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Real Time Application Clusters in Oracle Database

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ABSTRACT: A database is an organized collection of [data](#). It is the collection of [schemas](#), [tables](#), [queries](#), reports, [views](#), and other objects. The data are typically organized to model aspects of reality in a way that supports [processes](#) requiring information, such as modeling the availability of rooms in hotels in a way that supports finding a hotel with vacancies. A database management system (DBMS) is a [computer software](#) application that interacts with the user, other applications, and the database itself to capture and analyze data. A general-purpose DBMS is designed to allow the definition, creation, querying, update, and administration of databases. Such as one of the well-known DBMS is Oracle. Oracle Database (commonly referred to as Oracle RDBMS or simply as Oracle) is an [object-relational database management system](#) produced and marketed by [Oracle Corporation](#). The Oracle Database with Real Application Clusters (RAC) has been the solution of choice for thousands of Oracle customers for their database systems for more than a decade to share a database with multiple instances. Oracle Real Application Cluster 12c continues this success, providing significant enhancements in all of the areas that matter to the business success in various real time environments. It originally focused on providing improved database services, Oracle RAC has evolved over the years and is now based on a comprehensive high availability stack that can be used as the foundation of a database cloud system as well as a shared infrastructure that can ensure high availability, scalability, flexibility and agility for any application in your data center.

I. INTRODUCTION

Clustering can be considered the most important *unsupervised learning* problem so, as every other problem of this kind. It deals with finding a *structure* in a collection of unlabeled data. A loose definition of clustering could be “the process of organizing objects into groups whose members are similar in some way”. A *cluster* is therefore a collection of objects which are “similar” between them and are “dissimilar” to the objects belonging to other clusters. The implementation of Real time Application Clusters (RAC) will provide the various advantages in real time Database environment.

II. PHYSICAL AND LOGICAL STRUCTURE OF ORACLE DATABASE

An Oracle database system—identified by an alphanumeric system identifier or SID comprises at least one [instance](#) of the application, along with data storage.

Users of Oracle databases refer to the server-side memory-structure as the SGA (System Global Area). The SGA typically holds [cache](#) information such as data-buffers, [SQL](#) commands, and user information. In addition to storage, the database consists of online [redo logs](#) (or logs), which hold [transactional](#) history. Processes can in turn [archive](#) the online redo logs into archive logs (offline redo logs), which provide the basis for [data recovery](#) and for the physical-standby forms of [data replication](#) using [Oracle Data Guard](#).

The [Oracle RAC](#) (Real Application Clusters) option uses multiple instances attached to a central [storage array](#). In version 10g, [grid computing](#) introduced shared resources where an instance can use [CPU](#) resources from another node in the grid. The advantage of Oracle RAC is that the resources on both nodes are used by the database, and each node uses its own memory and CPU. Information is shared between nodes through the interconnect the [virtual private network](#). The Oracle DBMS can store and execute [stored procedures](#) and [functions](#) within it.



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A. PGA

The **Program Global Area (PGA)** is a private memory region that contains the data and control information for a server process. Only a server process can access the PGA. Oracle Database reads and writes information in the PGA on behalf of the server process. An example of such information is the run-time area of a cursor. Each time a cursor is executed, a new run-time area is created for that cursor in the PGA memory region of the server process executing that cursor.

B. SGA

The **System Global Area (SGA)** forms the part of the system memory ([RAM](#)) shared by all the processes belonging to a single [Oracle database](#) instance. The SGA contains all information necessary for the instance operation. In general, the SGA consists of the following:

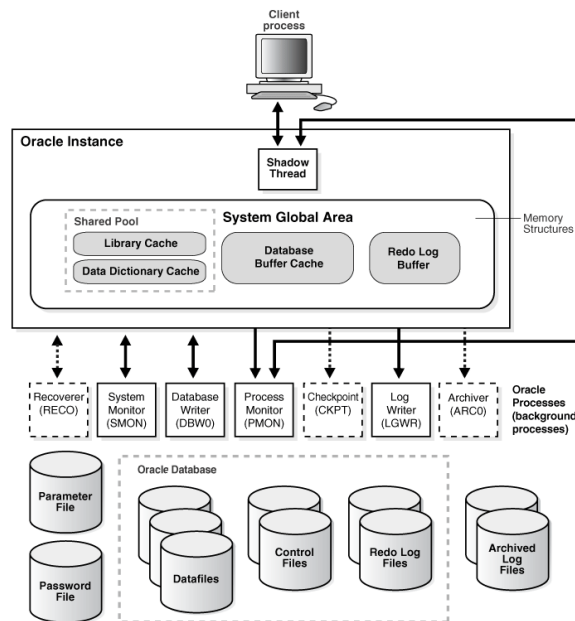
- Buffer cache: holds copies of data blocks read from data files
- Dictionary cache: holds information about data dictionary tables, such as information about account, data file, segment, extent, table and privileges
- Redo log buffer: contains information about database transactions, both committed and uncommitted, in preparation for writing to online redo log files
- Shared pool: holds the dictionary or row cache, the library cache, cursor definitions and shared SQL.
- Java pool: holds information for parsing Java statements.
- Large pool: including the User Global Area (UGA))
- Stream pool: this is remote connectivity for the database.
- Log Buffer: This is circular radiation and modifies or changes all data in database.

C. Background Process

To maximize performance and accommodate many users, a multi process Oracle system uses some additional Oracle processes called background processes.

An Oracle instance can have many background processes; not all are always present. There are numerous background processes.

- [Database Writer Process \(DBW_n\)](#)
- [Log Writer Process \(LGWR\)](#)
- [Checkpoint Process \(CKPT\)](#)
- [System Monitor Process \(SMON\)](#)
- [Process Monitor Process \(PMON\)](#)
- [Recoverer Process \(RECO\)](#)
- [Job Queue Processes](#)
- [Archiver Processes \(ARC_n\)](#)
- [Queue Monitor Processes \(QMN_n\)](#)
- [Other Background Processes](#)



D.Database

The Database consists of the data files, redo log files and Control files. Which Stores the data's in the form of Meta data and saved data's in the organized format on it.

III. REAL TIME APPLICATION CLUSTERS

Oracle RAC allows multiple computers to run Oracle [RDBMS](#) software simultaneously while accessing a single [database](#), thus providing [clustering](#).

In a non-RAC Oracle database, a single [instance](#) accesses a single database. The database consists of a collection of [data files](#), control files, and [redo logs](#) located on [disk](#). The instance comprises the collection of Oracle-related memory and background processes that run on a computer system.

In an Oracle RAC environment, 2 or more instances concurrently access a single database. This allows an application or user to connect to either computer and have access to a single coordinated set of data. The instances are connected within each other through an "Interconnect" which enables all the instances to be in sync in accessing the data.

IV. IMPLEMENTATION

Oracle RAC depends on the infrastructure component Oracle Clusterware to coordinate multiple servers and their sharing of data storage. The FAN (Fast Application Notification) technology detects down-states. RAC administrators can use the `srvctl` tool to manage RAC configurations.

Cache Fusion: Prior to Oracle 9, network-clustered Oracle databases used a storage device as the data-transfer medium (meaning that one node would write a data block to disk and another node would read that data from the same disk), which had the inherent disadvantage of lackluster performance. Oracle 9i addressed this issue: RAC uses a dedicated network connection for communications internal to the cluster.



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Since all computers/instances in a RAC access the same database, the overall system must guarantee the coordination of data changes on different computers such that whenever a computer queries data, it receives the current version — even if another computer recently modified that data. Oracle RAC refers to this functionality as Cache Fusion. Cache Fusion involves the ability of Oracle RAC to "fuse" the in-memory data cached physically separately on each computer into a single, global cache. The various versions of oracle RAC are:

- Oracle Real Application Clusters 12c Release 1 Enterprise Edition.
- Oracle Real Application Clusters One Node (RAC One Node) applies RAC to single-node installations running Oracle Database 11g Release 2 Enterprise Edition.

V. ADVANTAGES OF RAC

- Scalability
- High Availability
- If one database server goes down can be configured to automatically fail over to a server that is still up and running.
- High performance
- Multiple instances can share a single database at the same time.

VI. CONCLUSION

Where high Performance Computing provides a major advantage in real life. Where RAC in oracle provides various advantages in Real life Environment in IT and IT enables services. Hence Usage of RAC improves performances in real time environments.

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