

Let us start with Oracle DBA

What Does an Oracle DBA Do?

What is the Role of an Oracle DBA ?



*Installing and upgrading ORACLE
Server and application products*

Creating Databases whenever needed

Planning and allocating database storage

*Creating, modifying, and maintaining
database objects*

Backup and recovery of the database

Monitoring and optimizing the database

Responsible for contacting Oracle support

Applying patches

Types of DBAs

Development DBA

Production DBA

APPLICATION DBA or (APPS DBA)

Development DBA

- *Develop code (SQL)*
- *Develop code (PL/SQL)*
- *Create objects*
- *Testing*

How are DBAs Measured?

- *Uptime/Availability*
- *Application response time*
- *Quicker Problem Resolution*

Tnsnames.ora

Listener.ora

Oracle Server

Oracle Server

Oracle instance + Database

Define

Query Transformation

Bind

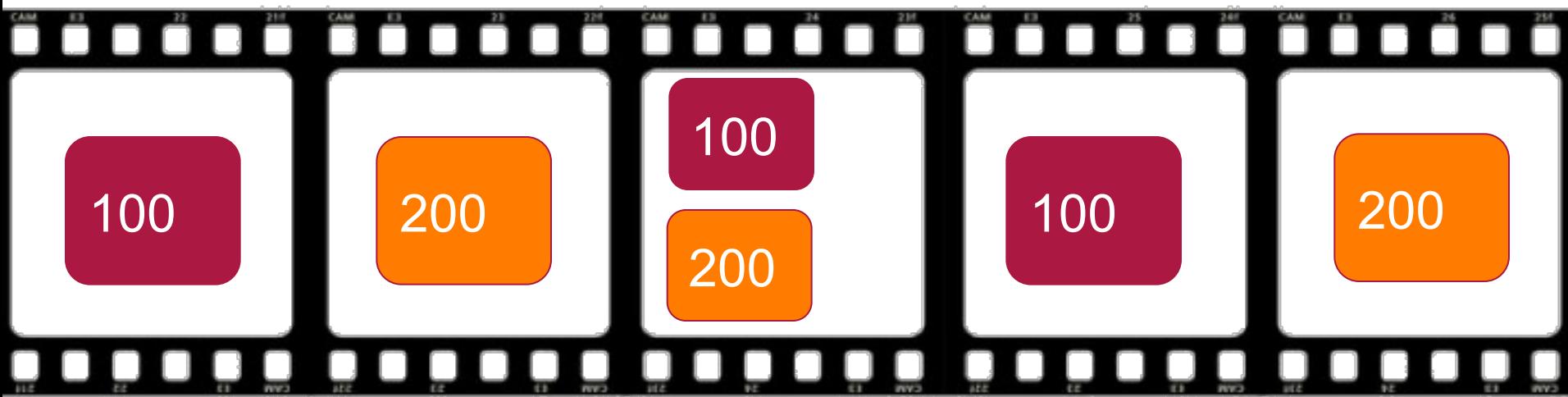
Fetch

Execute

PARSE



Update 100 to 200



UNDO

DATA

ZLOG BUFFER

UNDO

DATA

UNDO

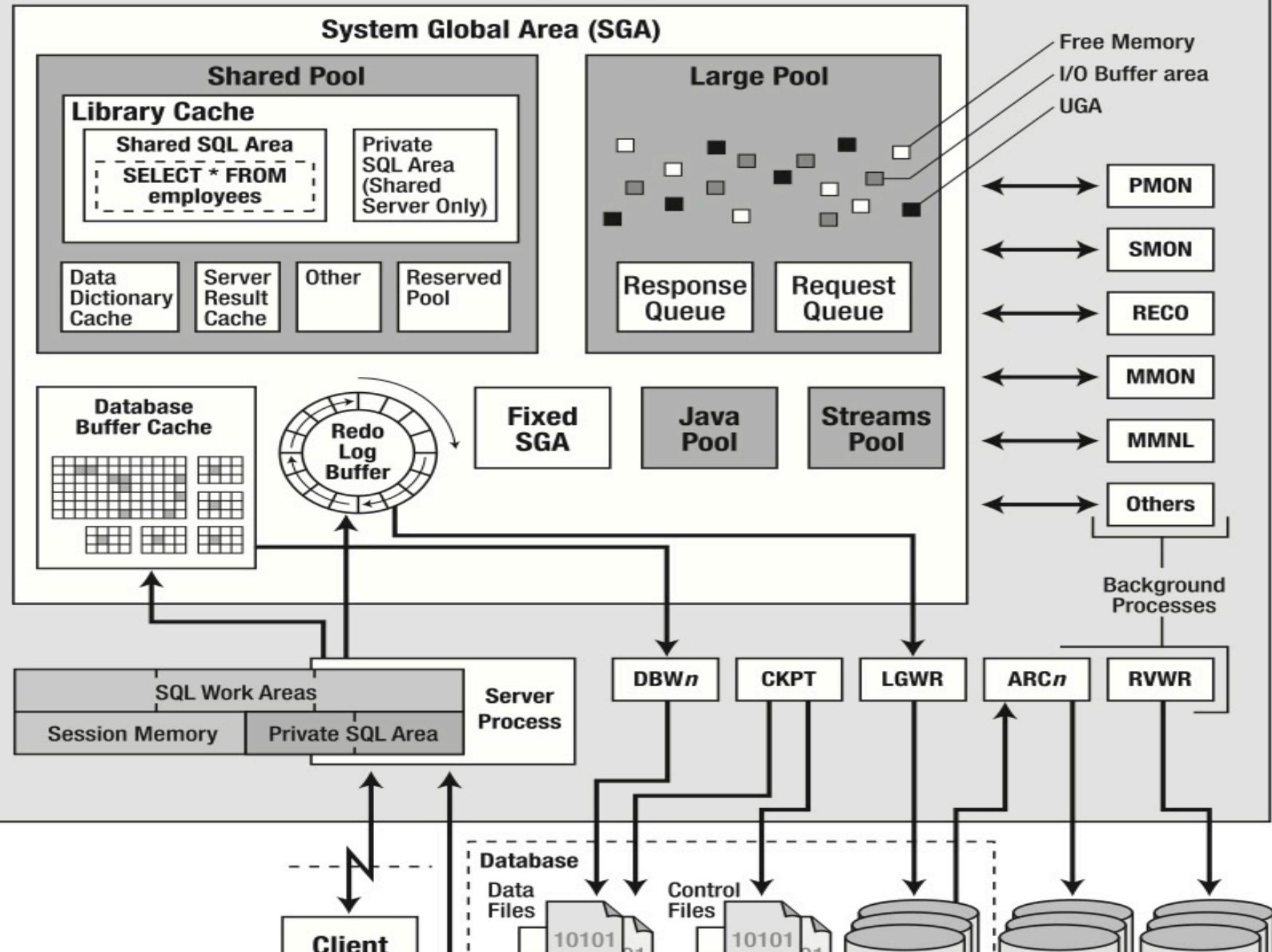
READ CONSISTENCY

REDO

RECOVERY

Oracle Architectural Components

Instance



Oracle instance

MEMORY STRUCTURES

+

BACKGROUND PROCESSES

User Process

Server Process

Background process

MEMORY STRUCTURES

MEMORY STRUCTURES

I. PROGRAM GLOBAL AREA

Process global area

2. SHARED GLOBAL AREA

System global area

Program Global Area

Memory reserved for each user process connecting to an Oracle database

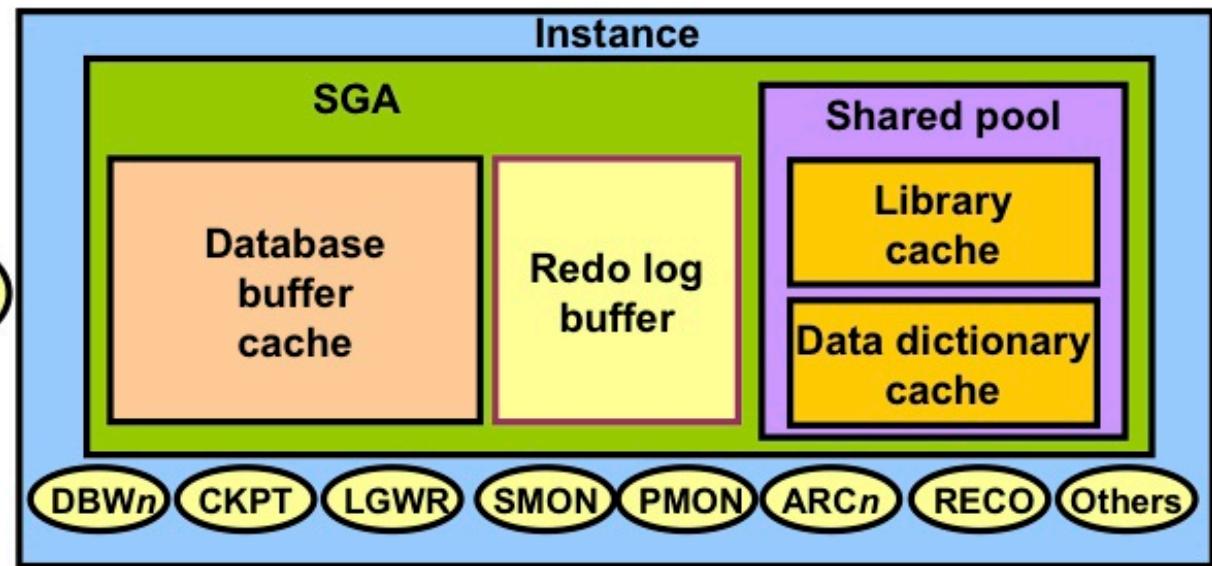
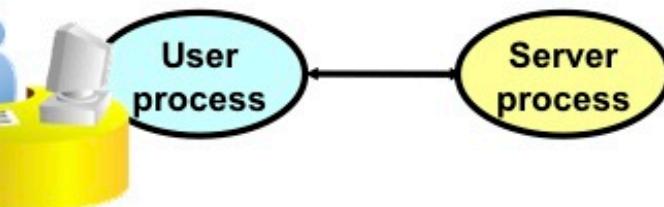
Allocated when a process is created

Deallocated when the process is terminated

*Used by **only one User process***

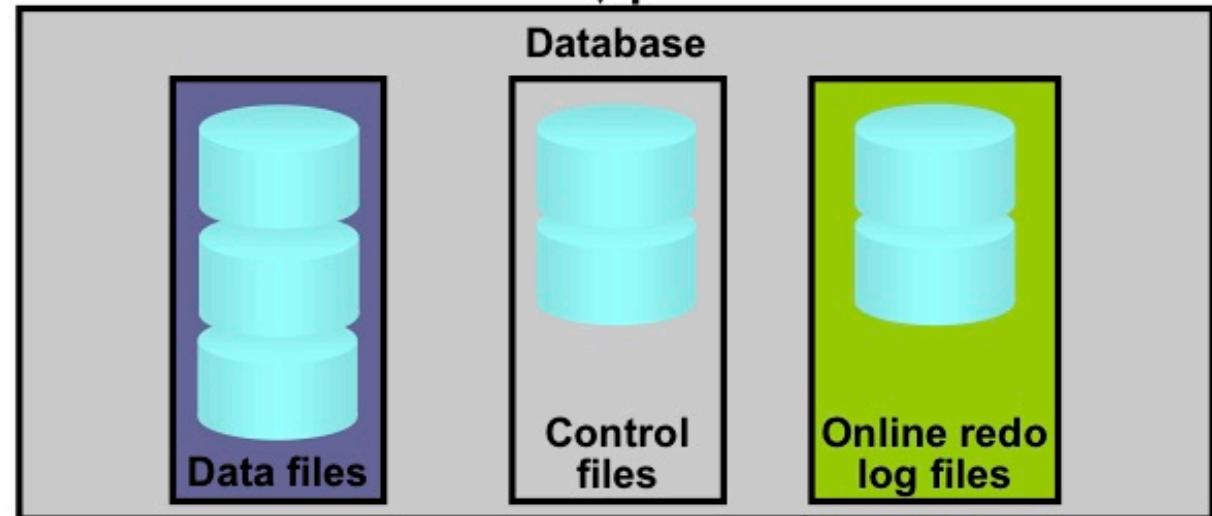
Oracle Database Server Structures

Memory structures

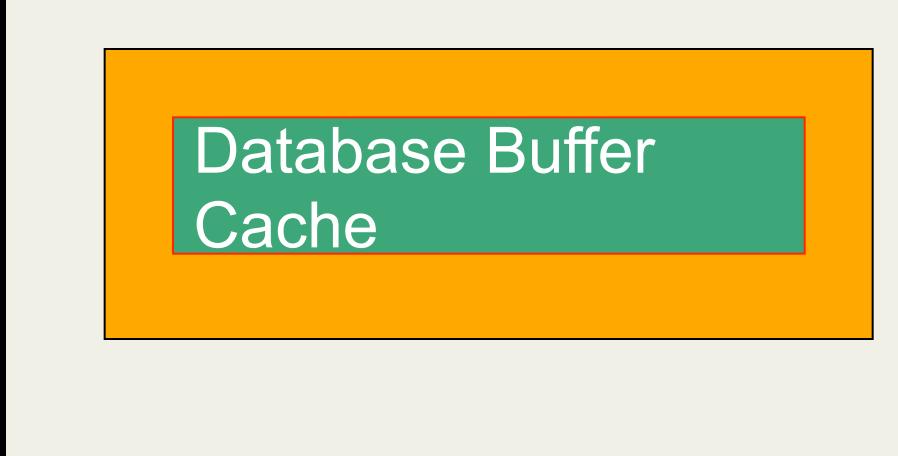


Processes

Storage structures



Database Buffer Cache



Database Buffer
Cache

*Before any database block can be used ,
it must be physically read from disk
and placed into the database buffer cache*

Database Buffer Cache

Free Buffer

Pinned Buffer

Dirty Buffer

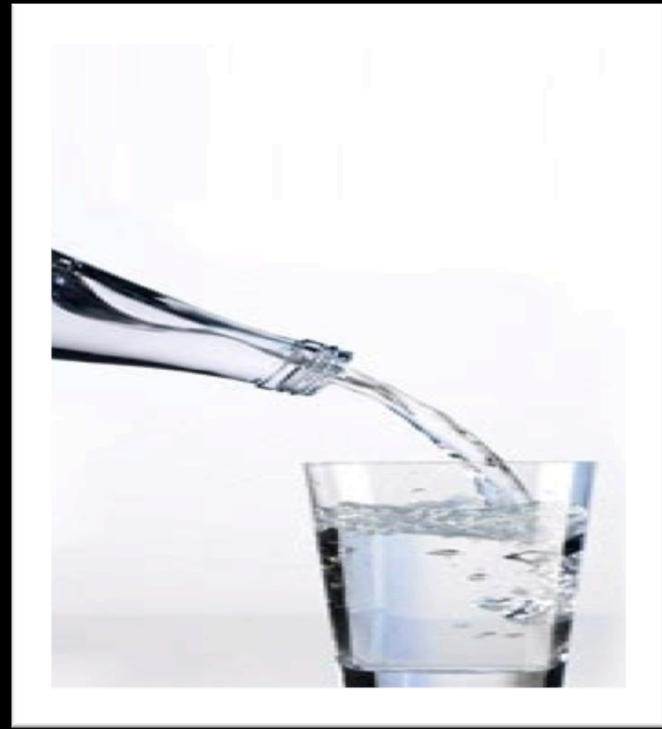
Free Buffer

EMPTY



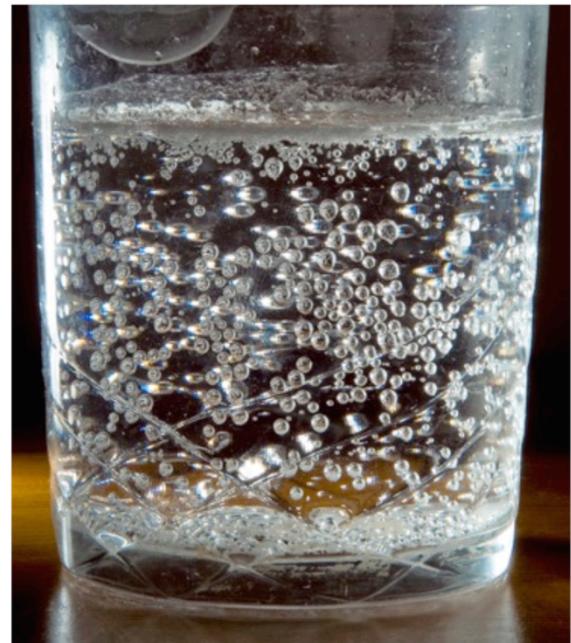
Pinned Buffer

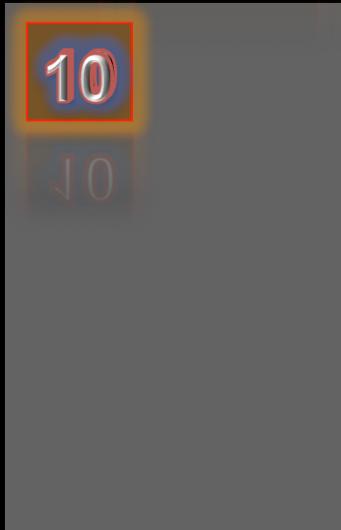
Some one using



Dirty Buffer

Completed the Job





FREE BUFFER



Another Example

Redo log Buffer

Records all changes made to the data blocks

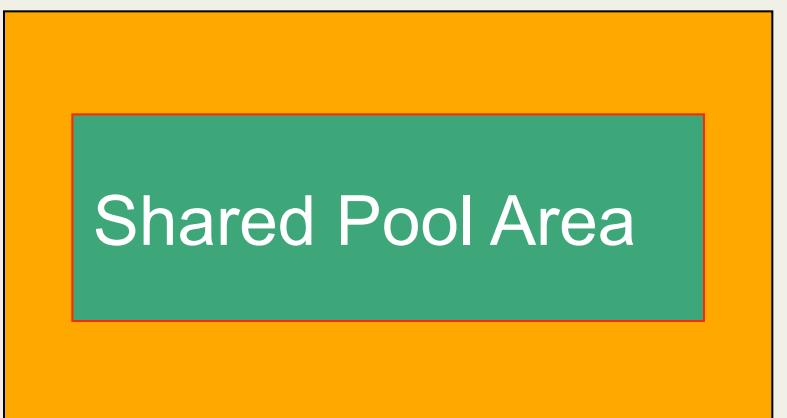
Primary purpose is recovery

*Changes recorded within are called
redo entries*

*Redo entries contain information to reconstruct
or redo changes*

Shared pool

Shared pool



The diagram shows a large orange rectangle representing the Shared Pool. Inside it, there is a smaller green rectangle labeled "Shared Pool Area". The entire diagram is set against a white background.

Shared Pool Area

Library cache

Data Dictionary cache

Library Cache

Helps in Parsing (Only Syntactic)

Stores most recently used SQL and PL/SQL statements

Enables the sharing of commonly used statements Algorithm

Consists of two structures:

Shared SQL area

Private SQL area

Data Dictionary Cache

ROW CACHE

Helps in Parsing (Only Semantic)

SQL query result cache and PL/SQL function result cache

Results of queries can be cached in memory

Large Pool

- *Session memory (UGA) for the Shared Server*
- *I/O server processes*
- *Backup and restore operations or RMAN*
- *Parallel Processing*

Java Pool

- Services parsing requirements for Java
- Required if installing and using Java

Streams Pool

Provide memory for Oracle Streams processes

User Process

Server Process

Background process

Server Process

Parsing

Read necessary data blocks from data files and keep them in Cache

Return results

Background processes

Smon

Pmon

Dbwr

Lgwr

Ckpt



THE REAL HERO

When a server process cannot find a free buffer .

- *Checkpoint occurs*
- *Dirty buffers reach threshold*
- *Timeout occurs (3Secs)*

Lgwr

- *At commit*
- *When one-third full*
- *Every three seconds*
- *Before DBWn writes*

What is fast commit

What is group commit

Smon

- *Performs Instance recovery*
- *Cleans up unused temporary segments*

Pmon

- *Performs process recovery when a user process fails*
 - *Cleans up the database buffer cache*
 - *Frees resources that are used by the user process*

Pmon

Monitors sessions for idle session timeout

*Dynamically registers database services
with listeners*

Recoverer Process

Used with the Distributed database system

Automatically resolves all in-doubt transactions

Removes any rows that correspond to in-doubt transactions

Archiver Processes (ARCn)

Copy redo log files

Can transmit Log files to standby destinations

MMON

*Performs manageability-related
background tasks*

Manageability Monitor process

MMNL

*Performs frequent and lightweight
manageability-related tasks*

Lightweight Manageability Monitor process

MMAN

Performs automatic memory management tasks

Memory Manager process (MMAN)

CJQ0:

Runs user jobs used in batch processing

Coordinator process

QMNx

Monitors the Streams

Queue Monitor process

ASM –Back ground processes



*Writes CHECK POINT Information in
Data file header and control files .*

What is a Checkpoint?

*A synchronization event at a specific point
in time*

What is a Checkpoint?

Causes some or all Dirty Buffers to be written to the Disk .

What is a Checkpoint?

Guarantees that blocks dirtied prior to that point in time are written to Disk

*Attendance is taken at 1 pm .
Names of students ,who came before
1pm are written in the register .*

What is a Checkpoint?

*Maintain DB consistency
(Keeping DB up to date)*

Types of Checkpoint

FULL Checkpoint

Thread Checkpoint

File Checkpoint

Incremental Checkpoint

FULL Checkpoint

All dirty buffers are moved to disk from all instances . (RAC)

Caused by:

Alter system checkpoint [global]

Alter database begin backup

Shutdown

Thread Checkpoint

*All dirty buffers are moved to disk
from Only one instance . (RAC)*

Caused by:

Alter system checkpoint local

File Checkpoint

*All dirty buffers are moved to disk
from all the files of a tablespace*

Caused by:

Alter tablespace TS1 offline

Alter tablespace TS1 begin backup

Alter tablespace TS1 read only

Incremental Checkpoint

*Writes the contents of **SOME** dirty buffers
to the database from CKPT - Queue*





□

□



□

□





□

□

□

□

Redo byte address (RBA) pointer in SGA



Advise Oracle where recovery should begin in the case of an instance failure.

DBWn writes dirty buffers in SCN order,

Redo entries in the log files are in SCN order

Incremental check pointing.

DBWn writes dirty buffers to the disk and advances pointer to the point till where it has completed

What is driving your Checkpoints?

log_checkpoint_timeout

log_checkpoint_interval

fast_start_mttr_target

fast_start_io_target

Manual check points

Self Tuning check points

Views that show checkpoint Information

- V\$INSTANCE_RECOVERY
- V\$SYSSTAT
- V\$DATABASE
- V\$INSTANCE_LOG_GROUP
- V\$THREAD
- V\$DATAFILE
- V\$DATAFILE_HEADER

Data Base Storage

Data files

Stores actual Data

Tablespaces

Segments

Extents

Data blocks

*There are two types
Of structures in Oracle*

1. Logical structures

Which cannot be seen from O/S

2. Physical structures

Which can be seen from O/S

1. Logical structures

Tablespaces ,segments , extents ,Blocks

2. Physical structures

Datafiles , log files , Control files

Data files

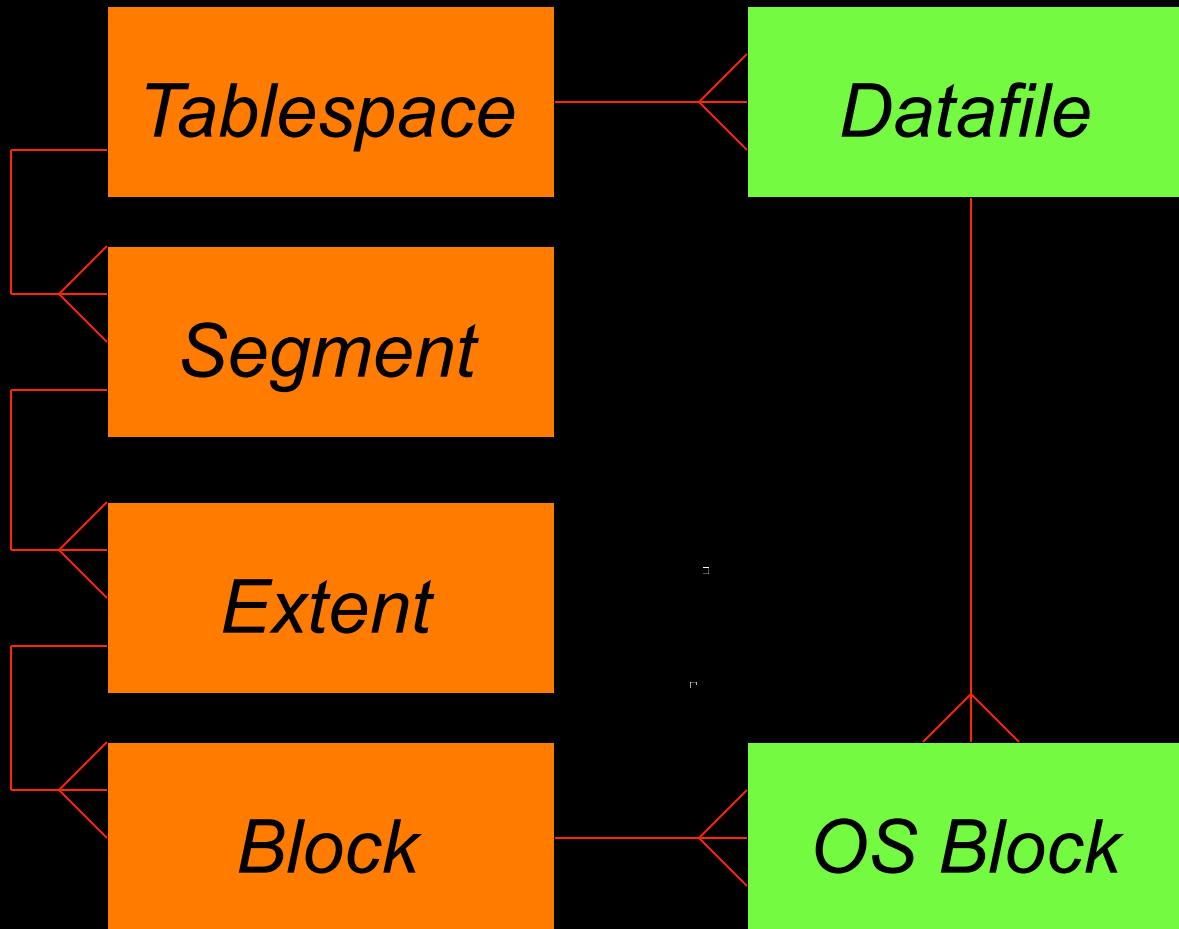
Tablespaces *Largest storage unit*

Segments

Extents

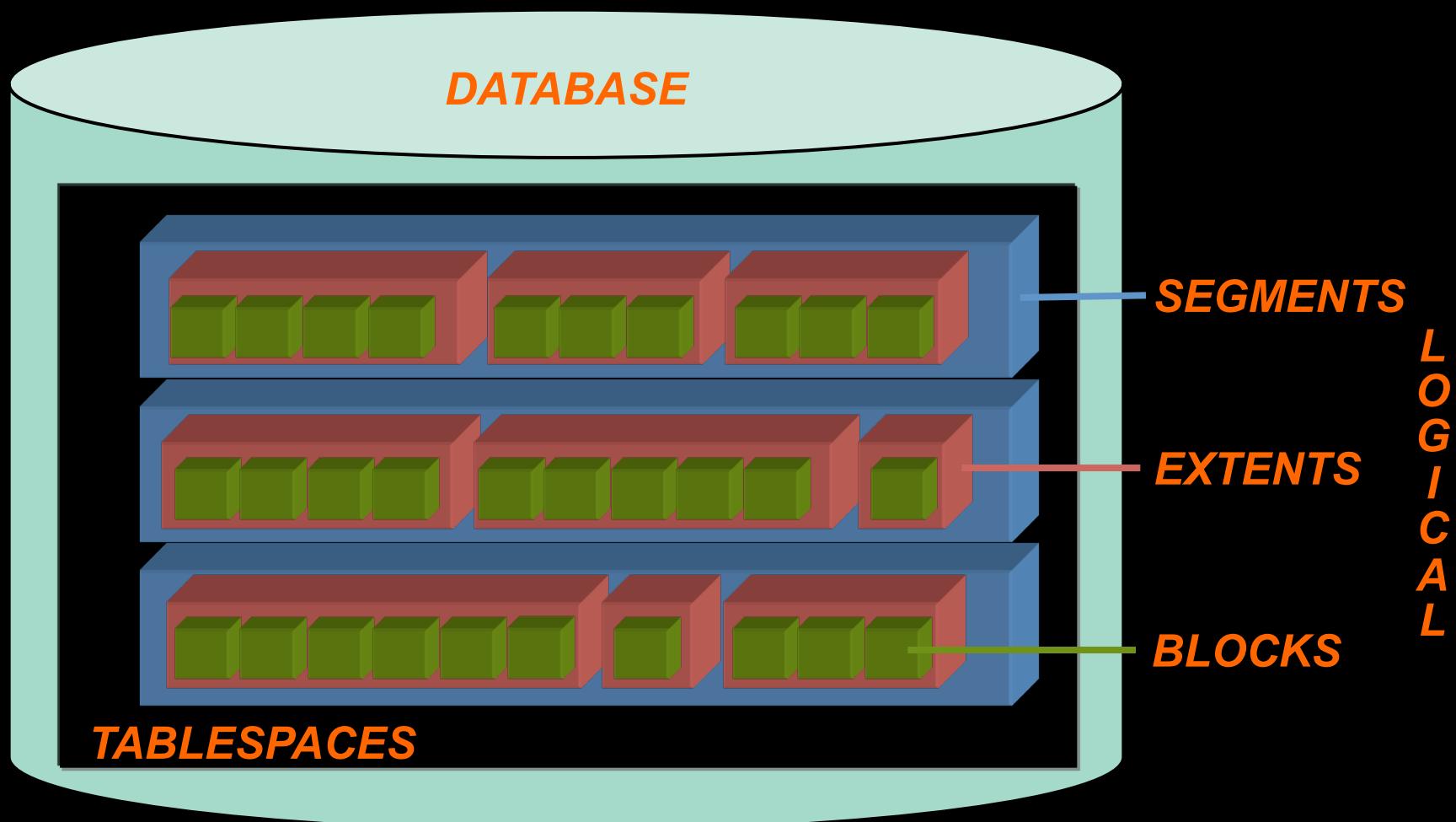
Data blocks *Smallest storage unit*

Mapping between Database and O/S

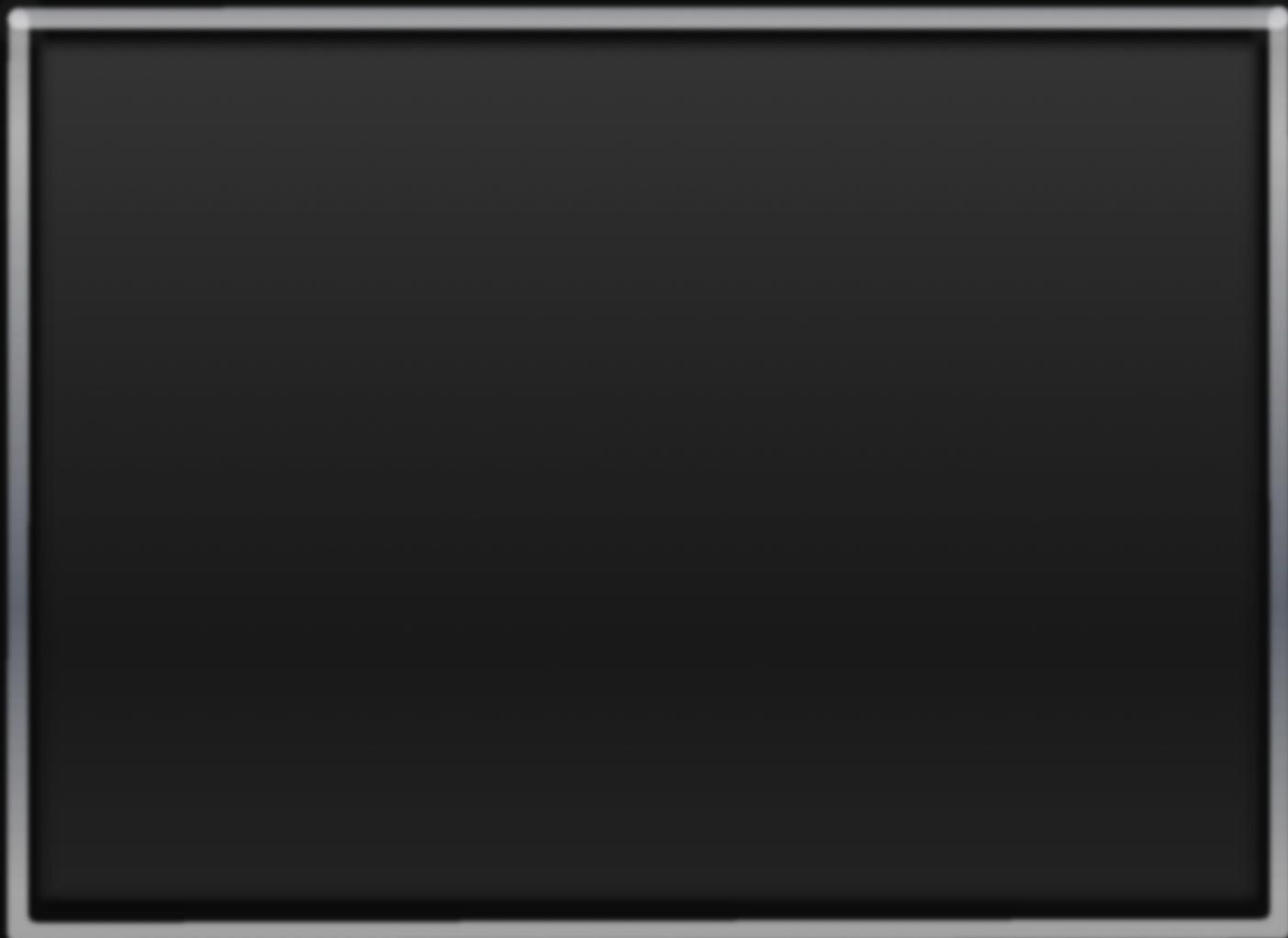


How Oracle store your Data

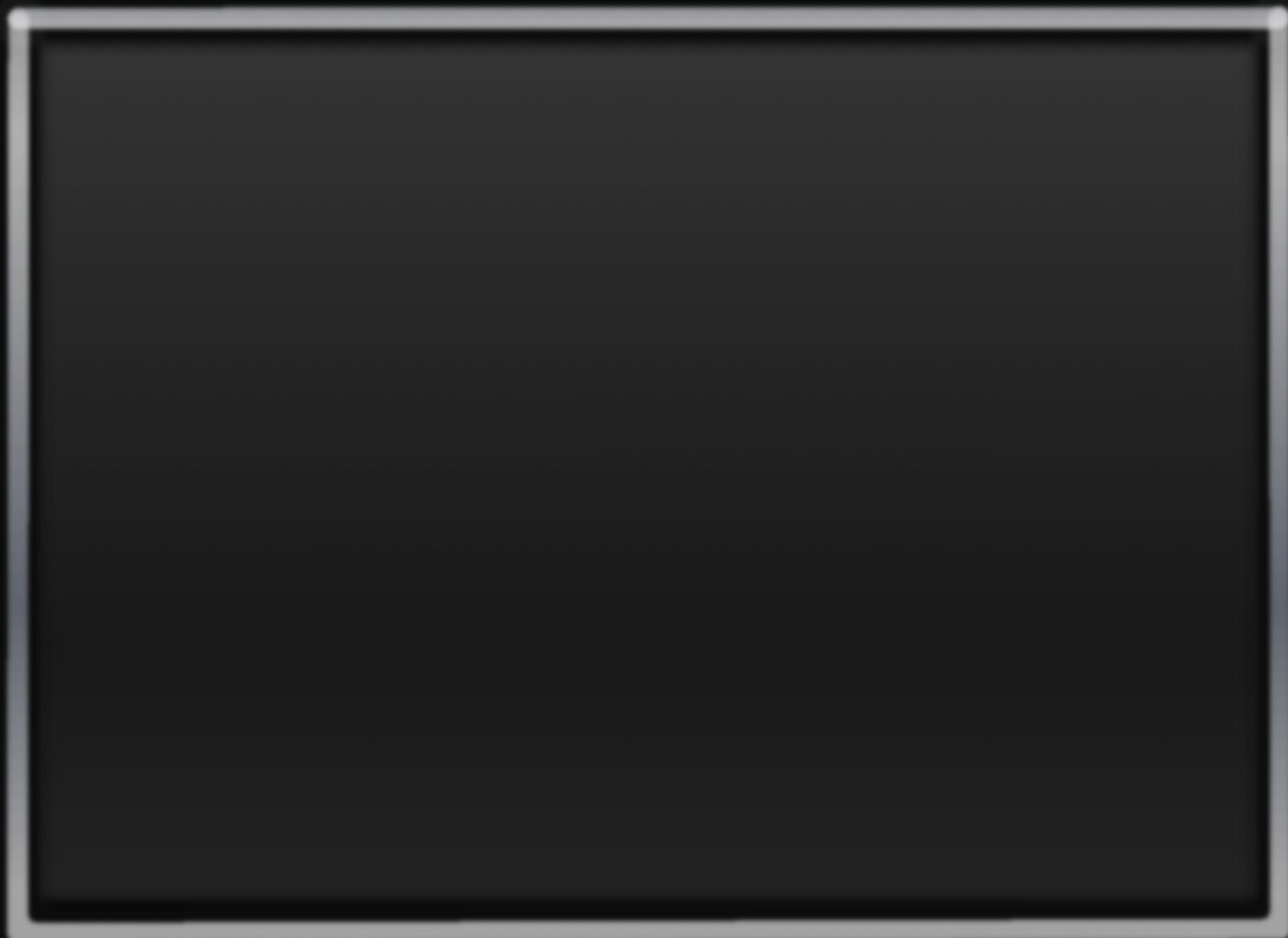
Physical



Tablespaces



Tablespaces



Tablespace *will have* *Datafiles*



Logical

Physical

Every Tablespace will have datafiles

TS1

DF1.DBF

DF2.DBF

DF3.DBF

DF4.DBF

No of Datafiles in a tablespace

Maximum 1024

Minnum 1

Tablespace *will have* *Segments*



Logical

Logical

Segment = *Table or Partition or Index*

Every Tablespace will have Segments

TS1

EMP

DEPT

EMP_IDX

DEPT_IDX

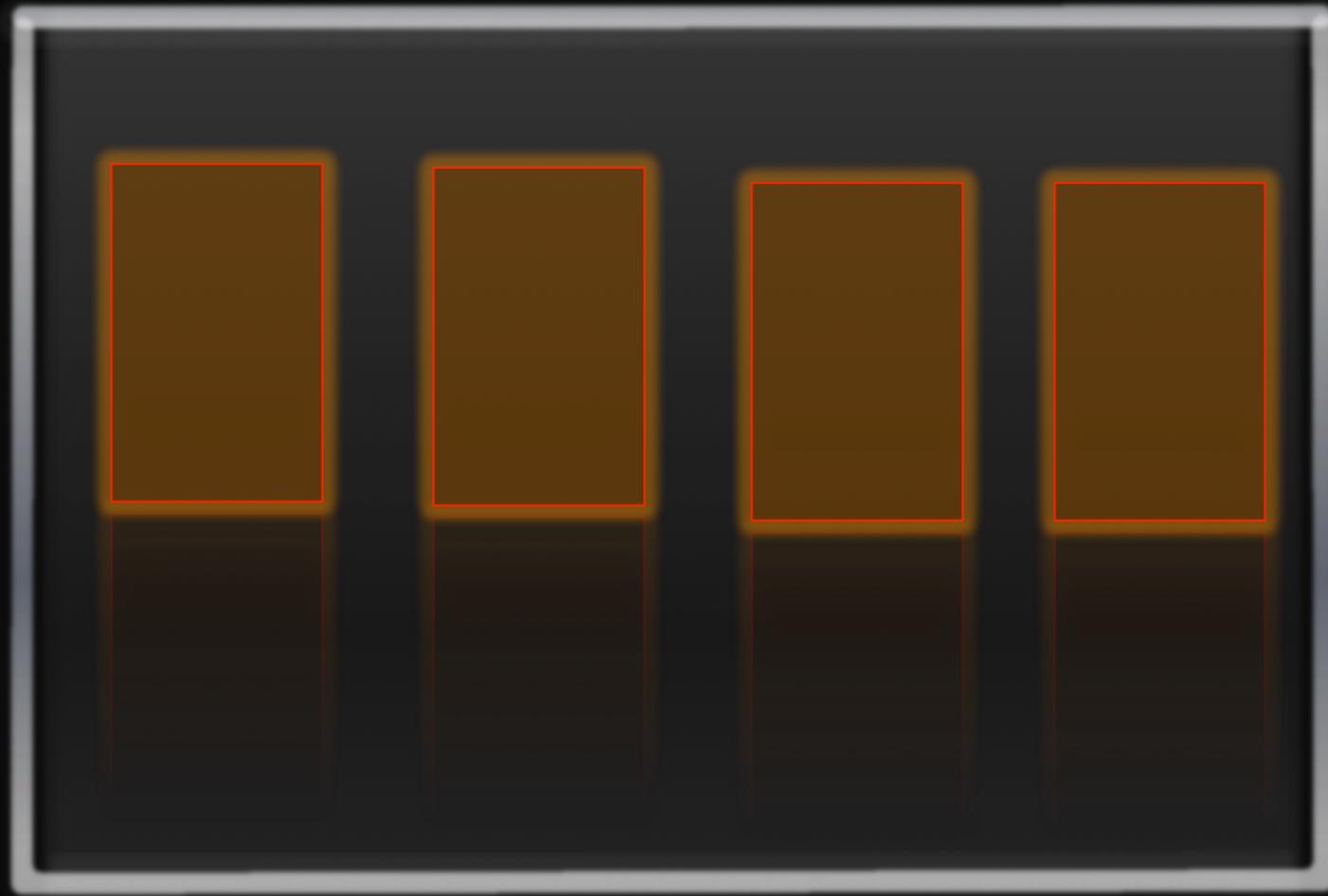
Tablespace will have segments

Each Segment will have extents

Every Tablespace will have Segments

TS1

EMP



Every Segment will have Extents

TS1

EMP

Initial

Next

Next

1

2

3

*CREATE TABLESPACE ts1
DATAFILE 'c:/oracle/df1.dbf' SIZE 50m*

Initial

Next

1m

1m

*How does Oracle decide size of the
3rd and other extents*

*CREATE TABLESPACE ts1
DATAFILE 'c:/oracle/df1.dbf' SIZE 50m*

Uniform size 1m

Initial

Next

Next

Next

1m

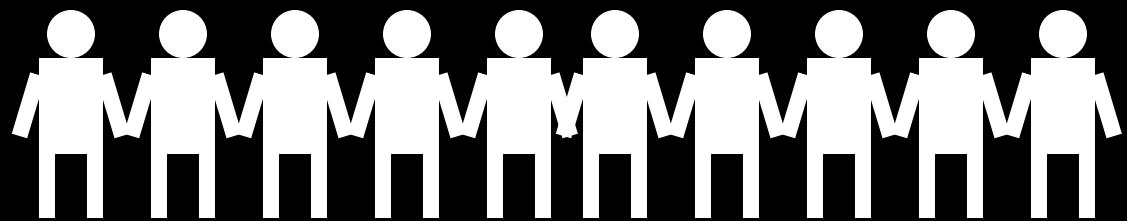
1m

1m

1m

Uniform Extents –

All extents are same in size



NON Uniform Extents

```
CREATE TABLESPACE ts1  
DATAFILE 'c:/oracle/df1.dbf' SIZE 50m
```

Initial

Next

1m

1m

*As we have not mentioned Uniform size ,
Oracle uses its own formula*

```
create tablespace ts2 datafile  
  '/u02/oracle/data/loctab01.dbf  
  size 50m  
  extent management local autoallocate
```

CREATE TABLESPACE ts1

DATAFILE 'c:/oracle/df1.dbf' SIZE 50m

Initial

Next

Next

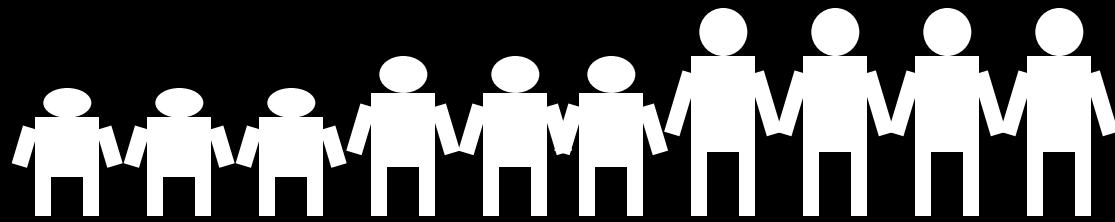
Next

Next

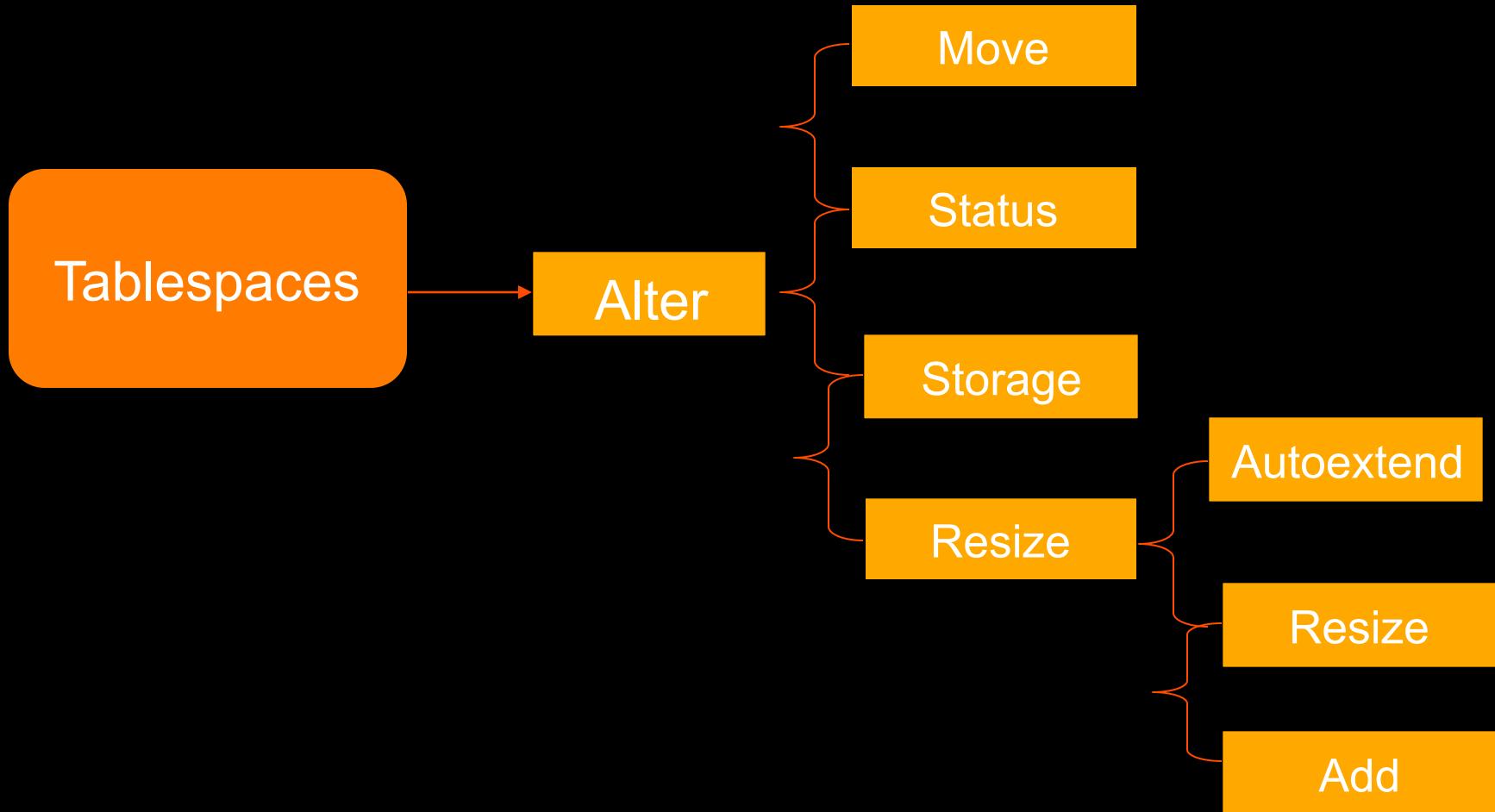
1m

1m

Auto-allocation



Alter Tablespaces



*Alter tablespace TS01
add datafile
'd:/oracle/df2.dbf' size 100M;*

TS1

DF1.DBF

DF2.DBF

*Alter database datafile
'd:/oracle/df1.dbf' resize 200 m*

TS1

DF1.DBF

DF2.DBF

200m

Autoextend on

*Alter tablespace ts1 add datafile
‘d:/oracle/df3.dbf’
Size 200m autoextend on ;*

*Alter tablespace ts1 add datafile
‘d:/oracle/df3.dbf’
Size 200m autoextend on
Maxsize 1000M;*

*Alter tablespace ts1 add datafile
‘d:/oracle/df3.dbf’
Size 200m autoextend on ;*

*Alter tablespace ts1 add datafile
‘d:/oracle/df3.dbf’*

Size 200m autoextend on ;

*If 200mb is filled ,then oracle will allocate
Space by itself,we don’t need to resize or
allocate more space*

*But there is no limit ,so oracle allocate
till you have no space in disk*

*Alter tablespace ts1 add datafile
‘d:/oracle/df3.dbf’*

*Size 200m autoextend on
Maxsize 1000M;*

*As there is limit , oracle will allocate
Only 1000 m maximum .*

Removing Tablespaces

Drop tablespace ts1;

Drop tablespace ts1 including contents ;

*Drop tablespace ts1 including contents and
datafiles ;*

Drop tablespace ts1;

1. *Drops the tablespace if it is empty*
2. *If you have any tables in this tablespace , this command will throw error*
3. *Oracle will not delete datafile , you need to delete*

Drop tablespace ts / including contents ;

1. *Drops the tablespace if it is empty*
2. *Drops the tablespace if it is empty or even
If it has tables*
3. *Oracle will not delete datafile ,
you need to delete*

Drop tablespace ts / including contents and datafiles ;

1. *Drops the tablespace if it is empty*
2. *Drops the tablespace if it is empty or even If it has tables*
3. *Oracle will delete datafile*

If there are referential integrity constraints in other tables that refer to the tables in the tablespace you intend to drop,

Drop tablespace ts1 cascade constraints ;

This command will throw error ,as it has Syntax error

Drop tablespace ts1 including contents cascade constraints ;

*How much space used by each user
In sysaux tablespace .*

```
SELECT occupant_name, schema_name,  
space_usage_kbytes, move_procedure  
FROM V$SYSAUX_OCCUPANTS;
```

Alter tablespace ts1 online;

*I can select any tables or write into any tables
That are in this tablespace ;*

Alter tablespace ts1 offline;

*I can't select any tables or write into any
tables That are in this tablespace ;*

Alter tablespace ts1 read only;

*I can select any tables or but I can't write
into any tables that are in this tablespace ;*

Alter tablespace ts1 read write;

*I can't select any tables or write into any
tables that are in this tablespace ;*

*Alter database datafile ‘d:/oracle/df1.dbf’
offline for drop ;*

*This statement takes the specified datafile
offline and marks it to be dropped:*

Renaming the datafiles

Alter database Rename file

'/c/oracle/df1.dbf',

TO

'/D/oracle/hello.dbf'

Steps for Renaming the datafiles

ALTER TABLESPACE ts1 OFFLINE NORMAL;

Cp c:\oracle\df1.dbf /D:/oracle/hello.dbf

Alter database Rename file

'/c/oracle/df1.dbf', to '/D/oracle/hello.dbf'

Alter tablespace ts1 online;

Tablespaces Using OMF

For adding new datafile

Or resizing

Or for dropping the datafile or tablespace

I have to give entire path (d:/oracle/)

To avoid this , We use OMF . If we use OMF

We don't need to give the path .

Tablespaces Using OMF

```
Alter system set  
db_create_file_dest = '/D:/oracle';
```

Managing Tablespaces with OMF

Create tablespace TSI datafile size 20M;

ALTER TABLESPACE TSI ADD DATAFILE;

DROP TABLESPACE TSI

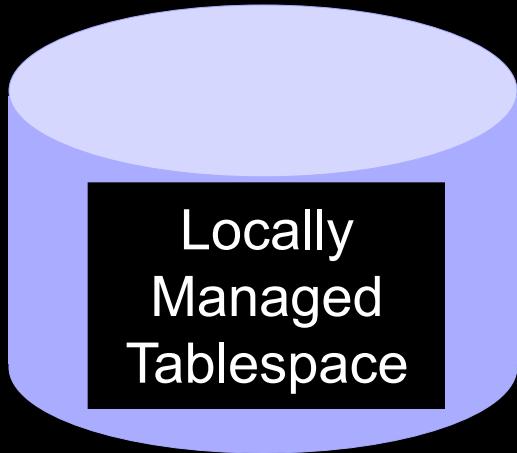
Obtaining Tablespace Information

- *V\$tablespace*
- *Dba_data_files*
- *V\$datafile*
- *Dba_tablespaces*
- *DBA_FREE_SPACE*
- *DBA_TS_QUOTAS*

Tablespace Alerts

- *Database Generated*
- *Warning, Critical*
- *Out of the box*
- *Tablespaces can be provisioned with more disk space before out-of-space conditions occur*

Tablespace Thresholds



=

97% Critical
85% Warning



Add Files

Resolve Space
Problem



Free up space

Redo Log Files

How Redo Log Files Work

Record all changes made to data

Used for recovery

Minimum 2 Redo log files are required

Redo log files are used in a cyclic fashion.

How Redo Log Files Work

When a redo log file is full, LGWR will move to the next log group ,called a log switch

*Checkpoint operation occurs and
Information written to the control file*

Archive files

Archive files are copy of Log files

Log files--Archive files

