Oracle Financial Services Liquidity Risk Solution

Performance Tuning Guide

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Oracle Financial Services Liquidity Risk Solution Performance Tuning Guide, Release 8.1.2.0.0

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Document Control

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Version Number	Revision Date	Change Log
1.0	First release: June 2020	This version is created to document the performance tuning steps in OFS LRS.

1 Preface

This chapter provides a brief description of the scope, the audience, and the references for this document.

1.1 Scope of the Guide

This document includes the performance tuning steps for OFS LRS.

1.2 Intended Audience

This manual is intended for database administrators.

1.3 Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info

Or, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

1.4 Related Information Sources

We strive to keep this and all other related documents updated regularly; visit the OHC Documentation Library to download the latest version available there. The list of related documents is provided here.

- OHC Documentation Library for OFS Liquidity Risk Solution : For existing customers of OFS Liquidity Risk Management (LRM):
  - *OFS Liquidity Risk Solution Application Pack*
  - *OFS Liquidity Risk Solution Application Pack Installation Guide*
  - *OFS Liquidity Risk Measurement and Management Analytics User Guide*
  - *OFS Liquidity Risk Measurement and Management User Guide*
  - *OFS Liquidity Risk Regulatory Calculations for Reserve Bank of India User Guide*
  - *OFS Liquidity Risk Regulatory Calculations for US Federal Reserve User Guide*
  - *OFS Liquidity Risk Regulatory Calculations for European Banking Authority User Guide*
- For new customers of OFS Liquidity Risk Solution (LRS):
  - *OFS Liquidity Risk Solution Application Pack Release Notes*
  - *OFS Liquidity Risk Solution Application Pack Installation Guide*
  - *OFS Liquidity Risk Measurement and Management Analytics User Guide*
  - *OFS Liquidity Risk Measurement and Management User Guide*
  - *OFS Liquidity Risk Regulatory Calculations for Reserve Bank of India User Guide*

  - *OFS Liquidity Risk Regulatory Calculations for US Federal Reserve User Guide*
  - *OFS Liquidity Risk Regulatory Calculations for European Banking Authority User Guide*
  - *OFS Liquidity Risk Regulatory Calculations for Bank of Thailand User Guide*
  - *OFS Liquidity Risk Regulatory Calculations for Bank Negara Malaysia User Guide*
  - *OFS Liquidity Risk Regulatory Calculations for Monetary Authority of Singapore User Guide*
  - *OFS Liquidity Risk Regulatory Calculations for Hong Kong Monetary Authority User Guide*
  - *OFS Deposit Insurance Calculations for Liquidity Risk Management User Guide*
- OHC Documentation Library for OFS AAAI Application Pack:
  - *OFS Advanced Analytical Applications Infrastructure (OFS AAAI) Application Pack Installation and Configuration Guide*
  - *OFS Analytical Applications Infrastructure User Guide*
  - *OFS Analytical Applications Infrastructure Administration Guide*
  - *Oracle Financial Services Analytical Applications Infrastructure Environment Check Utility Guide*

1.5 Conventions

The following conventions are used in this document.

Table 1-1 Conventions Used in the Document

Conventions	Description
Boldface	The boldface font type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
Italic	The italic font type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
Monospace	The monospace font type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

1.6 Abbreviations

The following table lists the abbreviations used in this document.

Table 1-2 Abbreviations Used in the Document

Abbreviations	Description
OFS LRS	OFS Liquidity Risk Solution
BAU	Business As usual
LRRCHKMA	OFS Liquidity Risk Regulatory Calculations for Hong Kong Monetary Authority
LRMM	OFS Liquidity Risk Measurement and Management
DICLRM	OFS Deposit Insurance Calculation for Liquidity Risk Management

2 Introduction

This document includes the performance tuning steps for OFS Liquidity Risk Solution (LRS). Follow the steps in this document to achieve the batch performance statistics for LRM Contractual and Business As usual (BAU) Run definitions.

> **Note**
>
> The performance tuning steps mentioned in this document were implemented and tested during the development and Quality Assurance (QA) phase of the OFS LRS Release 8.1 development life cycle.

3
OFSAAI Application Performance Tuning

This section includes the performance tuning steps for OFSAAI. Perform the following steps in the OFSAAI instance:

1. Navigate to the $FIC_HOME/ficdb/conf directory and modify the OracleDB configuration (OracleDB.conf) file as follows: **CNF_PARALLEL_QUERY=ENABLE CNF_PARALLEL_DML=ENABLE CNF_DEGREE_OF_PARALLELISM= CNF_PARALLEL_DEGREE_POLICY=MANUAL**

   Decide the value for CNF_DEGREE_OF_PARALLELISM based on the number of CPU cores available in the database (DB) engine server. It is recommended to use 40 % of the available core.

   For example, if the CPU cores are 10 in count, then assign CNF_DEGREE_OF_PARALLELISM=4.

   > **Note**
   >
   > The setting of these parameters assumes that the database is enabled for Parallel DML execution

2. Modify the .profile file of the OFSAAI instance user.

   Increase the memory setting for the variable X_ARGS_RLEXE as follows:

   X_ARGS_RLEXE="-Xms512m -Xmx4g -XX:+UseAdaptiveSizePolicy -XX:MaxPermSize=1024M -XX:+UseParallelOldGC -XX:+DisableExplicitGC

   $X_ARGS_GEN"
   The Rule engine uses these settings. If the OFSAAI application server has a memory of 32 GB, this value can be set up to 8 GB. For example: -Xms4g –Xmx8g

3. In the ETLLoader.sh file, used by the T2T, increase the load of Xms6400m -Xmx10256m to 10G.

4. Modify the SETUP_MASTER table as follows:

   a. Log in to the OFSAAI Atomic schema (this is the schema where the LRM objects are physicalized).

   b. Verify the following Component Codes and Component Values in the SETUP_MASTER table.

   Table 3-1 Component Codes and Component Values in the SETUP_MASTER Table

V_COMPONENT_CODE	V_COMPONENT_DESC	V_COMPONENT_VALUE
DT_ALLOC_HINT_MATERIALIZE	Appends /*+ materialize */ hint in the SELECT statement of the Allocation Engine Merge Query.	N

Table 3-1 (Cont.) Component Codes and Component Values in the SETUP_MASTER Table

V_COMPONENT_CODE	V_COMPONENT_DESC	V_COMPONENT_VALUE
DT_ALLOC_HINT_USE_HASH	In Allocation Engine Merge Query, whether to use /*+ USE_HASH */ to merge in the FCT_AGG_CASH_FLOWS table.	Y
DT_PARALLEL_DOP	Degree of parallelism to be used in DML and Queries statements in the data transformations.	4
DT_PARALLEL_ENABLE	Enables parallel sessions for DML and Queries statements in data transformations.	Y
GATHER_TABLE_STATS	If the value is set to Y, then the process will gather table statistics.	Y
GATHER_STAT_OWNER	Gather Stats Database User	Update the Atomic schema name.

- Decide the DT_PARALLEL_DOP value based on the number of CPU cores available in the database engine server. It is recommended to use 40 % of the available core. For example, if the CPU cores are 10 in count then assign DT_PARALLEL_DOP=4.

> **Note**
>
> The setting of these parameters assumes that the database is enabled for Parallel DML execution.

- You can turn-off the configuration by disabling the gather stats. To disable, set the component code GATHER_TABLE_STATS as N in the SETUP_MASTER table.

5. Modify the CONFIGURATION table as follows:
   a. Login to the Config schema.
   b. Set the PARAMVALUE settings for the PARAMNAME as follows.

Table 3-2 PARAMNAME and PARAMVALUE

PARAMNAME	PARAMVALUE	DESCRIPTION
QRY_OPT_USE_ROWID	Y	To use ROWID in MERGE ON statement for RRF, specify Y otherwise N.

6. Increase the Connection Pool in the WebLogic console, and set the Connection Pool to 100.

4 Database Performance Tuning

This section includes the database performance tuning steps. Perform the following steps:

1. Partition the following tables:
   - FSI_LRM_INSTRUMENT: Partition by range on the N_RUN_SKEY column
   - FCT_AGG_CASH_FLOWS: Partition by range on the N_RUN_SKEY column
   - FCT_MITIGANTS: Partition by range on the N_RUN_SKEY column
2. Disable all the Foreign Key Constraints in the following tables:
   - FCT_ACCOUNT_CASH_FLOWS
   - FCT_AGG_CASH_FLOWS
   - FCT_LRM_TIME_BUCKET_DETAILS
   - FSI_LRM_INSTRUMENT
   - FCT_MITIGANTS
   - FSI_DEPOSIT_INSURANCE
   - FSI_DEPOSIT_INSURANCE_DTLS
   - FCT_PARTY_PARTY_ACCT_RELTNSHP

   > **Note**
   >
   > Do NOT delete the foreign key constraints from the database or from the LRS Data Model.

```
BEGIN
FOR c IN
(SELECT c.owner, c.table_name, c.constraint_name
FROM user_constraints c, user_tables t
WHERE c.table_name = t.table_name
AND c.owner = '$Atomic_Schema '
AND t.table_name in ('FSI_LRM_INSTRUMENT', 'FCT_ACCOUNT_CASH_FLOWS',
'FCT_LRM_TIME_BUCKET_DETAILS', 'FCT_AGG_CASH_FLOWS', 'FCT_MITIGANTS')
AND c.status = 'ENABLED'
AND c.constraint_name not like 'PK%'
AND NOT (t.iot_type IS NOT NULL AND c.constraint_type = 'P')
ORDER BY c.constraint_type DESC)
LOOP
dbms_utility.exec_ddl_statement('alter table "' || c.owner || '"."' || c.table_name || '" disable constraint ' ||
c.constraint_name);
END LOOP;
END;
/
```

3. Create the following indexes.

> **Note**
>
> If the creation of the following indexes fails due to any reason – such as *object name already exists*, then provide new index names.

Scripts

```
CREATE INDEX IDX_ACCT_SKEY_1 ON FSI_LRM_INSTRUMENT (N_ACCT_SKEY) LOCAL
PARALLEL 4 NOLOGGING
/ CREATE INDEX IDX_AS_OF_DT_1 ON FSI_LRM_INSTRUMENT (N_AS_OF_DATE_SKEY) LOCAL
PARALLEL 4 NOLOGGING
/ CREATE INDEX IDX_LRM_INST_ID_1 ON FSI_LRM_INSTRUMENT (N_LRM_INSTRUMENT_ID)
LOCAL PARALLEL 4 NOLOGGING
/ CREATE INDEX IDX_RUN_SKEY_1 ON FSI_LRM_INSTRUMENT (N_RUN_SKEY) LOCAL
PARALLEL 4 NOLOGGING
/
CREATE INDEX IDX_FLTBD_ENTSK_1 ON FCT_LRM_TIME_BUCKET_DETAILS (N_ENTITY_SKEY)
PARALLEL 4 NOLOGGING
/
CREATE INDEX IDX_FLTBD_MIDSK_1 ON FCT_LRM_TIME_BUCKET_DETAILS
(N_MIS_DATE_SKEY) PARALLEL 4 NOLOGGING
/ CREATE INDEX IDX_FLTBD_RNSK_1 ON FCT_LRM_TIME_BUCKET_DETAILS (N_RUN_SKEY)
PARALLEL 4 NOLOGGING
/ CREATE INDEX IDX_SC_GAAP_1 ON STG_CARDS (V_GAAP_CODE) PARALLEL 4 NOLOGGING
/
CREATE INDEX IDX_SC_LR_ID_1 ON STG_CARDS (N_LOAD_RUN_ID) PARALLEL 4 NOLOGGING
/
CREATE INDEX IDX_SC_MIS_DATE_1 ON STG_CARDS (FIC_MIS_DATE) PARALLEL 4 NOLOGGING
/
CREATE INDEX IDX_SLC_MIS_DATE_1 ON STG_LOAN_CONTRACTS (FIC_MIS_DATE) PARALLEL 4
NOLOG
/
CREATE INDEX IDX_SLC_LR_ID_1 ON STG_LOAN_CONTRACTS (N_LOAD_RUN_ID) PARALLEL 4
NOLOGGING
/
CREATE INDEX IDX_SLC_GAAP_1 ON STG_LOAN_CONTRACTS (V_GAAP_CODE) PARALLEL 4
NOLOGGING
/
CREATE INDEX IDX_STD_MIS_DATE_1 ON STG_TD_CONTRACTS (FIC_MIS_DATE) PARALLEL 4
NOLOGGING
/
CREATE INDEX IDX_STD_LR_ID_1 ON STG_TD_CONTRACTS (N_LOAD_RUN_ID) PARALLEL 4
NOLOGGING
/
CREATE INDEX IDX_STD_GAAP_1 ON STG_TD_CONTRACTS (V_GAAP_CODE) PARALLEL 4
NOLOGGING
/
```

> **Note**
>
> - Decide the Parallel 4 value based on the number of CPU cores available in the database engine server. It is recommended to use 40 % of the available core. For example, if the CPU cores are 10 in count, then assign parallel to 4.
> - The setting of these parameters assumes that the database is enabled for Parallel DML execution.

a. For OFS Deposit Insurance Calculation for Liquidity Risk Management (DICLRM), follow these steps:

   i. For the FCT_PARTY_PARTY_ACCT_RELTNSHP table, create indexes for the following columns:

      - N_PARTY_SKEY
      - N_RELATED_PARTY_SKEY

   ii. For the N_POOL_ID column in the FSI_DEPOSIT_INSURANCE_DTLS table, index the following:

      - N_ACCT_SKEY
      - N_RUN_SKEY

b. For OFS Liquidity Risk Measurement and Management (LRMM), follow these steps: In the FSI_LRM_TIME_BUCKET_DAYS table, create indexes for the following columns:

   - N_MIS_DATE_SKEY
   - N_RUN_SKEY
   - N_HOLIDAY_CODE
   - D_BUSS_DAY_CONV_TB_DATE

c. For OFS Liquidity Risk Regulatory Calculations for Hong Kong Monetary Authority (LRRCHKMA), if the tasks T2T_STG_BORROWINGS_FLI_COM, T2T_STG_CASA_FLI_COM, T2T_STG_INVESTMENTS_FLI_COM, and T2T_STG_MITIGANTS_FM_COM consume more time, create indexes on the:

   - V_ACCOUNT_NUMBER column of the DIM_ACCOUNT table.
   - V_PARTY_ID column of the DIM_PARTY table.
   - FIC_MIS_DATE column of the STG_CASA table.

4. Alter the following tables for NOLOGGING:

```
ALTER TABLE FSI_LRM_INSTRUMENT NOLOGGING
/
ALTER TABLE FCT_ACCOUNT_CASH_FLOWS NOLOGGING
/
ALTER TABLE FCT_AGG_CASH_FLOWS NOLOGGING
/
ALTER TABLE FCT_MITIGANTS NOLOGGING
/
ALTER TABLE FCT_FCAST_AGG_CASH_FLOWS NOLOGGING
/
ALTER TABLE FCT_FCAST_DATES NOLOGGING
/
```

```
ALTER TABLE FCT_FCAST_LRM_LE_SUMMARY NOLOGGING
/
ALTER TABLE FCT_FCAST_LRM_TB_DETAILS NOLOGGING
/
ALTER TABLE FCT_FCST_EXCHANGE_RATES NOLOGGING
/
ALTER TABLE FSI_ACCT_COMPOSITE_KEY_MAP NOLOGGING
/
ALTER TABLE FCT_ACCOUNT_CASH_FLOWS NOLOGGING
/
ALTER TABLE FCT_LRM_TIME_BUCKET_DETAILS NOLOGGING
/
ALTER TABLE FCT_FCAST_ASSUMPT_AUDIT_TRAIL NOLOGGING
/
```

5. Gather Stats for all the tables in the Atomic Schema periodically.

   You must gather statistics periodically for objects where the statistics become stale over time, due to changing data volumes or changes in column values. New statistics should be gathered after a schema object's data or structure is modified in ways that make the previous statistics inaccurate. For example, after loading a significant number of rows into a table, collect new statistics on the number of rows. After updating data in a table, collecting new statistics on the number of rows is not required, but you might need new statistics on the average row length.

   Use the DBMS_STATS package to generate the statistics.

   Following are examples of Gather Stats:

```
begin
DBMS_STATS.GATHER_TABLE_STATS(ownname    => '$Atomic_Schema ',
tabname    =>

'FCT_LRM_TIME_BUCKET_DETAILS',




end;
/ Begin


estimate_percent => 20,
DEGREE    => 4,
granularity    => 'ALL',
CASCADE    => TRUE);


DBMS_STATS.GATHER_TABLE_STATS(ownname    => '$Atomic_Schema ',
tabname    =>

'FCT_AGG_CASH_FLOWS',
```

```
end;
/ Begin


estimate_percent => 20,
DEGREE    => 4,
granularity    => 'ALL',
CASCADE    => TRUE);


DBMS_STATS.GATHER_TABLE_STATS(ownname    => '$Atomic_Schema ',
tabname    =>

'FSI_LRM_INSTRUMENT',


estimate_percent => 20,
DEGREE    => 4,
granularity    => 'ALL',


CASCADE    => TRUE);
end;
/
Begin

DBMS_STATS.GATHER_TABLE_STATS(ownname    => '$Atomic_Schema ',
                        tabname    =>

'FCT_FCAST_AGG_CASH_FLOWS',
                      estimate_percent => 20,
                       DEGREE    => 4,
                    granularity    => 'ALL',
                       CASCADE    => TRUE);

end;
/
```

> **Note**
>
> Modify the ownname $Atomic_Schema to the actual schema name used by the Atomic schema.

6. Set the Temp Tablespace to 5TB.

   This step is optional. The database administrator can select the right Temp Tablespace depending on the volume of data coming in for LRS processing.

7. Periodically clean up the following Processing tables:

   a. For OFSDICLRM:

      - FSI_DEPOSIT_INSURANCE

- FSI_DEPOSIT_INSURANCE_DTLS

b. For OFSLRMM:

- FSI_LRM_TIME_BUCKET_DAYS

OFSAA Support

Raise a Service Request (SR) in My Oracle Support for queries related to the OFSAA applications.

Send Us Your Comments

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- Did you find any errors?
- Is the information clearly presented?
- Do you need more information? If so, where?
- Are the examples correct? Do you need more examples?
- What features did you like most about this manual?

If you find any errors or have any other suggestions for improvement, indicate the title and part number of the documentation along with the chapter/section/page number (if available) and contact the Oracle Support.

Before sending us your comments, you might like to ensure that you have the latest version of the document wherein any of your concerns have already been addressed. You can access My Oracle Support site that has all the revised/recently released documents.