

Database Practices Guide  
Oracle FLEXCUBE Investor Servicing  
Release 12.1.0.7.0  
[June] [2020]



## Table of Contents

1.	Introduction: .....	4
2.	Database Initialization Parameters.....	5
2.1	_ ALLOW_LEVEL_WITHOUT_CONNECT_BY .....	5
2.2	LM_RES_HASH_BUCKET .....	5
2.3	CURSOR_SHARING.....	5
2.4	DB_CACHE_ADVICE.....	6
2.5	FAST_START_MTTR_TARGET .....	6
2.6	JOB_QUEUE_PROCESSES .....	7
2.7	LOG_BUFFER.....	7
2.8	MEMORY_TARGET/MEMORY_MAX_TARGET .....	7
2.9	NLS_DATE_FORMAT .....	7
2.10	OPEN_CURSORS .....	8
2.11	OPTIMIZER_DYNAMIC_SAMPLING .....	8
2.12	OPTIMIZER_INDEX_CACHING .....	9
2.13	OPTIMIZER_INDEX_COST_ADJ.....	9
2.14	PARALLEL_MAX_SERVERS.....	10
2.15	PGA_AGGREGATE_LIMIT .....	10
2.16	PLSQL_CODE_TYPE .....	11
2.17	PROCESSES .....	11
2.18	REMOTE_DEPENDENCIES_MODE .....	11
2.19	SESSION_CACHED_CURSORS .....	12
2.20	SKIP_UNUSABLE_INDEXES.....	12
2.21	UNDO_RETENTION.....	13
3.	Redo Log Files.....	14
4.	Tablespace Layout and Moving Tables to Respective Tablespaces.....	15
5.	Table and Index Partitioning.....	17
6.	Sequence Caching .....	20
7.	PLSQL Optimizer Level .....	21
8.	Oracle FLEXCUBE Database Storage      Recommendations .....	22
a)	Key benefits of ASM.....	22
9.	Oracle FLEXCUBE Database Backup      Recommendations .....	23
a)	RMAN Vs Conventional Backup .....	23
b)	Benefits of Using RMAN.....	23
c)	Backup Strategy Recommendation.....	24
10.	Statistics Collection for FCIS Schema (Recommended Method) .....	1
a)	Customizing Default Statistics Collection Schedule .....	1
b)	Customizing Statistics Gathering for FCIS.....	3
i.	Statistics Histograms.....	3
ii.	Sample Size of Statistics .....	3
11.	FCIS Periodic Table Maintenance .....	5
12.	FCIS Functionality Related Performance Changes.....	6
13.	Known Issues .....	7
14.	Appendix .....	8

14.1.	Script to Check Histograms on FCIS Schema .....	8
14.2.	Script to Remove Histograms on FLEXCUBE Schema .....	8

---

## 1. Introduction:

This document contains FCIS Database best practices.

---

## 2. Database Initialization Parameters

Oracle FLEXCUBE standard database initialization parameters have been derived after performing the required benchmark tests (Performance Load tests).

**Note:** Since some of the initialization parameters values are specific to customer volume, parameters should be derived using [FLEXCUBE-Disk-Layouts-initparams-19c.xlsm](#) excel sheet base lined along with this document.

Following are the Parameters with the details and its relevance to Oracle FLEXCUBE:

### 2.1 \_\_ALLOW\_LEVEL\_WITHOUT\_CONNECT\_BY

Recommended Value: TRUE

This parameter is set to avoid following error,

- After Upgrading To Oracle 10g, Getting ORA-01788 When Running A Query That Includes The LEVEL Pseudo Column [ID 455953.1]

### 2.2 LM\_RES\_HASH\_BUCKET

Recommended Value: 8192

To avoid "LATCH: GES RESOURCE HASH LIST" waits in 19c RAC environment, we need to set this parameter.

### 2.3 CURSOR\_SHARING

Determines what kind of SQL statements can share the same cursors.

Property	Description
Parameter type	String
Default value	EXACT
Recommended Value	Force

#### Oracle FLEXCUBE relevance

Some of the FLEXCUBE sql statements are generated dynamically. So they contain literal values in the WHERE clause conditions. This results in large numbers of nearly identical statements with separate parse trees in Oracle's library cache, which can slow performance and cause latch problems.

By setting cursor\_sharing to FORCE database convert literals to bind variables before parsing the statement.

## 2.4 **DB\_CACHE\_ADVICE**

This enables or disables statistics gathering used for predicting behavior with different cache sizes through the V\$DB\_CACHE\_ADVICE performance view.

Property	Description
Parameter type	String
Syntax	DB_CACHE_ADVICE = { ON   READY   OFF }
Default value	If STATISTICS_LEVEL is set to TYPICAL / ALL, then ON If STATISTICS_LEVEL is set to BASIC, then OFF
Recommended Value	OFF (Should be ON while Performance Monitoring)

### **Oracle FLEXCUBE relevance**

Turning ON advisory will have an extra overhead. Please note it should be ON, only during performance monitoring.

## 2.5 **FAST\_START\_MTTR\_TARGET**

This enables you to specify the number of seconds the database takes to perform crash recovery of a single instance. When specified, FAST\_START\_MTTR\_TARGET is overridden by LOG\_CHECKPOINT\_INTERVAL.

Property	Description
Parameter type	Integer
Default value	0
Range of values	0 to 3600 seconds
Recommended Values	300

### **Oracle FLEXCUBE relevance**

If FAST\_START\_MTTR\_TARGET is not set to 300 then run time performance for write/redo generation intensive workloads will not be optimized. This will reduce checkpoint writes from DBWR processes, making more room for LGWR IO. To optimize run time performance for write/redo generation intensive workloads, increase the FAST\_START\_MTTR\_TARGET initialization parameter to 300.

## 2.6 JOB\_QUEUE\_PROCESSES

This specifies the maximum number of processes that can be created for the execution of jobs. It specifies the number of job queue processes per instance (J000, J999).

Property	Description
Parameter type	Integer
Default value	4000
Range of values	0 to 1000
Recommended Values	Refer <a href="#">FLEXCUBE-Disk-Layouts-initparams-19c.xlsm</a>

### Oracle FLEXCUBE relevance

This parameter has to be set with respect to the maximum number of scheduler jobs. To arrive at the right value, refer [FLEXCUBE-Disk-Layouts-initparams-19c.xlsm](#) excel.

## 2.7 LOG\_BUFFER

Recommended Value: Refer [FLEXCUBE-Disk-Layouts-initparams-19c.xlsm](#)

### Oracle FLEXCUBE relevance

The default log buffer size is too small as FLEXCUBE performs heavy DML during batch processing.

## 2.8 MEMORY\_TARGET/MEMORY\_MAX\_TARGET

Recommended Value: Refer [FLEXCUBE-Disk-Layouts-initparams-19c.xlsm](#).

For linux systems, make sure that the value of operating system /dev/shm mount is set to appropriate value to accommodate memory\_Target.

## 2.9 NLS\_DATE\_FORMAT

This specifies the default date format to use with the TO\_CHAR and TO\_DATE functions.

Property	Description
Parameter type	String
Syntax	NLS_DATE_FORMAT = "format"

Default value	Derived from NLS_TERRITORY
Recommended Values	DD-MON-RRRR

#### Oracle FLEXCUBE relevance

FLEXCUBE standard date format.

## 2.10 OPEN CURSORS

This specifies the maximum number of open cursors (handles to private SQL areas) a session can have at once. You can use this parameter to prevent a session from opening an excessive number of cursors.

Property	Description
Parameter type	Integer
Default value	50
Modifiable	ALTER SYSTEM
Range of values	1 to 4294967295 (4 GB -1)
Recommended Values	5000

#### Oracle FLEXCUBE relevance

It is important to set the value of OPEN\_CURSORS high enough to prevent FCIS application from running out of open cursors (ORA-01000: maximum open cursors exceeded).

## 2.11 OPTIMIZER\_DYNAMIC\_SAMPLING

This controls the level of dynamic sampling performed by the optimizer.

Property	Description
Parameter type	Integer
Default value	If OPTIMIZER_FEATURES_ENABLE is set to 10.0.0 or higher, then 2  If OPTIMIZER_FEATURES_ENABLE is set to 9.2.0, then 1  If OPTIMIZER_FEATURES_ENABLE is set to 9.0.1 or lower, then 0
Recommended Values	1



Range of values	0 to 10
-----------------	---------

#### Oracle FLEXCUBE relevance

Dynamic Sampling is a method of gathering additional statistics during optimization by recursively sampling statements. When dynamic sampling is enabled, queries are recursively generated by Oracle to test various selectivity based upon real values in order to improve their accuracy. This can result in the production of better explain plans.

Value 1 Sample all tables that have not been analyzed that meet certain criteria.

## 2.12 OPTIMIZER INDEX CACHING

This lets you adjust the behavior of cost-based optimization to favor nested loops joins and IN-list iterators.

Property	Description
Parameter type	Integer
Default value	0
Recommended Values	90
Range of values	0 to 100

#### Oracle FLEXCUBE relevance

The cost of executing an index using IN-list iterators or of executing nested loops join when an index is used to access the inner table depends on the caching of that index in the buffer cache.

FLEXCUBE favors nested loop joins by setting optimizer\_index\_caching to 90.

## 2.13 OPTIMIZER INDEX COST ADJ

This lets you tune optimizer behavior for access path selection to be more or less index friendly - that is, to make the optimizer more or less prone to selecting an index access path over a full table scan.

Property	Description
Parameter type	Integer
Default value	100
Recommended Values	50

Range of values	1 to 10000
-----------------	------------

#### Oracle FLEXCUBE relevance

FLEXCUBE favors index read over full table scan as it is very useful when optimizer favors to give a lower cost to index scans over full-table scans.

## 2.14 PARALLEL\_MAX\_SERVERS

This specifies the maximum number of parallel execution processes and parallel recovery processes for an instance. As demand increases, Oracle Database increases the number of processes from the number created at instance startup up to this value.

Property	Description
Parameter type	Integer
Default value	Derived from the values of CPU_COUNT, PARALLEL_THREADS_PER_CPU, and PGA_AGGREGATE_TARGET
Recommended Values	Refer <a href="#">FLEXCUBE-Disk-Layouts-initparams-19c.xlsm</a>
Range of values	0 to 3600
Real Application Clusters	Multiple instances can have different values

#### Oracle FLEXCUBE relevance

To arrive right value, refer [FLEXCUBE-Disk-Layouts-initparams-19c.xlsm](#) excel.

## 2.15 PGA\_AGGREGATE\_LIMIT

Recommended Value: 0

Oracle Flexcube Relevance:

Setting this parameter limits the pga consumed by the instance, hence might cause failure to few of the running processes.

## 2.16 PLSQL\_CODE\_TYPE

This specifies the compilation mode of the PL/SQL units.

Property	Description
Parameter type	String
Default value	INTERPRETED
Recommended values	NATIVE
Range of values	INTERPRETED, NATIVE

### Oracle FLEXCUBE relevance

The PL SQL interpreter overhead will be minimal when set to NATIVE.

## 2.17 PROCESSES

This specifies the maximum number of operating system user processes that can simultaneously connect to Oracle. Its value should allow for all background processes such as locks, job queue processes, and parallel execution processes.

Property	Description
Parameter type	Integer
Default value	100
Range of values	6 to operating system dependent
Recommended values	Refer <a href="#">FLEXCUBE-Disk-Layouts-initparams-19c.xlsm</a>

### Oracle FLEXCUBE relevance

This parameter can set be set with respect to maximum no of sessions connected to DB.

## 2.18 REMOTE\_DEPENDENCIES\_MODE

Specifies how Oracle should handle dependencies upon remote PL/SQL stored procedures.

Property	Description
Parameter type	String
Syntax	REMOTE_DEPENDENCIES_MODE = { TIMESTAMP   SIGNATURE }

Default value	TIMESTAMP
Recommended values	SIGNATURE

#### Oracle FLEXCUBE relevance

Oracle allows the procedure to execute as long as the signatures are considered safe. This setting allows client PL/SQL applications to be run without recompilation.

## 2.19 SESSION\_CACHED\_CURSORS

Specifies the number of session cursors to cache. Repeated parse calls of the same SQL statement cause the session cursor for that statement to be moved into the session cursor cache. Subsequent parse calls will find the cursor in the cache and do not need to reopen the cursor. Oracle uses a least recently used algorithm to remove entries in the session cursor cache to make room for new entries when needed.

Property	Description
Parameter type	Integer
Default value	50
Recommended values	400
Range of values	0 to operating system-dependent

#### Oracle FLEXCUBE relevance

This helps to cache the cursor thus avoid parsing of the cursor which heavy CPU intensive particularly in batch.

## 2.20 SKIP\_UNUSABLE\_INDEXES

Enables or disables the use and reporting of tables with unusable indexes or index partitions.

Property	Description
Parameter type	Boolean
Default value	True
Recommended values	FALSE
Range of values	true / false

### Oracle FLEXCUBE relevance

TRUE enables error reporting of indexes marked UNUSABLE. This setting does not allow inserts, deletes, and updates on tables with unusable indexes or index partitions. IT is set to false because FLEXCUBE application should throw error if any of the indexes become UNUSABLE.

## 2.21 UNDO RETENTION

This specifies (in seconds) the low threshold value of undo retention. For AUTOEXTEND undo tablespaces, the system retains undo for at least the time specified in this parameter, and automatically tunes the undo retention period to satisfy the undo requirements of the queries. For fixed- size undo tablespaces, the system automatically tunes for the maximum possible undo retention period, based on undo tablespace size and usage history, and ignores UNDO\_RETENTION unless retention guarantee is enabled.

The UNDO\_RETENTION parameter can only be honored if the current undo tablespace has enough space. If an active transaction requires undo space and the undo tablespace does not have available space, then the system starts reusing unexpired undo space. This action can potentially cause some queries to fail with a "snapshot too old" message.

Property	Description
Parameter type	Integer
Default value	900
Range of values	0 to 231 – 1
Recommended values	1800

### Oracle FLEXCUBE relevance

Increased value along with automatic undo management helps to avoid "snapshot too old error".

---

### 3. **Redo Log Files**

The default redo log files groups and size is inadequate to run Oracle FLEXCUBE. Hence, the recommended are:

- 6 redo log groups
- Redo log file size
  - 1 GB each for the DB size up to 1 TB
  - 2 GB each for DB size more than 1 TB

---

## 4. Tablespace Layout and Moving Tables to Respective Tablespaces

Oracle FCIS Tables and Indexes are placed in Default Tablespace.

Oracle FCIS tables and indexes can also be placed in corresponding tablespaces according to their usage. i.e. heavily populated tables and corresponding indexes can be placed in tablespaces with higher extent size whereas the maintenance tables where the data population is less can be placed in a tablespace with smaller extent size. This avoids frequent space allocation in turn improve the performance.

For example table PERIODICLOADACCRUALHISTORY is heavily populated hence this table and its indexes can be placed in tablespace FCISDATAXL and FCISINDXXL respectively where extent size is high. The table funddemographicstbl where data population is less, data and its indexes are placed in tablespace FCISDATASML and FCISINDXSML respectively which is having smaller extent size.

Setting up of FCIS tables and indexes to corresponding tablespace is optional.

Oracle FLEXCUBE Standard Tablespaces can be as follows:

Tablespace name	Tablespace type	Extent management	Segment space management
FCISDATASML	DATA	LOCAL	AUTO
FCISINDXSML	INDEX	LOCAL	AUTO
FCISDATAMED	DATA	LOCAL	AUTO
FCISINDEXMED	INDEX	LOCAL	AUTO
FCISDATAJAR	DATA	LOCAL	AUTO
FCISINDEXJAR	INDEX	LOCAL	AUTO
FCISDATAXL	DATA	LOCAL	AUTO
FCISINDXXL	INDEX	LOCAL	AUTO
FCISDFLT	AD HOC	LOCAL	AUTO

Note: Tablespaces extent size depends on Oracle FLEXCUBE implementation (i.e. Small, Medium and Large). So these parameters are to be derived using base lined excel [FLEXCUBE-Disk-Layouts-initparams-19c.xlsm](#) based on implementation.

Sample script to move table and index:

Alter table PERIODICLOADACCRUALTBL move tablespace FCISDATALAR;

Alter index PERIODICLOADACCHISTXN\_IDX2 rebuild tablespace FCISINDXLAR;

Similarly all tables and indexes should be moved to respective tablespaces.



## 5. Table and Index Partitioning

Table and index partitioning helps to reduce the contention and GC related delays in RAC environment. Table and index partitioning is mandatory if you have deployed Oracle FCIS in RAC database.

Table partitioning:

Following are the list of tables to be partitioned:

Table_name	Column_name	Partitioning_type
CONSOLIDATEDTXNTBL	FUNDID	list
TXNSETTLEMENTTBL	txn number	hash (16partitions)
UHBALLEDGERTBL	fundid	List
AGEINGTBL	TRANSACTIONNUMBER	HASH (16partitions)
ALLOCATIONTBL	TRANSACTIONNUMBER	HASH (16partitions)
POLICYTXNTBL	policytxnnumber	Hash (16partitions)
TXNINTERMEDIARYTBL	TRANSACTIONNUMBER	Hash (16partitions)
TXNDETAILSTBL	TRANSACTIONNUMBER	hash (16partitions)
LOADHISTORYTBL	fundid	List
PERIODICLOADLOGTBL	fundid	List
POLICYTXNFUNDRATIOTBL	policytxnnumber	Hash (16partitions)
POLICYFUNDTXNLINKTBL	policytxnnumber	Hash (16partitions)
CLEARINGTBL	transactionnumber	Hash (16partitions)
DERIVEDLOADHISTORYTBL	fundid	List

TXNVATVALUESTBL	transactionnumber	Hash (16partitions)
UNITHOLDERTBL	Unitholderid	Hash (16partitions)
UHINTERMEDIARYTBL	Unitholderid	Hash (16partitions)
DIVIDENDUHSPLITLOGTBL	KEYSTRING	HASH

Index partitioning:

Following are the list of tables whose indexes were partitioned:

Table_name	Index_name	Global / Partitioned Index
DIVIDENDDECLAREDETAILSTB	DIVDECTBLPK	Global
	DIVDECTBL_IDX41	Global
	DIVIDENDDECLAREDETAILSTBLIDX2	Hash
	DIVIDENDDECLAREDETAILSTBLIDX3	Hash
UHDIVIDENDBALANCETBL	UHDIVBALIDX_1	Hash
	UHDIVBALIDX_2	Hash
	UHDIVBALIDX_9	Hash
DIVIDENDDETAILSTBL	DIVDETSTBLPK	Hash
DIVIDENDUHSPLITLOGTBL	DIVIDENDSPLITPK	Hash
	DIVIDENDUHSPLITLOGIDX_1	Global
FORCEDDIVMODECHANGETBL	FORCEDDIVMODECHGTBLIDX1	Hash
FUNDDIVIDENDCOMPONENTV	DIVIDX01	Hash
FUNDDIVIDENDPAYMENTTBL	FNDDIVPAYTBLPK	Hash
	FNDDIVPAYTBL_IDX1	Hash
MOCKUHDIVIDENDBALANCETB	MOCKUHDIVIDENDBALANCEIDX_1	RANGE
UHDIVIDENDEQPAYMENTTBL	EQPAYMENTPK	Hash
UHDIVIDENDNPIPAYMENTTBL	UHDIVNPIPAYTBLPK	Hash

UHDIVIDENDPAYMENTTBL	UHDIVIDENDPAYMENT1PK	Hash
	UHDIVIDENDPAYMENTIDX_1	Hash
	UHDIVIDENDPAYMENTTBL_IDX	Global
	UHDIVIDENDPAYMENTTBL_IDX1	Global
WHTDIVIDENDCOMPONENTST	WHTDIVCOMPTBL_PK	Hash
PERLOADACCTEMPTBL	PERLOADACCT_IDX1	List
	PERLOADACCT_IDX2	List

---

## 6. Sequence Caching

Sequence Caching is applicable only if Oracle FCIS is deployed in RAC database.

Heavy use of sequences in RAC database causes high DFS lock handle & row cache lock waits which affect the application scalability. In order to overcome this issue, the sequences are to be cached with noorder option.

All the FCIS sequences should be recreated cache 500 and noorder. Steps to alter existing sequences as follows:

1. Login to FLEXCUBE schema
2. SQL > Spool sequence.sql
3. SQL > select ' alter sequence ' || sequence\_name || ' cache 500 noorder;' from user\_sequences;
4. SQL > spool off;
5. SQL > @ sequence.sql

Verify that cache and order changed to all sequences.

6. Select order\_flag, cache\_size from user\_sequences;

In FCIS some of the sequences are recreated as part of end of day batches. Those sequences have to be taken care in spRecreateSequences procedure. This procedure should be modified to include caching and noorder as follows:

```
I_Create := 'CREATE SEQUENCE ' || p_Seq_Name || ' INCREMENT BY 1 START WITH 1  
MINVALUE 1 NOCYCLE CACHE 500 NOORDER';
```

---

## 7. PLSQL Optimizer Level

The plsql\_optimize\_level value for all the pl/sql units should be same which would be the value set in plsql\_optimize\_level init parameter.

Following sql gives the PLSQL optimizer level for Oracle FLEXCUBE schema plsql units:

```
Select      PLSQL_OPTIMIZE_LEVEL, type, count (*)      "Count"      from
user_plsql_object_settings group by PLSQL_OPTIMIZE_LEVEL, type;
```

PLSQL\_OPTIMIZE\_LEVEL for all the objects should be same which should be value set in plsql\_optimize\_level init parameter. If there is a difference then the objects should be recompiled. This can be done using dbms\_utility.compile\_schema procedure.

Eg: - exec dbms\_utility.compile\_schema('FCISBM2') Here, 'FCISBM2' refers to Oracle FLEXCUBE schema.

**Note:** The 'dbms\_utility.compile\_schema' procedure invalidates and recompiles all the plsql units.

---

## 8. Oracle FLEXCUBE Database Storage Recommendations

Oracle database 10g release 2 onwards, Automatic Storage Management (ASM) is the recommended storage option for FLEXCUBE database. ASM is an integrated cluster aware volume manager and a file system designed and optimized for managing Oracle database files. ASM is the realization of the Oracle Stripe and Mirror Everything (SAME) storage management methodology researched and established as best practices for Oracle database environment over many years.

**Note:** For configuring ASM refer Automatic storage management best practice document provided by Oracle for your database version.

### a) Key benefits of ASM

- I/O is spread evenly across all available disk drives to prevent hot spots and maximize performance.
- ASM eliminates the need for over provisioning and maximizes storage resource utilization facilitating database consolidation.
- Inherent large file support.
- Performs automatic online redistribution after the incremental addition or removal of storage capacity.
- Maintains redundant copies of data to provide high availability, or leverage 3rd party RAID functionality.
- Supports Oracle Database 19c as well as Oracle Real Application Clusters (RAC).
- Capable of leveraging 3rd party multipathing technologies.
- For simplicity and easier migration to ASM, an Oracle Database 19c database can contain ASM and non-ASM files. Any new files can be created as ASM files whilst existing files can also be migrated to ASM.
- RMAN commands enable non-ASM managed files to be relocated to an ASM disk group.
- Oracle Database 19c Enterprise Manager can be used to manage ASM disk and file management activities.

---

## 9. Oracle FLEXCUBE Database Backup Recommendations

Backup Policy is a very important ingredient of any High Availability system. Oracle recommends RMAN utility for database backup.

RMAN is acronym for Recovery Manager, is Oracle utility which will backup, restore, and recover oracle data files. RMAN is an Oracle provided utility for efficiently performing Backup and Recovery. RMAN is available as a part of the standard Installation and no separate installation is required. Recovery Manager is a client/server application that uses database server sessions to perform backup and recovery. It stores metadata about its operations in the control file of the target database and, optionally, in a recovery catalog schema in an Oracle database.

You can invoke RMAN as a command-line executable from the operating system prompt or use some RMAN features through the Enterprise Manager GUI.

### a) RMAN Vs Conventional Backup

- During a conventional hot backup, the amount of Redo generated during the backup would be more due to the fact that the redo logs during the hot backup store the entire block images rather than the change vectors.
- RMAN doesn't place the tablespace in a backup mode and hence the amount of Redo generated during the RMAN backup is considerably low.
- RMAN can identify block corruption during backup operations and RMAN supports Block recovery.
- RMAN automatically detects new data files and will backup them. Also, RMAN supports incremental backup method.
- RMAN backs up only the blocks that have been used at least once. Unused blocks are never backed up. Unused block here refers to the blocks where in the block header is zeroed
- RMAN enables us to test the backup without actually restoring the backup.
- RMAN can verify physical and logical structures of the database without actually performing backup.
- Usage of Shared Pool and Large Pool for RMAN
- RMAN uses DBMS\_RCVMAN and DBMS\_BACKUP\_RESTORE packages for backup and recovery. These packages would be loaded in the shared pool for backup and restore operation. RMAN uses the PGA for backup and restore operation.
- RMAN Requires LARGE\_POOL only if TAPE\_IO\_SLAVES and DBWR\_IO\_SLAVES are defined.
- **Sizing Large Pool** -  $LARGE\_POOL = (Number\ of\ Channels) * (16\ MB + Tape\ Buffer)$

### b) Benefits of Using RMAN

- RMAN is an intelligent tool that comes at no extra cost. It is available free with the Oracle Database.
- RMAN introduced in Oracle 8 it has become simpler with newer versions and easier than user managed backups.
- Provides proper security for Backups.
- You can be 100% sure your database has been backed up.
- Controlfile and Spfile of the database can be configured to be automatically backed up by RMAN.
- It contains detail of the backups taken etc in its central repository Facility for testing validity of backups also commands like crosscheck to check the status of backup.
- Faster backups and restores compared to backups without RMAN.
- RMAN is the only native backup tool which supports incremental backups.

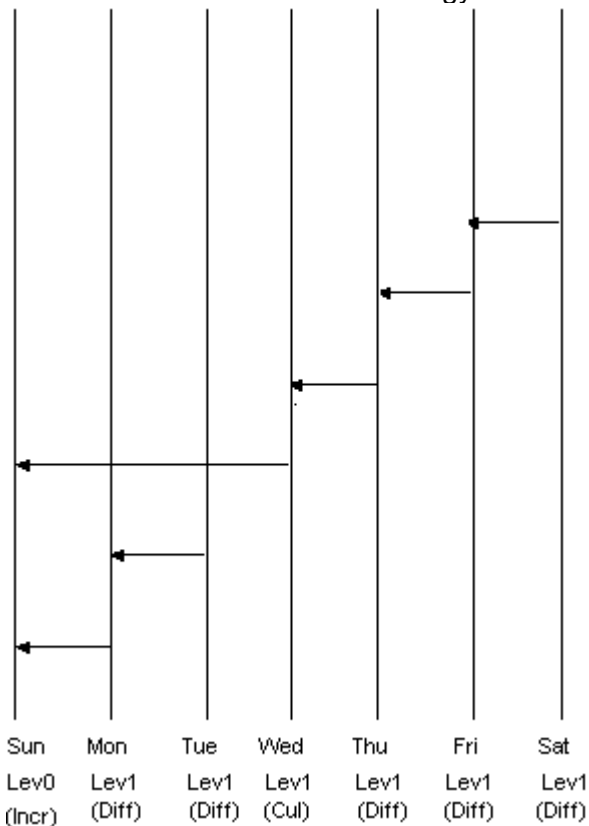
- Oracle 19c has got further optimized incremental backup which has resulted in improvement of performance during backup and recovery time.
- Parallel operations (Multiple Channels for Backup and Restore) are supported.
- Better querying facility for knowing different details of backup.
- No extra redo is generated when backup is performed, compared to conventional online backup.
- Maintains repository of backup metadata.
- Remembers backup set location.
- Knows what needs to be backed up.
- Knows what is required for recovery.
- Knows what backups are redundant.
- RMAN can back up the Database to Disk or directly to Tape. It is recommended that RMAN backup is performed to disk and then copied to tape.

### c) **Backup Strategy Recommendation**

RMAN will not backup the below files so it is advised to take the copy of the below files on regular basis (weekly/any change/addition to the file).

- Tnsnames.ora
- Listener.ora
- Password file
- Init.ora

The Best practice is to take create the pfile once the spfile is updated.  
Below is the recommended strategy.





---

## 10. Statistics Collection for FCIS Schema (Recommended Method)

Oracle provides a default scheduled job to collect statistics for the entire database and is default scheduled to run every night. Given that Oracle FLEXCUBE batch as well runs in the night it is critical that the statistics gathering is not run during the batch.

It is recommended to use the default database scheduled job that is shipped with Oracle

Database to collect statistics for Oracle FLEXCUBE Schema

**Note:** This document assumes that there is no other tool or a program is scheduled to collect statistics for the Database.

### a) Customizing Default Statistics Collection Schedule

The Default Scheduler is to be customized for the following:

- Ensure that the default statistics gathering program is configured and Running.

```
SELECT STATUS
```

```
FROM DBA_AUTOTASK_CLIENT
```

```
WHERE CLIENT_NAME='auto optimizer stats collection';
```

Should return - ENABLED

- Ensure that the default statistics gathering program is configured to run only on weekends. /\*

Start of Script – Script to be executed as SYS\*/

```
BEGIN DBMS_AUTO_TASK_ADMIN.ENABLE(
```

```
CLIENT_NAME => 'auto optimizer stats collection',
```

```
OPERATION => NULL,
```

```
WINDOW_NAME => 'SATURDAY_WINDOW'); DBMS_AUTO_TASK_ADMIN.ENABLE(
```

```
CLIENT_NAME => 'auto optimizer stats collection', OPERATION => NULL,
```

```
WINDOW_NAME => 'SUNDAY_WINDOW'); END;
```

```
/* End of Script */
```

- Default schedule is daily. So disable the daily schedules for optimizer statistics.

/\* Start of Script – Script to be executed as SYS\*/

```
BEGIN DBMS_AUTO_TASK_ADMIN.DISABLE(
```

```

CLIENT_NAME => 'auto optimizer stats collection', OPERATION => NULL,
WINDOW_NAME => 'MONDAY_WINDOW'); DBMS_AUTO_TASK_ADMIN.DISABLE(
CLIENT_NAME => 'auto optimizer stats collection', OPERATION => NULL,
WINDOW_NAME => 'TUESDAY_WINDOW');
DBMS_AUTO_TASK_ADMIN.DISABLE(
CLIENT_NAME => 'auto optimizer stats collection', OPERATION => NULL,
WINDOW_NAME => 'WEDNESDAY_WINDOW');
DBMS_AUTO_TASK_ADMIN.DISABLE(
CLIENT_NAME => 'auto optimizer stats collection', OPERATION => NULL,
WINDOW_NAME => 'THURSDAY_WINDOW'); DBMS_AUTO_TASK_ADMIN.DISABLE(
CLIENT_NAME => 'auto optimizer stats collection', OPERATION => NULL,
WINDOW_NAME => 'FRIDAY_WINDOW');
END;
/
/* End of Script */

```

Verify the setup using the following SQL

```

SELECT WINDOW_NAME,OPTIMIZER_STATS FROM DBA_AUTOTASK_WINDOW_CLIENTS;
Should return

```

MONDAY\_WINDOW DISABLED

TUESDAY\_WINDOW DISABLED

WEDNESDAY\_WINDOW DISABLED

THURSDAY\_WINDOW DISABLED

FRIDAY\_WINDOW DISABLED

SATURDAY\_WINDOW ENABLED

SUNDAY\_WINDOW ENABLED

## b) **Customizing Statistics Gathering for FCIS**

The default statistics gathering is designed to be generic. It is recommended to customize the default statistics gathering to suit FLECUBE online and batch.

Following are the areas that would need customization for FLEXCUBE:

- Statistics Histograms
- Sample Size of Statistics

### **i. Statistics Histograms**

**Note the following:**

- The default statistics gathering routine decides to collect histograms on specific tables based on certain criteria that are not documented.
- Statistics Histograms are not recommended for FLEXCUBE tables. Configure the default statistics gathered without Histograms.

/\* Start of Script – Script to be executed as SYS\*/

BEGIN

DBMS\_STATS.SET\_PARAM ('METHOD\_OPT','FOR ALL COLUMNS SIZE 1'); END;

/

/\*End of Script \*/ Verify the setup using

SELECT DBMS\_STATS.GET\_PARAM ('METHOD\_OPT') FROM DUAL;

Should return

FOR ALL COLUMNS SIZE 1

### **ii. Sample Size of Statistics**

The default statistics gathering routine decides on the percentage of data sampling

(AUTO\_SAMPLE\_SIZE).

The idea of sampling is to reduce the time taken for collecting statistics. Sampling could be effective for very large historical tables but not for medium and small tables and hence sampling of data for all FCIS tables is not recommended

Configure the default statistics gathered with 100% data coverage.

/\* Start of Script – Script to be executed as SYS\*/ BEGIN

DBMS\_STATS.SET\_PARAM('ESTIMATE\_PERCENT',100); END;

/

`/* End of Script */`

Verify the setup using

```
SELECT DBMS_STATS.GET_PARAM('ESTIMATE_PERCENT') FROM DUAL;
```

Should return 100

---

## 11. FCIS Periodic Table Maintenance

Find below the list of tables and the corresponding action that needs to be planned in a periodical basis so that no performance degradation is observed over a period of time. These activities need to be planned ahead since this would require downtime. Also ensure proper backups are taken prior to any table maintenance activity.

Details of the various Actions are as below:

Truncate Table: Take the backup of the current table data and truncate the table Recreate

Table: These tables and it corresponding indexes needs to be rebuild.

Table Name	Action
CSTB_MSG_LOG	Truncate Table
SMTB_IMAGE_UPLOAD	Truncate Table
STTB_RECORD_LOG	Recreate table
STTB_FIELD_LOG	Recreate table
PERIODICLOADACCRUALHISTORYTBL	Recreate table
CONSOLIDATEDTXNTBL	Recreate table
PERIODICLOADACCRUALTBL	Recreate table
PERIODICLOADHISTORYTBL	Recreate table
AGEINGTBL	Recreate table
POLICYTXNTBL	Recreate table
UHDIVIDENDBALANCETBL	Recreate table

For Maintenance Activity related to Truncate and Recreate table, the impact to be analyzed at site level before implementing the action. Also for any purging related solutions required, please refer the Section 2.1 Purge Frequency Maintenance (UserManuals/PDF/Admin/Admin.pdf).

---

## 12. FCIS Functionality Related Performance Changes

The following parameters are discussed on functionality related performance changes:

Parameter	Recommended Value	How to find
Real debug parameter	N	select param_val from cstb_param where param_name='REAL_DEBUG'
PROCESSORCOUNT	Based on the processor count	select * from paramstbl where PARAMCODE = 'PROCESSORCOUNT'; Value decides the parallel degree for EOD jobs
JOB COUNT	Based on the processor count	select * from paramstbl where PARAMCODE = 'JOB COUNT'; Value decides the parallel degree for EOD jobs
PARALLELLEVEL	2	select * from paramstbl where PARAMCODE = 'PARALLELLEVEL'. Value decides the parallel degree for Allocation batch

---

## 13. Known Issues

After upgrading to Oracle database 19.6 from 19.3 base, pluggable database upon opening moves to restricted mode. This is a known issue. Oracle Support has released patch 30881407 for the same, which needs to be applied on top of 19.6.

---

## 14. Appendix

### 14.1. Script to Check Histograms on FCIS Schema

Following script would have to be executed in the Oracle FLEXCUBE schema:

```
select distinct table_name
from
(
select table_name from user_tab_columns where histogram!='NONE'
)
```

Should return **No Records**

### 14.2. Script to Remove Histograms on FLEXCUBE Schema

Following script would have to be executed in the Oracle FLEXCUBE schema if there are any rows:

```
declare
cursor cur_tables is
select distinct table_name
from
(
select table_name from user_tab_columns where histogram!='NONE'
);
begin
for rec_tables in cur_tables
loop
dbms_stats.gather_table_stats(ownname=>USER,tabname=>rec_tables.table_name,METHOD_OPT=>'FOR ALL COLUMNS SIZE 1',CASCADE=>TRUE,DEGREE=>2,ESTIMATE_PERCENT=>NULL);
end loop;
end;
```





Database Practices Guide\_db19c

[June] [2020]

Version 12.1.0.7.0

Oracle Financial Services Software Limited  
Oracle Park  
Off Western Express Highway Goregaon (East)  
Mumbai, Maharashtra 400 063  
India

Worldwide Inquiries:

Phone: +91 22 6718 3000 Fax: +91

22 6718 3001 [www.oracle.com/financialservices/](http://www.oracle.com/financialservices/)

Copyright © 2007 - 2020, Oracle and/or its affiliates. All rights reserved.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

**U.S. GOVERNMENT END USERS:** Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are “commercial computer software” pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate failsafe, backup, redundancy, and other measures to ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing.

This software or hardware and documentation may provide access to or information on content, products and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services.