Processes:**

**These are dedicated OS processes that perform crucial tasks behind the scenes:**

- Server Process (SMON): Monitors and restarts crashed instances
- Database Writer (DBWn): Writes dirty buffers from the SGA to disk.
- Redo Apply Process (LGWR): Applies redo entries from the redo buffers to disk.
- Checkpoint Process (CKPT): Writes checkpoints to control files, ensuring consistent recovery.
- Archiver Process (ARCn): Offloads redo logs to archive storage.

- Log Miner Process (MMON): Extracts data from redo logs for various purposes.
- Recovery Manager (RMAN): Performs backups, restores, and other recovery tasks.
- Job Queue Processes (CJQ0, CJQ1): Execute scheduled jobs defined in the database.
- Listener (LSNR): Listens for incoming client connections.

## **Q2. Describe Oracle logical and physical storage structure.**

### **Logical Storage:**

This layer defines how users and applications interact with data. It uses various logical units to organize and manage data independently of the physical location on disk. Key elements include:

- Data Blocks: The smallest unit of data storage, typically 4KB or 8KB in size. Data is stored and retrieved in multiples of these blocks.
- Extents: A contiguous group of data blocks allocated to a specific segment.
- Segments: Logical units that group related data, such as a table or an index. Each segment consists of one or more extents.
- Tablespaces: Collections of one or more segments. They provide a way to group related data and manage storage allocation at a higher level.

### **Physical Storage:**

This layer deals with the actual files and devices where data resides on disk. It has its own set of structures:

- Data Files: Physical files created by Oracle Database that store data blocks. Multiple data files can belong to a single tablespace.
- Control Files: Small files containing crucial information about the database, such as data file locations and recovery parameters.
- Redo Logs: Files that track all data modifications to ensure transaction consistency and facilitate recovery.

- Archive Files: Optional files used to store redo logs after they are no longer needed for online operations.

**Key aspects of the relationship:**

- Independence: Logical structures like tablespaces are independent of specific physical files. This allows flexibility for managing storage (adding/resizing data files) without affecting user access.
- Abstraction: Logical units hide the complexities of physical storage from users and applications, simplifying data management.
- Performance: Optimized allocation of data blocks and extents within tablespaces can improve query performance.