

***Advanced Customer Services***

Report of Findings For

DWPRD

Prepared For



**Prepared by Advanced Customer Services**

|  |  |
| --- | --- |
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| Data Collection: | From 12-SEP-16 01:00 to 14-SEP-16 23:00 |



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# Executive Summary

Oracle Advanced Customer Services (ACS) conducted a technical assessment on the Techcombank DWPRD database hosted on Linux hosts named dw01db01, dw01db02. There were no changes made to the assessed system. This document recommends changes and identifies specific areas that require investigation that is more detailed.

The Engineered Assessment Performance (EAP) is a remote service that examines a customer system to make high-level performance recommendations and identify critical areas requiring immediate attention.

The goal of the technical assessment of the DWPRD environment, i.e., host, database, and I/O subsystem, was to identify factors that may be negatively affecting system performance and response time. Performance data was collected from 12-SEP-16 01:00 to 14-SEP-16 23:00.

|  |  |  |
| --- | --- | --- |
| **Category** | **Information** | **Additional Comments** |
| **Database** | Set redolog size to 8GB | See Redo Transaction Activity |
| Many tables have stale statistic which may causes sub-optimal execution plan | See Gather tables statistics |
| Review segment with large size. Archive or restructure | See Largest segments |
| Rebuild or drop unusable indexes | See Unusable indexes |
| Some index owner is different from table owner.  Recreate index with correct owner | See Table owner & index owner is different |
| Drop redundant indexes | See Redundant index |
| Large tables should be partition to utilize partition pruning feature | See Table partitioned but index non-partitioned |
| Index on partition table should use LOCAL option or created with different partition column. | See Table partitioned but index non-partitioned |
| Index with low distinct key may not effective for queries should be drop | See Index with low distinct keys |
| Some indexes on large tables are not optimized.  Re-organize as recommend | See Restructure large tables indexes |
| Review SQL with high load on database | See Resource Intensive  SQL |

Other areas were also identified that can be examined by reviewing the Findings and Recommendations Section in detail.

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# System Reviewed

The following system was reviewed during this engagement:

## Host

|  |  |
| --- | --- |
| Server Name | dw01db01, dw01db02 |
| Running DB Instances | 1 |
| Purpose (Production, development, Q&A) | Production |
| Platform | Linux x86 64-bit |
| Model | SUN FIRE X4170 M2 SERVER |
| Operating System | Oracle Linux |
| O/S Version and Release | LINUX X86-64 OELRHEL 6.7 2.6.39400.264.6.el6uek.x86\_64 |
| Cluster Software / Version | Grid Infrastructure |
| # CPU | 24 |
| Processor / CPU Speed | Intel(R) Xeon(R) CPU X5670 @ 2.93GHz |
| Memory | 96 GB |
| Volume Manager / Version |  |

## Database

|  |  |
| --- | --- |
| Database Name | dwprd |
| Instance Name | dwprd1, dwprd2 |
| RAC-Configuration | Yes |
| Machine Name | dw01db01, dw01db02 |
| RDBMS Version/Release | 11.2.0.4.0 |
| Usage (OLTP, DSS, etc.) | DSS |
| File System / raw devices | ASM |
| AIO | Yes |
| Disk Space (of all db files) | Datafiles: 21 TB Tempfiles: 780 GB |
| Archiving Enabled? | Yes |

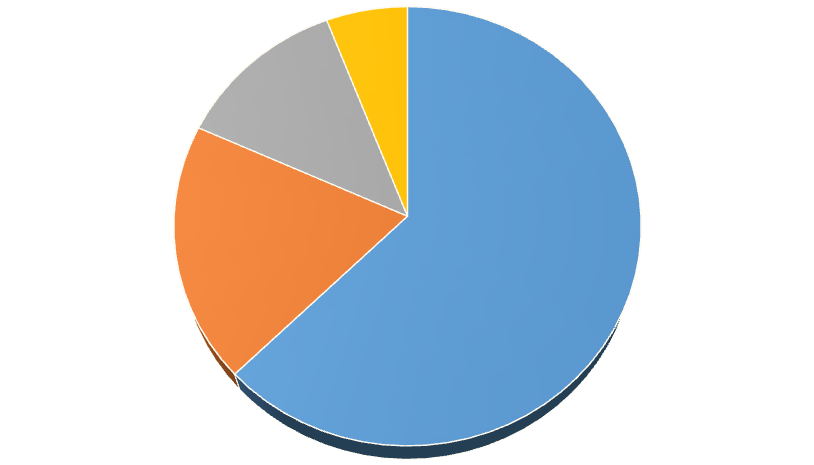
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# Overview

Unless otherwise noted, all findings are based on data collected from 12-SEP-16 01:00 to 14-SEP-16 23:00.

## Database Response Time

Within the scope of the RDBMS, Response Time in its simplest form consists of Service Time + Wait Time. Service Time equates to time the request is actively being processed on the CPU, while Wait Time encompasses everything else. Oracle tracks Service Time in views related to system statistics and Wait Time within a set of views collectively known as the Wait Interface. By taking snapshots of the relevant views, deltas can be calculated and analyzed to explain precisely where user response time is being spent.



DB CPU, 49.1

cell single

block physical

read, 14.9

SQL\*Net more

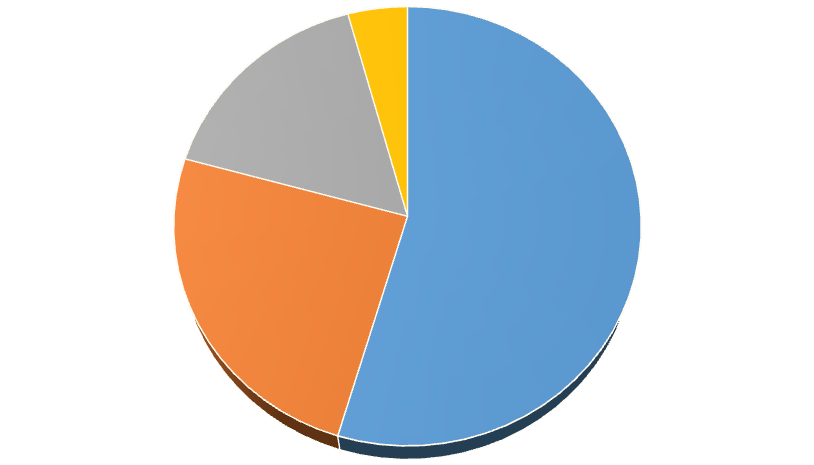
data from dblink,

9.7

direct path read,

4.6

#### Figure 1: Top Foreground Waits for DWPRD1



DB CPU, 43.2

SQL\*Net more

data from dblink,

19.5

cell single block

physical read, 13

direct path read,

3.4

**Figure 2: Top Foreground Waits for DWPRD2**

## Connection Balance

It is advisable for Oracle RAC databases to have connections load balanced to make optimum utilization of resources. Given below is connection load balance graph for both the instances.

0

50

100

150

200

250

300

SEP

12-

-16 01:00

SEP

12-

-16 04:00

12-

-16 07:00

SEP

12-

SEP

-16 10:00

SEP

-16 13:00

12-

-16 16:00

12-

SEP

12-

-16 19:00

SEP

12-

-16 22:00

SEP

-16 01:00

SEP

13-

13-

-16 04:00

SEP

13-

SEP

-16 07:00

SEP

-16 10:00

13-

SEP

13-

-16 13:00

13-

-16 16:00

SEP

13-

-16 19:00

SEP

-16 22:00

SEP

13-

SEP

14-

-16 01:00

14-

-16 04:00

SEP

14-

-16 07:00

SEP

14-

-16 10:00

SEP

-16 13:00

SEP

14-

SEP

14-

-16 16:00

-16 19:00

SEP

14-

14-

-16 22:00

SEP

Sessions

**Figure 3: Average Database Sessions for DWPRD1**

0

50

100

150

200

250

12-

-16 01:00

SEP

12-

-16 04:00

SEP

SEP

12-

-16 07:00

SEP

12-

-16 10:00

12-

-16 13:00

SEP

12-

-16 16:00

SEP

12-

-16 19:00

SEP

-16 22:00

SEP

12-

-16 01:00

SEP

13-

SEP

13-

-16 04:00

13-

-16 07:00

SEP

13-

-16 10:00

SEP

-16 13:00

SEP

13-

13-

-16 16:00

SEP

13-

-16 19:00

SEP

-16 22:00

SEP

13-

SEP

14-

-16 01:00

-16 04:00

14-

SEP

14-

-16 07:00

SEP

14-

-16 10:00

SEP

14-

-16 13:00

SEP

-16 16:00

SEP

14-

-16 19:00

SEP

14-

SEP

-16 22:00

14-

Sessions

#### Figure 4: Average Database Sessions for DWPRD2

**Observation**: As seen from the data, average number of session is evenly distributed on both the instances. No connection spikes or logon/logoff storms are observed. This indicates that connections are successfully load balanced across all nodes in the cluster.

## Average Active Session

The number of active session show how many users are waiting for Oracle to process it’s task. The higher, the more load are put on database server.

0

5

10

15

20

25

30

35

40

12-

-16 01:00

SEP

SEP

12-

-16 04:00

SEP

12-

-16 07:00

SEP

-16 10:00

12-

SEP

-16 13:00

12-

-16 16:00

12-

SEP

12-

-16 19:00

SEP

12-

-16 22:00

SEP

13-

-16 01:00

SEP

13-

-16 04:00

SEP

SEP

-16 07:00

13-

SEP

13-

-16 10:00

-16 13:00

SEP

13-

13-

-16 16:00

SEP

13-

-16 19:00

SEP

13-

-16 22:00

SEP

14-

-16 01:00

SEP

-16 04:00

14-

SEP

14-

-16 07:00

SEP

14-

-16 10:00

SEP

-16 13:00

SEP

14-

14-

-16 16:00

SEP

-16 19:00

SEP

14-

-16 22:00

SEP

14-

Average Active Sessions

#### Figure 5: Average Active Sessions for DWPRD1

0

5

10

15

20

25

30

35

12-

-16 00:00

SEP

12-

-16 03:00

SEP

SEP

12-

-16 06:00

SEP

-16 09:00

12-

SEP

-16 12:00

12-

-16 15:00

12-

SEP

12-

-16 18:00

SEP

12-

-16 21:00

SEP

13-

-16 00:00

SEP

-16 03:00

SEP

13-

SEP

13-

-16 06:00

SEP

13-

-16 09:00

13-

-16 12:00

SEP

13-

-16 15:00

SEP

13-

-16 18:00

SEP

13-

-16 21:00

SEP

14-

-16 00:00

SEP

SEP

14-

-16 03:00

-16 06:00

14-

SEP

14-

-16 09:00

SEP

14-

-16 12:00

SEP

14-

-16 15:00

SEP

14-

-16 18:00

SEP

-16 21:00

SEP

14-

SEP

15-

-16 00:00

Average Active Sessions

**Figure 6: Average Active Sessions for DWPRD2**

**Observation**: Average active session is high at early morning.

## CPU Utilization

CPU capacity is a critical resource that should remain below a sustained rate of seventy percent at nearly all times. Whenever CPU utilization is over this amount, response time and throughput suffer, particularly if the saturation is sustained. This system was at all times well below seventy percent.

0

10

20

30

40

50

60

70

80

90

100

12-

-16 01:00

SEP

12-

-16 04:00

SEP

SEP

12-

-16 07:00

12-

-16 10:00

SEP

12-

-16 13:00

SEP

-16 16:00

12-

SEP

SEP

12-

-16 19:00

12-

SEP

-16 22:00

-16 01:00

13-

SEP

-16 04:00

13-

SEP

-16 07:00

13-

SEP

SEP

13-

-16 10:00

-16 13:00

SEP

13-

13-

-16 16:00

SEP

13-

-16 19:00

SEP

13-

SEP

-16 22:00

SEP

14-

-16 01:00

14-

SEP

-16 04:00

-16 07:00

SEP

14-

SEP

-16 10:00

14-

SEP

-16 13:00

14-

-16 16:00

SEP

14-

14-

-16 19:00

SEP

14-

SEP

-16 22:00

ORA CPU%

OS CPU%

#### Figure 7: CPU Break Down for DWPRD1

0

10

20

30

40

50

60

70

80

12-

SEP

-16 00:00

-16 03:00

SEP

12-

-16 06:00

12-

SEP

12-

-16 09:00

SEP

12-

SEP

-16 12:00

SEP

-16 15:00

12-

-16 18:00

12-

SEP

12-

SEP

-16 21:00

-16 00:00

SEP

13-

SEP

13-

-16 03:00

SEP

13-

-16 06:00

SEP

13-

-16 09:00

13-

SEP

-16 12:00

-16 15:00

SEP

13-

-16 18:00

SEP

13-

-16 21:00

13-

SEP

14-

-16 00:00

SEP

SEP

-16 03:00

14-

14-

SEP

-16 06:00

SEP

-16 09:00

14-

SEP

-16 12:00

14-

SEP

-16 15:00

14-

SEP

-16 18:00

14-

14-

-16 21:00

SEP

SEP

-16 00:00

15-

ORA CPU%

OS CPU%

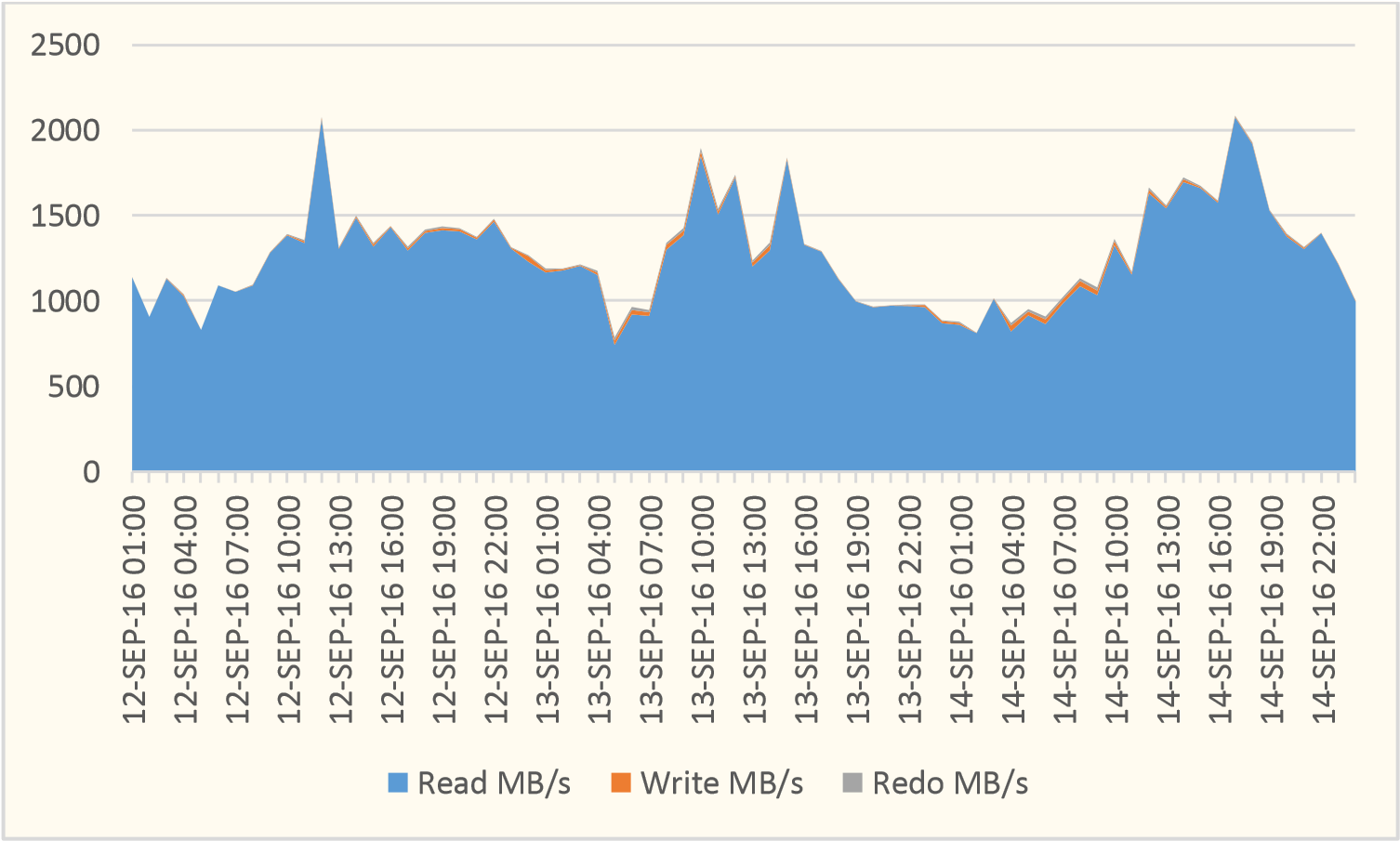
#### Figure 8: CPU Break Down for DWPRD2

**Observation**:

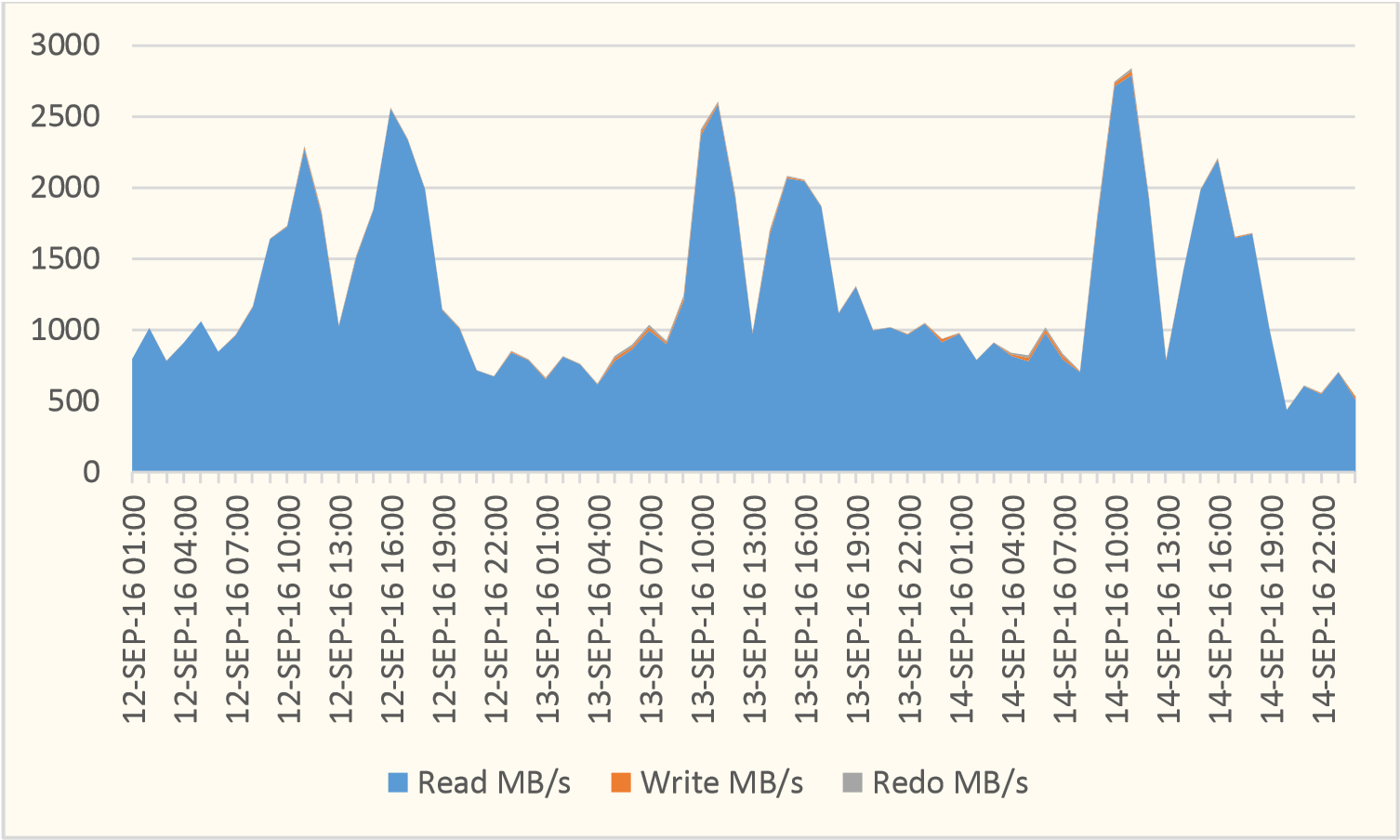
The CPU utilization is high during 4:00-8:00 daily.

## Disk IO Activity

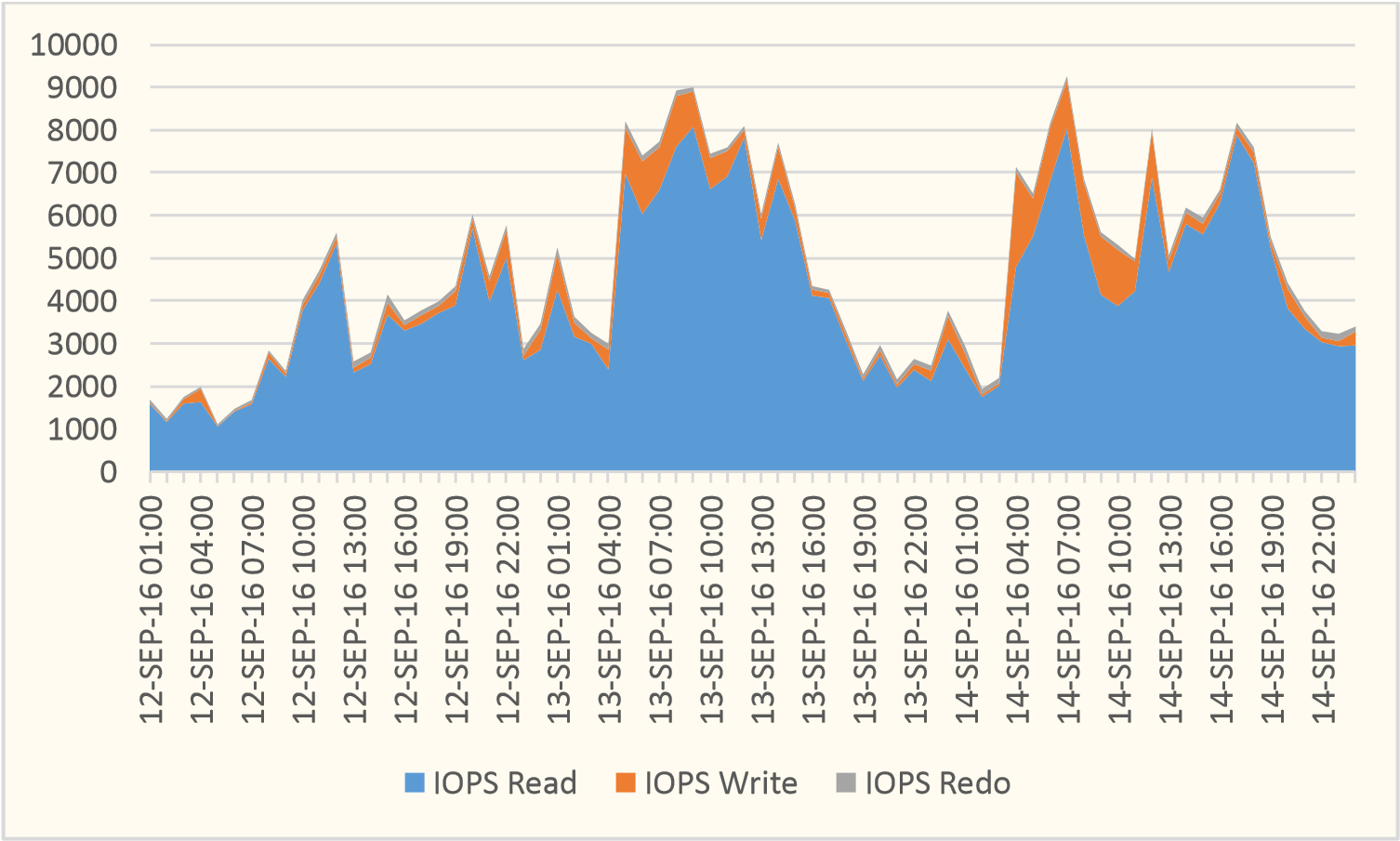
Physical Disk IO involves the transfer of data to or from the physical hardware. If a disk is more than 60% busy over sustained periods of time, this can indicate overuse of that resource.



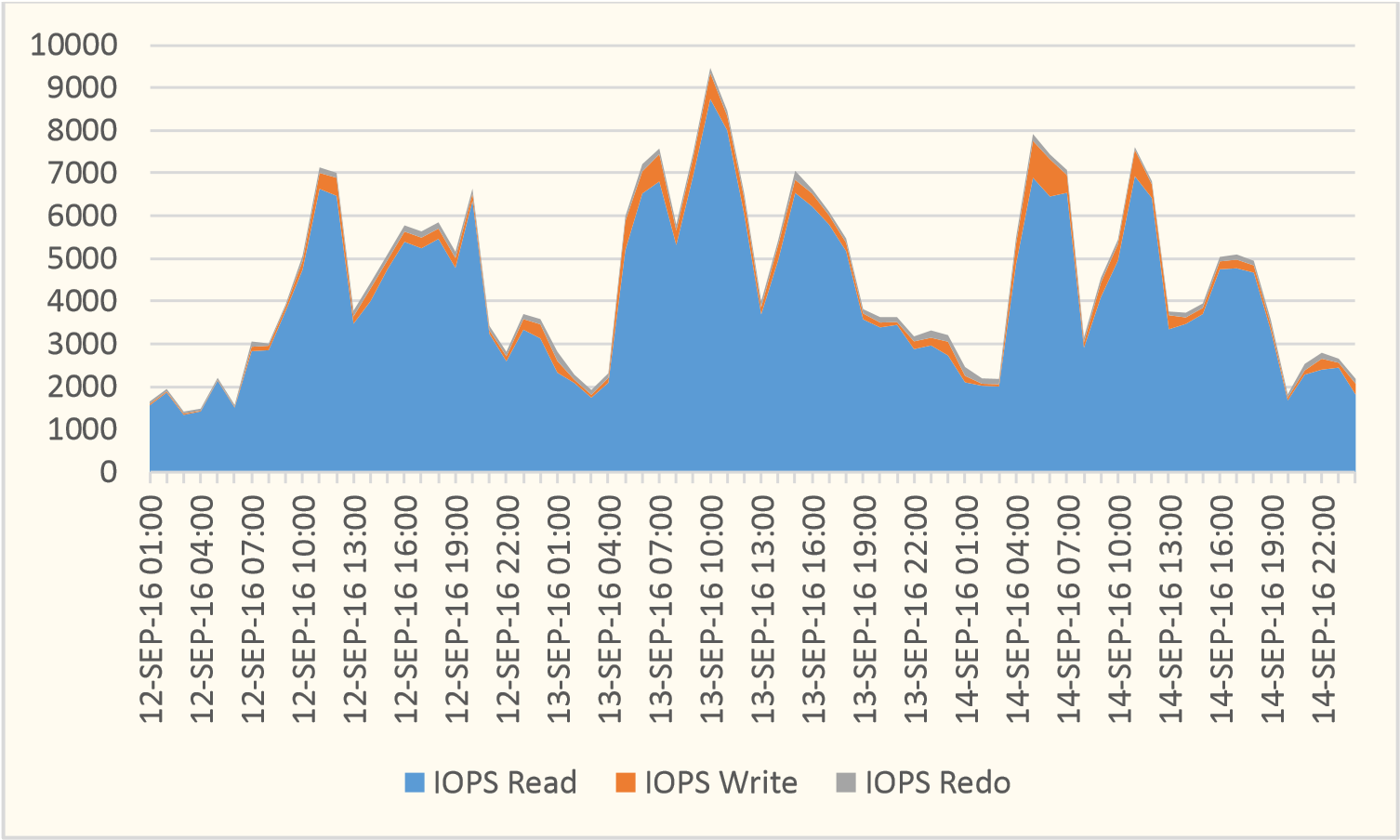
**Figure 9: Disk IO for DWPRD1**



**Figure 10: Disk IO for DWPRD2**



**Figure 11: Read , Write Operations per Second (IOPS) for DWPRD1**



**Figure 12: Read , Write Operations per Second (IOPS) for DWPRD2**

## Logical IO

Oracle Logical I/O is defined as whenever the Oracle kernel requests access to an Oracle block in the database buffer cache. If the kernel cannot find a specified Oracle block in the database buffer cache, then the Logical I/O causes physical I/O. Because of this, Logical Reads is a better measurement of internal database activity than Physical Reads. Additionally, Logical

Reads do require resources and affect response time to a much greater extent than once was

thought.

0

1000

2000

3000

4000

5000

6000

7000

SEP

-16 01:00

12-

SEP

-16 04:00

12-

SEP

-16 07:00

12-

SEP

12-

-16 10:00

SEP

-16 13:00

12-

12-

SEP

-16 16:00

-16 19:00

12-

SEP

SEP

-16 22:00

12-

SEP

-16 01:00

13-

-16 04:00

13-

SEP

SEP

-16 07:00

13-

SEP

-16 10:00

13-

13-

SEP

-16 13:00

-16 16:00

13-

SEP

SEP

-16 19:00

13-

13-

-16 22:00

SEP

-16 01:00

SEP

14-

SEP

14-

-16 04:00

SEP

-16 07:00

14-

SEP

-16 10:00

14-

SEP

14-

-16 13:00

SEP

-16 16:00

14-

SEP

-16 19:00

14-

-16 22:00

14-

SEP

Logical IO MB/s

#### Figure 13: Logical IO for DWPRD1

0

1000

2000

3000

4000

5000

6000

7000

-16 01:00

12-

SEP

12-

-16 04:00

SEP

12-

-16 07:00

SEP

SEP

12-

-16 10:00

SEP

-16 13:00

12-

SEP

-16 16:00

12-

12-

-16 19:00

SEP

-16 22:00

SEP

12-

13-

SEP

-16 01:00

13-

SEP

-16 04:00

SEP

-16 07:00

13-

SEP

-16 10:00

13-

SEP

-16 13:00

13-

13-

-16 16:00

SEP

13-

SEP

-16 19:00

13-

-16 22:00

SEP

14-

-16 01:00

SEP

-16 04:00

SEP

14-

14-

-16 07:00

SEP

SEP

14-

-16 10:00

14-

SEP

-16 13:00

-16 16:00

SEP

14-

14-

-16 19:00

SEP

SEP

-16 22:00

14-

Logical IO MB/s

**Figure 14: Logical IO for DWPRD2**

## Transactions Rate and User Calls

Peak periods are often defined by the transaction arrival rate. In Oracle, a transaction is defined by a series of operations that result in either a COMMIT operation, or a ROLLBACK operation.

0

20

40

60

80

100

120

12-

-16 01:00

SEP

12-

-16 04:00

SEP

SEP

12-

-16 07:00

SEP

-16 10:00

12-

SEP

-16 13:00

12-

-16 16:00

12-

SEP

12-

-16 19:00

SEP

12-

-16 22:00

SEP

SEP

13-

-16 01:00

13-

-16 04:00

SEP

SEP

-16 07:00

13-

SEP

13-

-16 10:00

SEP

13-

-16 13:00

13-

-16 16:00

SEP

13-

-16 19:00

SEP

SEP

13-

-16 22:00

SEP

14-

-16 01:00

-16 04:00

14-

SEP

14-

-16 07:00

SEP

14-

-16 10:00

SEP

-16 13:00

SEP

14-

SEP

14-

-16 16:00

-16 19:00

SEP

14-

14-

-16 22:00

SEP

Transaction per second

**Figure 15: Transactions per Second for DWPRD1**

0

20

40

60

80

100

120

140

160

12-

-16 01:00

SEP

12-

-16 04:00

SEP

SEP

12-

-16 07:00

-16 10:00

12-

SEP

SEP

-16 13:00

12-

-16 16:00

12-

SEP

12-

-16 19:00

SEP

12-

-16 22:00

SEP

13-

-16 01:00

SEP

13-

-16 04:00

SEP

SEP

-16 07:00

13-

SEP

13-

-16 10:00

-16 13:00

SEP

13-

13-

-16 16:00

SEP

13-

-16 19:00

SEP

13-

-16 22:00

SEP

14-

-16 01:00

SEP

-16 04:00

14-

SEP

14-

-16 07:00

SEP

14-

-16 10:00

SEP

-16 13:00

SEP

14-

14-

-16 16:00

SEP

-16 19:00

SEP

14-

14-

-16 22:00

SEP

Transaction per second

**Figure 16: Transactions per Second for DWPRD2**

0

200

400

600

800

1000

1200

1400

1600

1800

12-

-16 01:00

SEP

SEP

12-

-16 04:00

SEP

12-

-16 07:00

SEP

-16 10:00

12-

SEP

-16 13:00

12-

-16 16:00

12-

SEP

12-

-16 19:00

SEP

12-

-16 22:00

SEP

SEP

13-

-16 01:00

-16 04:00

SEP

13-

-16 07:00

13-

SEP

13-

-16 10:00

SEP

SEP

13-

-16 13:00

13-

-16 16:00

SEP

13-

-16 19:00

SEP

SEP

13-

-16 22:00

SEP

14-

-16 01:00

14-

-16 04:00

SEP

14-

-16 07:00

SEP

14-

-16 10:00

SEP

14-

SEP

-16 13:00

14-

-16 16:00

SEP

-16 19:00

SEP

14-

14-

-16 22:00

SEP

User Calls

#### Figure 17: User call per seconds for DWPRD1

0

500

1000

1500

2000

2500

3000

3500

12-

-16 01:00

SEP

SEP

12-

-16 04:00

SEP

12-

-16 07:00

12-

SEP

-16 10:00

SEP

-16 13:00

12-

-16 16:00

12-

SEP

12-

-16 19:00

SEP

12-

-16 22:00

SEP

13-

-16 01:00

SEP

13-

-16 04:00

SEP

SEP

13-

-16 07:00

13-

-16 10:00

SEP

13-

-16 13:00

SEP

13-

-16 16:00

SEP

13-

-16 19:00

SEP

13-

-16 22:00

SEP

SEP

14-

-16 01:00

-16 04:00

14-

SEP

14-

-16 07:00

SEP

14-

-16 10:00

SEP

14-

SEP

-16 13:00

14-

-16 16:00

SEP

14-

-16 19:00

SEP

14-

-16 22:00

SEP

User Calls

**Figure 18: User call per seconds for DWPRD2**

## PGA Memory Statistics

The Program Global Area (PGA) is a memory buffer that contains data and control information for a server process. A PGA is created by Oracle when a server process is started. The information in a PGA depends on the Oracle configuration.

Access to it is exclusive to that server process and is read from and written to only by the Oracle code acting on behalf of it. An example of such information is the runtime area of a cursor. Each time a cursor is executed, a new runtime area is created for that cursor in the PGA memory region of the server process executing that cursor. Analyze this section helps when using the new model to allocate PGA.

The goal is to have most work areas running with an optimal size (for example, more than 90% or even 100% for pure OLTP systems), while a smaller fraction of them are running with a onepass size (for example, less than 10%). Multi-pass execution should be avoided. Even for DSS systems running large sorts and hash-joins, the memory requirement for the one-pass executions is relatively small. A system configured with a reasonable amount of PGA memory should not need to perform multiple passes over the input data.

Under automatic PGA memory management mode, Oracle honors the

PGA\_AGGREGATE\_TARGET limit by controlling dynamically the amount of PGA memory allotted to SQL database areas. At the same time, Oracle maximizes the performance of all the memory-intensive SQL operators by maximizing the number of database areas that are using an optimal amount of PGA memory (cache memory). The rest of the database areas are executed in one-pass mode, unless the PGA memory limit set by PGA\_AGGREGATE\_TARGET is so low that multipass execution is required to reduce even more the consumption of PGA memory and honor the PGA target limit.

In 11g, PGA\_AGGREGATE\_TARGET controls work areas allocated by both dedicated and shared connections.

This metric is computed by Oracle to reflect the performance of the PGA memory component. It is cumulative from instance start-up. A value of 100% means that all work areas executed by the system since instance start-up have used an optimal amount of PGA memory. This is, of course, ideal but rarely happens except maybe for pure OLTP systems. In reality, some work areas run one-pass or even multi-pass, depending on the overall size of the PGA memory. When a work area cannot run optimally, one or more extra passes is performed over the input data. This reduces the cache-hit percentage in proportion to the size of the input data and the number of extra passes performed.

0

5

10

15

20

25

30

35

2016-09-11 23:00

2016-09-12 02:00

2016-09-12 05:00

2016-09-12 08:00

2016-09-12 11:00

2016-09-12 14:00

2016-09-12 17:00

2016-09-12 20:00

2016-09-12 23:00

2016-09-13 02:00

2016-09-13 05:00

2016-09-13 08:00

2016-09-13 11:00

2016-09-13 14:00

2016-09-13 17:00

2016-09-13 20:00

2016-09-13 23:00

2016-09-14 02:00

2016-09-14 05:00

2016-09-14 08:00

2016-09-14 11:00

2016-09-14 14:00

2016-09-14 17:00

2016-09-14 20:00

2016-09-14 23:00

MEM\_GB

SGA\_GB

PGA\_GB

VM\_IN\_GB

VM\_OUT\_GB

**Figure 19: Memory allocated for DWPRD1**

0

5

10

15

20

25

30

2016-09-11 23:00

2016-09-12 02:00

2016-09-12 05:00

2016-09-12 08:00

2016-09-12 11:00

2016-09-12 14:00

2016-09-12 17:00

2016-09-12 20:00

2016-09-12 23:00

2016-09-13 02:00

2016-09-13 05:00

2016-09-13 08:00

2016-09-13 11:00

2016-09-13 14:00

2016-09-13 17:00

2016-09-13 20:00

2016-09-13 23:00

2016-09-14 02:00

2016-09-14 05:00

2016-09-14 08:00

2016-09-14 11:00

2016-09-14 14:00

2016-09-14 17:00

2016-09-14 20:00

2016-09-14 23:00

MEM\_GB

SGA\_GB

PGA\_GB

VM\_IN\_GB

VM\_OUT\_GB

**Figure 20: Memory allocated for DWPRD2**

92.2

92.4

92.6

92.8

93

93.2

93.4

93.6

93.8

SEP

-16 23:00

11-

-16 02:00

12-

SEP

12-

-16 05:00

SEP

-16 08:00

12-

SEP

-16 11:00

12-

SEP

-16 14:00

12-

SEP

12-

-16 17:00

SEP

12-

-16 20:00

SEP

12-

-16 23:00

SEP

SEP

13-

-16 02:00

13-

SEP

-16 05:00

SEP

13-

-16 08:00

-16 11:00

SEP

13-

13-

-16 14:00

SEP

13-

SEP

-16 17:00

SEP

13-

-16 20:00

-16 23:00

SEP

13-

14-

-16 02:00

SEP

SEP

-16 05:00

14-

SEP

-16 08:00

14-

SEP

-16 11:00

14-

14-

SEP

-16 14:00

-16 17:00

14-

SEP

14-

SEP

-16 20:00

SEP

-16 23:00

14-

PGA Cache Hit %

**Figure 21: PGA cache hit % for DWPRD1**

80

82

84

86

88

90

92

94

96

98

100

102

11-

-16 23:00

SEP

SEP

12-

-16 02:00

SEP

12-

-16 05:00

SEP

-16 08:00

12-

SEP

-16 11:00

12-

-16 14:00

12-

SEP

12-

-16 17:00

SEP

12-

-16 20:00

SEP

12-

-16 23:00

SEP

13-

-16 02:00

SEP

SEP

13-

-16 05:00

13-

SEP

-16 08:00

13-

SEP

-16 11:00

13-

-16 14:00

SEP

13-

-16 17:00

SEP

13-

-16 20:00

SEP

SEP

13-

-16 23:00

14-

-16 02:00

SEP

14-

-16 05:00

SEP

14-

-16 08:00

SEP

14-

-16 11:00

SEP

14-

SEP

-16 14:00

14-

-16 17:00

SEP

-16 20:00

SEP

14-

14-

-16 23:00

SEP

PGA Cache Hit %

#### Figure 22: PGA cache hit % for DWPRD2

**Observation**:

No changes requires for PGA size.

## Redo Transaction Activity

Redo logs contain the transaction data that is created when users submit changes to the database. As each redo log fills to capacity with these changes, it “switches” to the next redo log to continue, while the just filled redo log is then copied by the archiving process. If redo log switching is occurring too frequently, slowdowns may be experienced while waiting on the archiver process to finish, or for redo log space manipulation to occur. Increasing or decreasing the size of the redo logs can easily adjust the rate of switching.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **#** | **GROUP#** | **TYPE** | **MEMBER** | Size(GB) |
| **1** | 1 | ONLINE | +DATA\_DG/dwprd/onlinelog/group\_1.288.794644165 | 4 |
| **2** | 1 | ONLINE | +HST\_DG/dwprd/onlinelog/group\_1.256.794648377 | 4 |
| **3** | 2 | ONLINE | +DATA\_DG/dwprd/onlinelog/group\_2.400.794648389 | 4 |
| **4** | 2 | ONLINE | +HST\_DG/dwprd/onlinelog/group\_2.257.794648395 | 4 |
| **5** | 3 | ONLINE | +DATA\_DG/dwprd/onlinelog/group\_3.401.794648399 | 4 |
| **6** | 3 | ONLINE | +HST\_DG/dwprd/onlinelog/group\_3.258.794648403 | 4 |
| **7** | 4 | ONLINE | +DATA\_DG/dwprd/onlinelog/group\_4.402.794648407 | 4 |
| **8** | 4 | ONLINE | +HST\_DG/dwprd/onlinelog/group\_4.259.794648411 | 4 |
| **9** | 5 | ONLINE | +DATA\_DG/dwprd/onlinelog/group\_5.403.794648415 | 4 |
| **10** | 5 | ONLINE | +HST\_DG/dwprd/onlinelog/group\_5.260.794648419 | 4 |
| **11** | 6 | ONLINE | +DATA\_DG/dwprd/onlinelog/group\_6.404.794648423 | 4 |
| **12** | 6 | ONLINE | +HST\_DG/dwprd/onlinelog/group\_6.261.794648427 | 4 |
| **13** | 7 | ONLINE | +DATA\_DG/dwprd/onlinelog/group\_7.405.794648431 | 4 |
| **14** | 7 | ONLINE | +HST\_DG/dwprd/onlinelog/group\_7.262.794648435 | 4 |
| **15** | 8 | ONLINE | +DATA\_DG/dwprd/onlinelog/group\_8.406.794648439 | 4 |
| **16** | 8 | ONLINE | +HST\_DG/dwprd/onlinelog/group\_8.263.794648443 | 4 |

0

100

200

300

400

500

600

700

800

900

2016/09/01

2016/09/02

2016/09/03

2016/09/04

2016/09/05

2016/09/06

2016/09/07

2016/09/08

2016/09/09

2016/09/10

2016/09/11

2016/09/12

2016/09/13

2016/09/14

2016/09/15

2016/09/16

2016/09/17

2016/09/18

2016/09/19

2016/09/20

2016/09/21

**Figure 23: Redo log per day (GB) for DWPRD1**

0

100

200

300

400

500

600

700

800

900

2016/09/01

2016/09/02

2016/09/03

2016/09/04

2016/09/05

2016/09/06

2016/09/07

2016/09/08

2016/09/09

2016/09/10

2016/09/11

2016/09/12

2016/09/13

2016/09/14

2016/09/15

2016/09/16

2016/09/17

2016/09/18

2016/09/19

2016/09/20

2016/09/21

**Figure 24: Redo log per day (GB) for DWPRD2**

0

5

10

15

20

25

2016/09/12 00:00

2016/09/12 03:00

2016/09/12 06:00

2016/09/12 09:00

2016/09/12 12:00

2016/09/12 15:00

2016/09/12 18:00

2016/09/12 21:00

2016/09/13 00:00

2016/09/13 03:00

2016/09/13 06:00

2016/09/13 09:00

2016/09/13 12:00

2016/09/13 15:00

2016/09/13 18:00

2016/09/13 21:00

2016/09/14 00:00

2016/09/14 03:00

2016/09/14 06:00

2016/09/14 09:00

2016/09/14 12:00

2016/09/14 15:00

2016/09/14 18:00

2016/09/14 21:00

2016/09/15 00:00

#### Figure 25: Redo log switch DWPRD1

0

5

10

15

20

25

2016/09/12 00:00

2016/09/12 03:00

2016/09/12 06:00

2016/09/12 09:00

2016/09/12 12:00

2016/09/12 15:00

2016/09/12 18:00

2016/09/12 21:00

2016/09/13 00:00

2016/09/13 03:00

2016/09/13 06:00

2016/09/13 09:00

2016/09/13 12:00

2016/09/13 15:00

2016/09/13 18:00

2016/09/13 21:00

2016/09/14 00:00

2016/09/14 03:00

2016/09/14 06:00

2016/09/14 09:00

2016/09/14 12:00

2016/09/14 15:00

2016/09/14 18:00

2016/09/14 21:00

2016/09/15 00:00

#### Figure 26: Redo log switch DWPRD2

**Recommendation**: During ETL interval, redo logswitch is high ~20 switch per hour. Recommend change redo log size to 8GB.

# Findings

## Gather tables statistics

Many tables do not have up to date statistic:

|  |  |  |
| --- | --- | --- |
| **OWNER** | **LAST ANALYZE** | **COUNT(\*)** |
| **DWH** | 01/02/2012 00:00:00 | 1 |
| **DWH** | 03/01/2012 00:00:00 | 1 |
| **DWH** | 03/23/2012 00:00:00 | 1 |
| **DWH** | 04/17/2012 00:00:00 | 1 |
| **DWH** | 04/24/2012 00:00:00 | 1 |
| **DWH** | 09/24/2012 00:00:00 | 1 |
| **DWH** | 10/20/2012 00:00:00 | 1 |
| **DWH** | 10/25/2012 00:00:00 | 1 |
| **DWH** | 11/24/2012 00:00:00 | 1 |
| **DWH** | 11/29/2012 00:00:00 | 1 |
| **DWH** | 12/07/2012 00:00:00 | 1 |
| **DWH** | 12/09/2012 00:00:00 | 3 |
| **DWH** | 12/11/2012 00:00:00 | 1 |
| **DWH** | 12/16/2012 00:00:00 | 2 |
| **DWH** | 12/19/2012 00:00:00 | 1 |
| **DWH** | 12/20/2012 00:00:00 | 1 |
| **DWH** | 12/29/2012 00:00:00 | 2 |
| **DWH** | 08/18/2013 00:00:00 | 24 |
| **DWH** | 08/19/2013 00:00:00 | 3 |
| **DWH** | 08/25/2013 00:00:00 | 3 |
| **DWH** | 09/05/2013 00:00:00 | 1 |
| **DWH** | 09/18/2013 00:00:00 | 1 |
| **DWH** | 01/24/2014 00:00:00 | 1 |
| **DWH** | 05/17/2014 00:00:00 | 1 |
| **DWH** | 07/16/2014 00:00:00 | 2 |
| **DWH** | 01/23/2016 00:00:00 | 88 |
| **DWH** | 02/24/2016 00:00:00 | 403 |
| **DWH** | 03/11/2016 00:00:00 | 1 |
| **DWH** | 05/20/2016 00:00:00 | 2 |
| **DWH** | 06/07/2016 00:00:00 | 2 |
| **DWH** | 09/12/2016 00:00:00 | 3 |
| **DWH** | 09/14/2016 00:00:00 | 1 |
| **DWH** | 09/17/2016 00:00:00 | 3 |
| **DWH** |  | 113 |
| **DWH2013** |  | 331 |
| **DWH2014** |  | 419 |
| **DWH2015** | 01/06/2016 00:00:00 | 614 |
| **DWH\_BK** |  | 2,265 |

|  |  |  |
| --- | --- | --- |
| **DWH\_LIVE** | 08/18/2013 00:00:00 | 10 |
| **DWH\_LIVE** | 08/19/2013 00:00:00 | 1 |
| **DWH\_LIVE** | 09/20/2013 00:00:00 | 10 |
| **DWH\_LIVE** |  | 9 |
| **DWH\_QUERY** | 08/18/2013 00:00:00 | 32 |
| **DWH\_QUERY** | 08/19/2013 00:00:00 | 114 |
| **DWH\_QUERY** | 08/23/2013 00:00:00 | 1 |
| **DWH\_QUERY** | 08/29/2013 00:00:00 | 1 |
| **DWH\_QUERY** | 09/03/2013 00:00:00 | 2 |
| **DWH\_QUERY** | 09/12/2013 00:00:00 | 1 |
| **DWH\_QUERY** | 09/13/2013 00:00:00 | 2 |
| **DWH\_QUERY** | 09/15/2013 00:00:00 | 2 |
| **DWH\_QUERY** | 09/20/2013 00:00:00 | 2 |
| **DWH\_QUERY** |  | 3,647 |
| **DWH\_STAGING** | 08/18/2013 00:00:00 | 203 |
| **DWH\_STAGING** | 08/19/2013 00:00:00 | 2 |
| **DWH\_STAGING** | 09/05/2013 00:00:00 | 1 |
| **DWH\_STAGING** | 09/14/2013 00:00:00 | 1 |
| **DWH\_STAGING** | 09/15/2013 00:00:00 | 1 |
| **DWH\_STAGING** | 09/18/2013 00:00:00 | 6 |
| **DWH\_STAGING** | 05/10/2014 00:00:00 | 1 |
| **DWH\_STAGING** | 03/07/2016 00:00:00 | 1 |
| **DWH\_STAGING** |  | 1,230 |
| **EDW\_ADM** |  | 113 |
| **EDW\_DMT** | 02/10/2014 00:00:00 | 1 |
| **EDW\_DMT** | 05/14/2014 00:00:00 | 1 |
| **EDW\_DMT** | 07/10/2014 00:00:00 | 5 |
| **EDW\_DMT** | 07/11/2014 00:00:00 | 1 |
| **EDW\_DMT** | 07/20/2014 00:00:00 | 1 |
| **EDW\_DMT** | 07/30/2014 00:00:00 | 8 |
| **EDW\_DMT** | 07/31/2014 00:00:00 | 1 |
| **EDW\_DMT** | 08/01/2014 00:00:00 | 28 |
| **EDW\_DMT** | 08/02/2014 00:00:00 | 10 |
| **EDW\_DMT** | 08/05/2014 00:00:00 | 1 |
| **EDW\_DMT** | 08/18/2014 00:00:00 | 1 |
| **EDW\_DMT** | 09/15/2014 00:00:00 | 1 |
| **EDW\_DMT** | 01/28/2015 00:00:00 | 6 |
| **EDW\_DMT** |  | 52 |
| **EDW\_SOR** | 12/25/2013 00:00:00 | 2 |
| **EDW\_SOR** | 12/26/2013 00:00:00 | 1 |
| **EDW\_SOR** | 01/15/2014 00:00:00 | 1 |
| **EDW\_SOR** | 01/27/2014 00:00:00 | 1 |
| **EDW\_SOR** | 02/13/2014 00:00:00 | 1 |
| **EDW\_SOR** | 02/19/2014 00:00:00 | 1 |
| **EDW\_SOR** | 03/28/2014 00:00:00 | 1 |
| **EDW\_SOR** | 05/14/2014 00:00:00 | 1 |

|  |  |  |
| --- | --- | --- |
| **EDW\_SOR** | 05/23/2014 00:00:00 | 1 |
| **EDW\_SOR** | 06/16/2014 00:00:00 | 1 |
| **EDW\_SOR** | 06/27/2014 00:00:00 | 1 |
| **EDW\_SOR** | 07/09/2014 00:00:00 | 8 |
| **EDW\_SOR** | 07/10/2014 00:00:00 | 1 |
| **EDW\_SOR** | 07/17/2014 00:00:00 | 1 |
| **EDW\_SOR** | 07/22/2014 00:00:00 | 1 |
| **EDW\_SOR** | 07/23/2014 00:00:00 | 1 |
| **EDW\_SOR** | 07/25/2014 00:00:00 | 1 |
| **EDW\_SOR** | 07/26/2014 00:00:00 | 18 |
| **EDW\_SOR** | 07/30/2014 00:00:00 | 19 |
| **EDW\_SOR** | 07/31/2014 00:00:00 | 4 |
| **EDW\_SOR** | 08/01/2014 00:00:00 | 1 |
| **EDW\_SOR** | 08/02/2014 00:00:00 | 3 |
| **EDW\_SOR** | 08/04/2014 00:00:00 | 1 |
| **EDW\_SOR** | 11/12/2014 00:00:00 | 1 |
| **EDW\_SOR** | 12/06/2014 00:00:00 | 1 |
| **EDW\_SOR** | 01/17/2015 00:00:00 | 1 |
| **EDW\_SOR** | 07/16/2015 00:00:00 | 1 |
| **EDW\_SOR** |  | 40 |
| **EDW\_STG** | 02/25/2014 00:00:00 | 2 |
| **EDW\_STG** | 03/04/2014 00:00:00 | 1 |
| **EDW\_STG** | 04/19/2014 00:00:00 | 1 |
| **EDW\_STG** | 05/29/2014 00:00:00 | 1 |
| **EDW\_STG** | 06/06/2014 00:00:00 | 1 |
| **EDW\_STG** | 06/10/2014 00:00:00 | 1 |
| **EDW\_STG** | 06/11/2014 00:00:00 | 1 |
| **EDW\_STG** | 06/19/2014 00:00:00 | 1 |
| **EDW\_STG** | 06/26/2014 00:00:00 | 1 |
| **EDW\_STG** | 06/27/2014 00:00:00 | 1 |
| **EDW\_STG** | 06/30/2014 00:00:00 | 1 |
| **EDW\_STG** | 07/01/2014 00:00:00 | 1 |
| **EDW\_STG** | 07/11/2014 00:00:00 | 1 |
| **EDW\_STG** | 07/12/2014 00:00:00 | 1 |
| **EDW\_STG** | 07/20/2014 00:00:00 | 4 |
| **EDW\_STG** | 07/22/2014 00:00:00 | 1 |
| **EDW\_STG** | 07/23/2014 00:00:00 | 4 |
| **EDW\_STG** | 07/24/2014 00:00:00 | 2 |
| **EDW\_STG** | 07/27/2014 00:00:00 | 1 |
| **EDW\_STG** | 07/30/2014 00:00:00 | 39 |
| **EDW\_STG** | 07/31/2014 00:00:00 | 2 |
| **EDW\_STG** | 08/01/2014 00:00:00 | 105 |
| **EDW\_STG** | 08/02/2014 00:00:00 | 13 |
| **EDW\_STG** | 08/09/2014 00:00:00 | 1 |
| **EDW\_STG** | 08/10/2014 00:00:00 | 1 |
| **EDW\_STG** | 10/02/2014 00:00:00 | 1 |

|  |  |  |
| --- | --- | --- |
| **EDW\_STG** | 12/06/2014 00:00:00 | 1 |
| **EDW\_STG** | 01/28/2015 00:00:00 | 2 |
| **EDW\_STG** | 05/22/2015 00:00:00 | 1 |
| **EDW\_STG** | 01/08/2016 00:00:00 | 2 |
| **EDW\_STG** |  | 429 |
| **GG12C** |  | 24 |
| **KRM** | 08/19/2013 00:00:00 | 118 |
| **KRM\_APP** | 08/18/2013 00:00:00 | 216 |
| **KRM\_APP** | 08/19/2013 00:00:00 | 204 |
| **KRM\_APP** | 09/01/2013 00:00:00 | 1 |
| **KRM\_APP** | 09/15/2013 00:00:00 | 1 |
| **KRM\_APP** | 09/16/2013 00:00:00 | 3 |
| **KRM\_APP** | 09/18/2013 00:00:00 | 2 |
| **KRM\_APP** | 09/19/2013 00:00:00 | 1 |
| **KRM\_APP** | 09/20/2013 00:00:00 | 31 |
| **KRM\_APP** | 09/21/2013 00:00:00 | 1 |
| **KRM\_APP** | 09/25/2013 00:00:00 | 1 |
| **KRM\_APP** | 04/22/2014 00:00:00 | 2 |
| **KRM\_APP** | 08/17/2015 00:00:00 | 1 |
| **KRM\_APP** | 12/31/2015 00:00:00 | 1 |
| **KRM\_APP** | 09/05/2016 00:00:00 | 1 |
| **KRM\_APP** |  | 411 |
| **KRM\_BIPLATFORM** | 08/18/2013 00:00:00 | 37 |
| **KRM\_BIPLATFORM** | 08/19/2013 00:00:00 | 68 |
| **KRM\_BIPLATFORM** | 09/20/2013 00:00:00 | 1 |
| **KRM\_ETL** | 10/10/2012 00:00:00 | 11 |
| **KRM\_ETL** | 10/25/2012 00:00:00 | 1 |
| **KRM\_ETL** | 11/12/2012 00:00:00 | 1 |
| **KRM\_ETL** | 12/04/2012 00:00:00 | 1 |
| **KRM\_ETL** | 12/07/2012 00:00:00 | 3 |
| **KRM\_ETL** | 12/23/2012 00:00:00 | 1 |
| **KRM\_ETL** | 12/30/2012 00:00:00 | 2 |
| **KRM\_ETL** | 01/02/2013 00:00:00 | 34 |
| **KRM\_ETL** | 08/18/2013 00:00:00 | 11 |
| **KRM\_ETL** | 08/19/2013 00:00:00 | 18 |
| **KRM\_ETL** | 09/20/2013 00:00:00 | 7 |
| **KRM\_ETL** |  | 52 |
| **KRM\_MDS** | 08/19/2013 00:00:00 | 7 |
| **KRM\_MDS** | 08/30/2013 00:00:00 | 3 |
| **KRM\_MDS** | 08/31/2013 00:00:00 | 3 |
| **KRM\_MDS** |  | 1 |
| **KRM\_RPT** | 08/18/2013 00:00:00 | 48 |
| **KRM\_RPT** | 08/19/2013 00:00:00 | 27 |
| **KRM\_RPT** | 08/29/2013 00:00:00 | 1 |
| **KRM\_RPT** | 09/01/2013 00:00:00 | 6 |
| **KRM\_RPT** | 09/05/2013 00:00:00 | 1 |

|  |  |  |
| --- | --- | --- |
| **KRM\_RPT** | 09/06/2013 00:00:00 | 2 |
| **KRM\_RPT** | 09/07/2013 00:00:00 | 1 |
| **KRM\_RPT** | 09/10/2013 00:00:00 | 1 |
| **KRM\_RPT** | 09/12/2013 00:00:00 | 1 |
| **KRM\_RPT** | 09/15/2013 00:00:00 | 1 |
| **KRM\_RPT** | 09/16/2013 00:00:00 | 3 |
| **KRM\_RPT** | 09/18/2013 00:00:00 | 6 |
| **KRM\_RPT** | 09/19/2013 00:00:00 | 1 |
| **KRM\_RPT** | 09/20/2013 00:00:00 | 6 |
| **KRM\_RPT** | 02/25/2014 00:00:00 | 1 |
| **KRM\_RPT** |  | 163 |
| **KRM\_WORK\_REPO** | 08/19/2013 00:00:00 | 118 |
| **LINHNXH** |  | 1 |
| **PA\_AWR\_USER** | 08/18/2013 00:00:00 | 1 |
| **PA\_AWR\_USER** | 08/19/2013 00:00:00 | 1 |
| **PA\_AWR\_USER** |  | 45 |
| **T24REP** | 10/31/2015 00:00:00 | 1 |
| **T24REP** | 12/08/2015 00:00:00 | 1 |
| **T24REP** | 09/09/2016 00:00:00 | 4 |
| **T24REP** |  | 633 |
| **TCB\_BIPLATFORM** | 08/18/2013 00:00:00 | 37 |
| **TCB\_BIPLATFORM** | 08/19/2013 00:00:00 | 64 |
| **TCB\_BIPLATFORM** | 09/11/2013 00:00:00 | 2 |
| **TCB\_BIPLATFORM** | 09/18/2013 00:00:00 | 2 |
| **TCB\_BIPLATFORM** | 09/20/2013 00:00:00 | 1 |
| **TCB\_DWH\_CARD** | 08/18/2013 00:00:00 | 5 |
| **TCB\_DWH\_CARD** | 08/19/2013 00:00:00 | 6 |
| **TCB\_DWH\_CARD** | 09/09/2013 00:00:00 | 1 |
| **TCB\_DWH\_CARD** | 09/13/2013 00:00:00 | 1 |
| **TCB\_DWH\_CARD** |  | 4 |
| **TCB\_DWH\_CEB** | 09/20/2013 00:00:00 | 9 |
| **TCB\_DWH\_CEB** |  | 76 |
| **TCB\_DWH\_CEB2** | 08/17/2013 00:00:00 | 1 |
| **TCB\_DWH\_CEB2** | 08/18/2013 00:00:00 | 6 |
| **TCB\_DWH\_CEB2** | 08/19/2013 00:00:00 | 3 |
| **TCB\_DWH\_CEB2** | 09/20/2013 00:00:00 | 1 |
| **TCB\_DWH\_CEB2** | 09/21/2013 00:00:00 | 1 |
| **TCB\_DWH\_CEB2** |  | 12 |
| **TCB\_DWH\_HOMEBANKING** | 08/18/2013 00:00:00 | 8 |
| **TCB\_DWH\_HOMEBANKING** | 08/19/2013 00:00:00 | 9 |
| **TCB\_DWH\_HOMEBANKING** |  | 1 |
| **TCB\_DWH\_QTRR** |  | 10 |
| **TCB\_DWH\_REPORT** | 08/19/2013 00:00:00 | 1 |
| **TCB\_DWH\_REPORT** |  | 3 |
| **TCB\_DWH\_STAGING** | 03/27/2012 00:00:00 | 1 |
| **TCB\_DWH\_STAGING** | 08/18/2013 00:00:00 | 135 |

|  |  |  |
| --- | --- | --- |
| **TCB\_DWH\_STAGING** | 08/19/2013 00:00:00 | 7 |
| **TCB\_DWH\_STAGING** |  | 4 |
| **TCB\_DWH\_TCKH** | 12/07/2011 00:00:00 | 1 |
| **TCB\_DWH\_TCKH** | 03/06/2012 00:00:00 | 1 |
| **TCB\_DWH\_TCKH** | 03/28/2012 00:00:00 | 1 |
| **TCB\_DWH\_TCKH** | 05/29/2012 00:00:00 | 1 |
| **TCB\_DWH\_TCKH** | 09/16/2012 00:00:00 | 1 |
| **TCB\_DWH\_TCKH** | 10/07/2012 00:00:00 | 1 |
| **TCB\_DWH\_TCKH** | 12/09/2012 00:00:00 | 1 |
| **TCB\_DWH\_TCKH** | 12/22/2012 00:00:00 | 1 |
| **TCB\_DWH\_TCKH** | 12/23/2012 00:00:00 | 2 |
| **TCB\_DWH\_TCKH** | 08/19/2013 00:00:00 | 4 |
| **TCB\_DWH\_TCKH** | 09/09/2013 00:00:00 | 4 |
| **TCB\_DWH\_TCKH** | 09/11/2013 00:00:00 | 1 |
| **TCB\_DWH\_TCKH** | 09/15/2013 00:00:00 | 1 |
| **TCB\_DWH\_TCKH** | 09/17/2013 00:00:00 | 1 |
| **TCB\_DWH\_TCKH** | 09/18/2013 00:00:00 | 1 |
| **TCB\_DWH\_TCKH** | 09/19/2013 00:00:00 | 1 |
| **TCB\_DWH\_TCKH** |  | 515 |
| **TCB\_DWH\_TCKH2011** | 08/19/2013 00:00:00 | 1 |
| **TCB\_DWH\_VAS** | 08/18/2013 00:00:00 | 124 |
| **TCB\_DWH\_VAS** | 08/19/2013 00:00:00 | 382 |
| **TCB\_DWH\_VAS** | 08/27/2013 00:00:00 | 14 |
| **TCB\_DWH\_VAS** | 09/01/2013 00:00:00 | 1 |
| **TCB\_DWH\_VAS** | 09/02/2013 00:00:00 | 3 |
| **TCB\_DWH\_VAS** | 09/04/2013 00:00:00 | 1 |
| **TCB\_DWH\_VAS** | 09/05/2013 00:00:00 | 7 |
| **TCB\_DWH\_VAS** | 09/07/2013 00:00:00 | 18 |
| **TCB\_DWH\_VAS** | 09/08/2013 00:00:00 | 3 |
| **TCB\_DWH\_VAS** | 09/09/2013 00:00:00 | 1 |
| **TCB\_DWH\_VAS** | 09/10/2013 00:00:00 | 10 |
| **TCB\_DWH\_VAS** | 09/15/2013 00:00:00 | 9 |
| **TCB\_DWH\_VAS** | 09/16/2013 00:00:00 | 2 |
| **TCB\_DWH\_VAS** | 09/17/2013 00:00:00 | 1 |
| **TCB\_DWH\_VAS** | 09/18/2013 00:00:00 | 5 |
| **TCB\_DWH\_VAS** | 09/19/2013 00:00:00 | 13 |
| **TCB\_DWH\_VAS** | 09/20/2013 00:00:00 | 47 |
| **TCB\_DWH\_VAS** | 01/06/2014 00:00:00 | 1 |
| **TCB\_DWH\_VAS** | 01/15/2015 00:00:00 | 1 |
| **TCB\_DWH\_VAS** |  | 929 |
| **TCB\_ETL\_REPO** | 08/19/2013 00:00:00 | 180 |
| **TCB\_LIVE** | 08/18/2013 00:00:00 | 41 |
| **TCB\_LIVE** | 08/19/2013 00:00:00 | 6 |
| **TCB\_LIVE** | 08/23/2013 00:00:00 | 1 |
| **TCB\_LIVE** | 09/01/2013 00:00:00 | 1 |
| **TCB\_LIVE** | 09/18/2013 00:00:00 | 1 |
| **TCB\_LIVE** | 09/19/2013 00:00:00 | 7 |
| **TCB\_LIVE** | 09/20/2013 00:00:00 | 25 |
| **TCB\_LIVE** | 08/01/2016 00:00:00 | 2 |
| **TCB\_LIVE** |  | 35 |
| **TCB\_LIVE2012** | 08/18/2013 00:00:00 | 84 |
| **TCB\_LIVE2012** | 08/19/2013 00:00:00 | 16 |
| **TCB\_LIVE2012** |  | 1 |
| **TCB\_LIVE\_REPO** | 08/19/2013 00:00:00 | 180 |
| **TCB\_LIVE\_STAGING** | 08/18/2013 00:00:00 | 7 |
| **TCB\_LIVE\_STAGING** |  | 15 |
| **TCB\_LIVE\_WORK** | 08/19/2013 00:00:00 | 118 |
| **TCB\_MBV** |  | 136 |
| **TCB\_MBV\_2014** |  | 65 |
| **TCB\_MDS** | 08/19/2013 00:00:00 | 8 |
| **TCB\_MDS** | 09/15/2013 00:00:00 | 5 |
| **TCB\_MDS** |  | 1 |
| **TCB\_MONITOR** | 08/11/2011 00:00:00 | 1 |
| **TCB\_MONITOR** | 09/12/2011 00:00:00 | 1 |
| **TCB\_MONITOR** | 09/20/2011 00:00:00 | 2 |
| **TCB\_MONITOR** | 10/15/2011 00:00:00 | 1 |
| **TCB\_MONITOR** | 10/31/2011 00:00:00 | 1 |
| **TCB\_MONITOR** | 01/11/2012 00:00:00 | 1 |
| **TCB\_MONITOR** | 02/15/2012 00:00:00 | 1 |
| **TCB\_MONITOR** | 12/16/2012 00:00:00 | 2 |
| **TCB\_MONITOR** | 09/07/2013 00:00:00 | 1 |
| **TCB\_MONITOR** | 09/20/2013 00:00:00 | 1 |
| **TCB\_MONITOR** |  | 6 |
| **TCB\_ODI\_MASTER** | 08/19/2013 00:00:00 | 58 |
| **TCB\_ODI\_MASTER\_11G** | 08/19/2013 00:00:00 | 62 |
| **TCB\_ODI\_WORK** | 08/19/2013 00:00:00 | 88 |
| **TCB\_ODI\_WORK\_11G** | 08/19/2013 00:00:00 | 118 |
| **TCKH\_BIZ\_USER** |  | 28 |
| **TEST\_KRM** | 08/19/2013 00:00:00 | 118 |
| **TEST\_ODI\_REPO** | 08/19/2013 00:00:00 | 180 |
| **THANHCT2** |  | 1 |
| **THANHNP2** |  | 1 |
| **THONT3** |  | 19 |

Stale statistic causes Oracle to generate sub-optimal plan which affect SQL performance.

**Recommendation**: Gather statistic to enable Oracle generate optimal execution plans.

## Largest segments

These segments contribute most to database size. Large table is slow to access if full scan is required.

|  |  |  |  |
| --- | --- | --- | --- |
| **OWNER** | **SEGMENT\_NAME** | **SEGMENT\_TYPE** | **GB** |
| **TCB\_DWH\_VAS** | R312\_TAB11F | TABLE PARTITION | 660 |
| **EDW\_SOR** | AR\_TVR\_SMY | TABLE PARTITION | 510 |
| **EDW\_DMT** | AR\_BHVR\_ANL\_FCT | TABLE PARTITION | 476 |
| **T24REP** | F\_PROTOCOL | TABLE | 388 |
| **T24REP** | FBNK\_STMT\_ENTRY | TABLE PARTITION | 377 |
| **DWH** | RE\_CRF\_SBVGL | TABLE PARTITION | 345 |
| **DWH** | PD\_BALANCES | TABLE PARTITION | 303 |
| **DWH** | ACCOUNT | TABLE PARTITION | 281 |
| **DWH** | ESB\_MESSAGES\_OSBV1\_QUERY | TABLE PARTITION | 263 |
| **TCB\_DWH\_VAS** | R310\_TAB\_2 | TABLE | 260 |
| **EDW\_DMT** | AR\_BHVR\_ANL\_FCT\_TXN | TABLE PARTITION | 249 |
| **EDW\_DMT** | CST\_INSIGHT\_ANL\_FCT | TABLE PARTITION | 248 |
| **EDW\_SOR** | AU\_SMY | TABLE PARTITION | 236 |
| **EDW\_SOR** | PST\_ENTR | TABLE PARTITION | 212 |
| **DWH** | LMM\_ACCOUNT\_BALANCES | TABLE PARTITION | 196 |
| **T24REP** | SYS\_LOB0296293891C00005$$ | LOBSEGMENT | 182 |
| **DWH2015** | ACCOUNT | TABLE PARTITION | 182 |
| **DWH2014** | ACCOUNT | TABLE PARTITION | 181 |
| **DWH2013** | ACCOUNT | TABLE PARTITION | 180 |
| **DWH** | STMT\_ENTRY | TABLE PARTITION | 177 |
| **DWH** | EB\_CONTRACT\_BALANCES\_TSD | TABLE PARTITION | 174 |
| **TCB\_DWH\_VAS** | IDX\_MCO\_NEW\_YM | INDEX | 158 |
| **EDW\_SOR** | IDX\_AU\_SMY\_01 | INDEX | 143 |
| **TCB\_DWH\_VAS** | IDX\_MCO\_NEW\_TK | INDEX | 141 |
| **TCB\_DWH\_VAS** | MCO\_TCB\_NEW | TABLE PARTITION | 136 |
| **EDW\_DMT** | IDX\_AR\_BHVR\_FCT\_CDR\_DT | INDEX | 134 |
| **DWH** | EB\_CONTRACT\_BALANCES\_TSD\_OLD | TABLE PARTITION | 126 |
| **T24REP** | OGG\_STMT\_ENTRY | TABLE PARTITION | 126 |
| **TCB\_DWH\_VAS** | R\_TBL\_LN\_0002\_04 | TABLE | 122 |
| **EDW\_SOR** | UK\_PST\_ENTR | INDEX | 119 |
| **DWH** | SYS\_LOB0317948601C00005$$ | LOBSEGMENT | 119 |
| **TCB\_DWH\_VAS** | R\_TBL\_DS\_0003 | TABLE PARTITION | 112 |
| **GG12C** | GGS\_DDL\_HIST | TABLE | 108 |
| **TCB\_DWH\_VAS** | IDX\_MCO\_YMONTH\_YNGAYBC | INDEX | 108 |
| **DWH2013** | PK\_RE\_CRF\_SBVGL | INDEX | 106 |
| **EDW\_SOR** | UK\_AR\_TVR\_SMY | INDEX | 106 |
| **EDW\_DMT** | AR\_ST\_ANL\_FCT | TABLE PARTITION | 105 |
| **KRM\_RPT** | TMP\_TBL\_KRM\_PORT\_ALL\_1MONTH | TABLE | 104 |
| **DWH** | CMS\_TRANSACTION | TABLE PARTITION | 101 |
| **EDW\_SOR** | UK\_AU\_BAL | INDEX | 99 |
| **EDW\_SOR** | FTP\_SMY | TABLE PARTITION | 99 |
| **T24REP** | SYS\_LOB0224682674C00003$$ | LOB PARTITION | 89 |
| **EDW\_SOR** | ACS\_FCY\_TVR\_SMY | TABLE PARTITION | 81 |
| **DWH** | CNTD\_HOPDONG | TABLE PARTITION | 80 |
| **KRM\_APP** | FTP\_OUT | TABLE PARTITION | 79 |
| **KRM\_RPT** | KRM\_SYN\_PORT\_FTP\_ALL\_201504 | TABLE | 79 |
| **EDW\_DMT** | AR\_BHVR\_ANL\_FCT\_MTH | TABLE | 78 |
| **DWH** | KDR\_CURVESRATESHIST | TABLE | 72 |
| **EDW\_SOR** | AU\_BAL | TABLE PARTITION | 72 |
| **TCB\_DWH\_VAS** | R304\_TAB\_MIS | TABLE | 71 |
| **DWH** | SYS\_LOB0342936527C00008$$ | LOB PARTITION | 70 |
| **T24REP** | OGG\_PROTOCOL | TABLE PARTITION | 69 |
| **EDW\_DMT** | FTP\_ANL\_FCT | TABLE PARTITION | 68 |
| **DWH2015** | CATEG\_ENTRY | TABLE PARTITION | 66 |
| **DWH2015** | PD\_BALANCES | TABLE PARTITION | 59 |
| **DWH** | CATEG\_ENTRY | TABLE PARTITION | 57 |
| **DWH** | CMS\_COLLECTIONCENTRALBANK | TABLE PARTITION | 57 |
| **DWH** | PROTOCOL | TABLE PARTITION | 54 |
| **T24REP** | PK\_J$F\_PROTOCOL | INDEX | 54 |
| **T24REP** | PK\_J$FBNK\_EB\_C005 | INDEX | 51 |
| **T24REP** | J$FBNK\_EB\_C005 | TABLE | 51 |
| **TCB\_DWH\_VAS** | R\_TBL\_DS\_0003\_CON\_ID\_IND | INDEX PARTITION | 50 |

**Recommendation**: Archive old data or re-organize these segment to optimize size/DML access on tables/indexes.

## Unusable indexes

These indexes are in unusable state which may affect SQL performance:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **OWNER** | **INDEX NAME** | **TABLE NAME** | **NUM**  **ROWS** | **LAST**  **ANALYZED** |
| **DWH2015** | CMS\_CONTRACTITEM5\_PK | CMS\_CONTRACTITEM | 973,256 | 01/06/2016 01:57:17 |
| **DWH2015** | PK\_CMS\_CRD\_CARD | CMS\_CRD\_CARD | 2,083,719 | 01/06/2016 01:57:25 |
| **DWH2015** | IDX\_CMS\_CRD\_CARD\_IPL | CMS\_CRD\_CARD\_IPL | 3,725,041 | 01/06/2016 01:57:28 |
| **DWH2015** | PK\_RCCSEQU | RE\_CONSOL\_CONTRACT\_SEQU | 696,181 | 01/06/2016 04:13:47 |

**Recommendation**: Rebuild or drop unusable indexes.

## Table owner & index owner is different

Following indexes have owner other than table owner:

|  |  |  |  |
| --- | --- | --- | --- |
| **TABLE OWNER** | **TABLE NAME** | **INDEX**  **OWNER** | **INDEX NAME** |
| **DWH\_BK** | PD\_20160719 | T24REP | IDX\_PD\_20160719 |
| **DWH\_QUERY** | CDR\_DT\_DIM | DWH | IDX\_CDR\_DI |
| **DWH\_QUERY** | TMP\_STMT\_SESS | T24REP | IDX\_TMP\_STMT\_SESS |
| **EDW\_STG** | T\_DMT\_PD\_AR\_BSN\_MTH | DWH | IDX\_T\_DMT\_PD\_AR\_MTH\_AR\_ID |
| **KRM\_APP** | KRM\_SYN\_CAR\_BDS | KRM\_ETL | CAR\_BDS\_SO\_HDONG\_IDX |
| **KRM\_APP** | PORT\_SOLVENCY | KRM\_ETL | PORT\_SOL\_U\_SECTOR\_IDX |
| **KRM\_APP** | PORT\_SOLVENCY | KRM\_ETL | SOL\_A\_LEAD\_SYN\_IDX |
| **T24REP** | TBL\_HBK\_ACCOUNT\_REGISTER | TCB\_LIVE | IDX\_HBK\_ACCOUNT\_REGIS\_ACC\_MOBI |
| **TCB\_DWH\_VAS** | MCO\_TCB\_MM\_DETAILS | DWH | MCO\_TCB\_MM\_DETAILS\_ALL |

**Recommendation**: Table owner & index owner should be the same. Recreate indexes with correct owner.

## Redundant index

These indexes has other superset index which means Oracle can use the superset index for the query.

More index will make DML on a table slower.

Drop unnecessary index will reduce time for DML on tables.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **#** | **TABLE**  **OWNER** | **TABLE NAME** | **REDUNDANT INDEX** | **SUPERSET INDEX** |
| **1** | DWH | FUNDS\_TRANS  FER | IDX\_FT\_PROCESSING\_DATE  (PROCESSING\_DATE) | IDX\_FT\_PROCESSDATE\_CREDITACC  (PROCESSING\_DATE:CREDIT\_ACCT\_NO) |
| **2** | DWH | FUNDS\_TRANS  FER | IDX\_FT\_PROCESSING\_DATE  (PROCESSING\_DATE) | IDX\_FT\_PROCESSDATE\_DEBITACC  (PROCESSING\_DATE:DEBIT\_ACCT\_NO) |
| **3** | DWH2013 | CATEG\_ENTRY | CATEG\_BOOKINGDATE  (BOOKING\_DATE) | IDX\_FACT\_CATEG\_ENTRY  (BOOKING\_DATE:CUSTOMER\_NO) |
| **4** | DWH2013 | FUNDS\_TRANS  FER | IDX\_FT\_PROCESSING\_DATE  (PROCESSING\_DATE) | IDX\_FT\_PROCESSDATE\_CREDITACC  (PROCESSING\_DATE:CREDIT\_ACCT\_NO) |
| **5** | DWH2013 | FUNDS\_TRANS  FER | IDX\_FT\_PROCESSING\_DATE  (PROCESSING\_DATE) | IDX\_FT\_PROCESSDATE\_DEBITACC  (PROCESSING\_DATE:DEBIT\_ACCT\_NO) |
| **6** | DWH2013 | LMM\_ACCOUN  T\_BALANCES | LMM\_ACCOUNT\_BALANCES\_CONT  (BANK\_ID:CONTRACT\_NUMBER) | PK\_LMM  (BANK\_ID:CONTRACT\_NUMBER:PROCESS\_DATE) |
| **7** | DWH2013 | RE\_CONSOL\_SP  EC\_ENTRY | IDX\_RCSE\_BOOKING\_DATE  (BOOKING\_DATE) | IDX\_RCSE\_BKDATE\_CUS  (BOOKING\_DATE:CUSTOMER\_ID) |
| **8** | DWH2013 | STMT\_ENTRY | STMT\_ENTRY\_BOOKING\_DATE  (BOOKING\_DATE) | IDX\_STMT\_ENTRY\_BD\_ACC  (BOOKING\_DATE:ACCOUNT\_NUMBER) |
| **9** | DWH2013 | STMT\_ENTRY | STMT\_ENTRY\_BOOKING\_DATE  (BOOKING\_DATE) | IDX\_STMT\_ENTRY\_BD\_CUS  (BOOKING\_DATE:CUSTOMER\_ID) |
| **10** | DWH2014 | CATEG\_ENTRY | CATEG\_BOOKINGDATE  (BOOKING\_DATE) | IDX\_FACT\_CATEG\_ENTRY  (BOOKING\_DATE:CUSTOMER\_NO) |
| **11** | DWH2014 | FUNDS\_TRANS  FER | IDX\_FT\_PROCESSING\_DATE  (PROCESSING\_DATE) | IDX\_FT\_PROCESSDATE\_CREDITACC  (PROCESSING\_DATE:CREDIT\_ACCT\_NO) |
| **12** | DWH2014 | FUNDS\_TRANS  FER | IDX\_FT\_PROCESSING\_DATE  (PROCESSING\_DATE) | IDX\_FT\_PROCESSDATE\_DEBITACC  (PROCESSING\_DATE:DEBIT\_ACCT\_NO) |
| **13** | DWH2014 | RE\_CONSOL\_SP  EC\_ENTRY | IDX\_RCSE\_BOOKING\_DATE  (BOOKING\_DATE) | IDX\_RCSE\_BKDATE\_CUS  (BOOKING\_DATE:CUSTOMER\_ID) |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **14** | DWH2014 | STMT\_ENTRY | STMT\_ENTRY\_BOOKING\_DATE  (BOOKING\_DATE) | IDX\_STMT\_ENTRY\_BD\_ACC  (BOOKING\_DATE:ACCOUNT\_NUMBER) |
| **15** | DWH2014 | STMT\_ENTRY | STMT\_ENTRY\_BOOKING\_DATE  (BOOKING\_DATE) | IDX\_STMT\_ENTRY\_BD\_CUS  (BOOKING\_DATE:CUSTOMER\_ID) |
| **16** | DWH2015 | CATEG\_ENTRY | CATEG\_BOOKINGDATE  (BOOKING\_DATE) | IDX\_FACT\_CATEG\_ENTRY  (BOOKING\_DATE:CUSTOMER\_NO) |
| **17** | DWH2015 | FUNDS\_TRANS  FER | IDX\_FT\_PROCESSING\_DATE  (PROCESSING\_DATE) | IDX\_FT\_PROCESSDATE\_CREDITACC  (PROCESSING\_DATE:CREDIT\_ACCT\_NO) |
| **18** | DWH2015 | FUNDS\_TRANS  FER | IDX\_FT\_PROCESSING\_DATE  (PROCESSING\_DATE) | IDX\_FT\_PROCESSDATE\_DEBITACC  (PROCESSING\_DATE:DEBIT\_ACCT\_NO) |
| **19** | DWH2015 | RE\_CONSOL\_SP  EC\_ENTRY | IDX\_RCSE\_BOOKING\_DATE  (BOOKING\_DATE) | IDX\_RCSE\_BKDATE\_CUS  (BOOKING\_DATE:CUSTOMER\_ID) |
| **20** | DWH2015 | STMT\_ENTRY | STMT\_ENTRY\_BOOKING\_DATE  (BOOKING\_DATE) | IDX\_STMT\_ENTRY\_BD\_ACC  (BOOKING\_DATE:ACCOUNT\_NUMBER) |
| **21** | DWH2015 | STMT\_ENTRY | STMT\_ENTRY\_BOOKING\_DATE  (BOOKING\_DATE) | IDX\_STMT\_ENTRY\_BD\_CUS  (BOOKING\_DATE:CUSTOMER\_ID) |
| **22** | DWH\_QUE  RY | PLSQL\_PROFIL  ER\_DATA | PLSQL\_PROFILER\_DINDEX  (RUNID:UNIT\_NUMBER) | PK\_PLSQL\_PROFILER\_DATA  (RUNID:UNIT\_NUMBER:LINE#) |
| **23** | GG12C | GGS\_DDL\_HIST | GGS\_DDL\_HIST\_index1 (OBJECTID) | GGS\_DDL\_HIST\_i2  (OBJECTID:STARTSCN:FRAGMENTNO) |
| **24** | KRM | SNP\_COL | COL\_FK1 (I\_TABLE) | AK\_COL (I\_TABLE:COL\_NAME) |
| **25** | KRM | SNP\_COND | COND\_FK1 (I\_TABLE) | AK\_COND (I\_TABLE:COND\_NAME) |
| **26** | KRM | SNP\_DIAG\_PAR  AM | SNP\_DIAG\_PARAM\_FK1 (I\_DIAGRAM) | PK\_SNP\_DIAG\_PARAM  (I\_DIAGRAM:PARAM\_NAME) |
| **27** | KRM | SNP\_GRP\_STAT  E | SNP\_GRP\_STATE\_FK1 (I\_PROJECT) | AK\_SNP\_GRP\_STATE  (I\_PROJECT:GRP\_STATE\_CODE) |
| **28** | KRM | SNP\_JOIN | JOIN\_FK1 (I\_TABLE\_FK) | AK\_JOIN (I\_TABLE\_FK:FK\_NAME) |
| **29** | KRM | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | AK\_JOIN\_COL (I\_JOIN:POS) |
| **30** | KRM | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | PK\_JOIN\_COL (I\_JOIN:I\_COL\_FK) |
| **31** | KRM | SNP\_KEY | KEY\_FK1 (I\_TABLE) | AK\_KEY (I\_TABLE:KEY\_NAME) |
| **32** | KRM | SNP\_KEY\_COL | KEY\_COL\_FK1 (I\_KEY) | PK\_KEY\_COL (I\_KEY:I\_COL) |
| **33** | KRM | SNP\_LINE\_TRT | LINE\_TRT\_FK1 (I\_TRT) | PK\_LINE\_TRT (I\_TRT:ORD\_TRT) |
| **34** | KRM | SNP\_LINE\_TRT  \_UE | LINE\_TRT\_UE\_FK1 (I\_USER\_EXIT) | PK\_LINE\_TRT\_UE (I\_USER\_EXIT:I\_TRT:ORD\_TRT) |
| **35** | KRM | SNP\_LPI\_EXC\_L  OG | LPI\_ELOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_EXC\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:I\_LP\_STEP\_EXCEPT  ) |
| **36** | KRM | SNP\_LPI\_RUN | LPI\_RUN\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_RUN (I\_LP\_INST:NB\_RUN) |
| **37** | KRM | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_EXC\_FK (I\_LP\_INST:I\_LP\_STEP\_EXCEPT) |
| **38** | KRM | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_STEP\_FK (I\_LP\_INST:PAR\_I\_LP\_STEP) |
| **39** | KRM | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_VAR\_FK (I\_LP\_INST:VAR\_NAME) |
| **40** | KRM | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_STEP (I\_LP\_INST:I\_LP\_STEP) |
| **41** | KRM | SNP\_LPI\_STEP\_  LOG | LPI\_SLOG\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_LOG (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) |
| **42** | KRM | SNP\_LPI\_STEP\_  VAR | LPI\_SVAR\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_VAR  (I\_LP\_INST:I\_LP\_STEP:VAR\_NAME) |
| **43** | KRM | SNP\_LPI\_VAR | LPI\_VAR\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_VAR (I\_LP\_INST:VAR\_NAME) |
| **44** | KRM | SNP\_LPI\_VAR\_  LOG | LPI\_VLOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_VAR\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:VAR\_NAME) |
| **45** | KRM | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_EXC\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP\_EXCEPT) |
| **46** | KRM | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_STEP\_FK  (I\_LOAD\_PLAN:PAR\_I\_LP\_STEP) |
| **47** | KRM | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_VAR\_FK (I\_LOAD\_PLAN:VAR\_NAME) |
| **48** | KRM | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_STEP (I\_LOAD\_PLAN:I\_LP\_STEP) |
| **49** | KRM | SNP\_LP\_STEP\_  VAR | LP\_STVAR\_STEP\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP) | PK\_LP\_STEP\_VAR  (I\_LOAD\_PLAN:I\_LP\_STEP:VAR\_NAME) |
| **50** | KRM | SNP\_LP\_VAR | LP\_VAR\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_VAR (I\_LOAD\_PLAN:VAR\_NAME) |

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| **51** | KRM | SNP\_MISSING\_  REF | SNP\_MREF\_FK3 (ID\_OBJECT\_PK) | PK\_SNP\_MISSING\_REF  (ID\_OBJECT\_PK:ID\_OBJECT\_FK:REF\_KEY\_NAME) |
| **52** | KRM | SNP\_MOD\_FOL  DER | MOD\_FOLDER\_FK1  (PAR\_I\_MOD\_FOLDER) | AK\_MOD\_FOLDER  (PAR\_I\_MOD\_FOLDER:MOD\_FOLDER\_NAME) |
| **53** | KRM | SNP\_OBJECT\_I  D\_COL | SNP\_OID\_COL\_FK2 (I\_OBJECT\_ID) | PK\_OBJECT\_ID\_COL (I\_OBJECT\_ID:COL\_ORDER) |
| **54** | KRM | SNP\_OBJ\_DIAG | SNP\_OBJ\_DIAG\_FK1 (I\_DIAGRAM) | PK\_SNP\_OBJ\_DIAG  (I\_DIAGRAM:I\_OBJECTS:I\_INSTANCE:SYN\_NUMB) |
| **55** | KRM | SNP\_PARAM\_L  PI\_RUN | LPIRPARAM\_LPIR\_FK  (I\_LP\_INST:NB\_RUN) | PK\_PARAM\_LPI\_RUN  (I\_LP\_INST:NB\_RUN:PARAM\_NAME) |
| **56** | KRM | SNP\_PARAM\_S  ESS | PARAM\_SESS\_FK (SESS\_NO) | PK\_PARAM\_SESS (SESS\_NO:PARAM\_NAME) |
| **57** | KRM | SNP\_PARTITIO  N | IX\_PARTITION\_TABLE (I\_TABLE) | AK\_PARTITION (I\_TABLE:PARTITION\_NAME) |
| **58** | KRM | SNP\_POP\_CON  STRAINT | POP\_CONSTRAINT\_FK1 (I\_POP) | PK\_POP\_CONSTRAINT  (I\_POP:CONST\_TYPE:CONST\_NAME) |
| **59** | KRM | SNP\_POP\_MAP  PING | PMAP\_PCOL\_FK (I\_POP\_COL) | PK\_POP\_MAPPING (I\_POP\_COL:I\_DATA\_SET) |
| **60** | KRM | SNP\_SCEN\_REP  ORT | SCEN\_REPORT\_FK1 (SCEN\_NO) | PK\_SCEN\_REPORT (SCEN\_NO:SCEN\_RUN\_NO) |
| **61** | KRM | SNP\_SCEN\_STE  P | SCEN\_STEP\_FK1 (SCEN\_NO) | PK\_SCEN\_STEP (SCEN\_NO:NNO) |
| **62** | KRM | SNP\_SCEN\_TAS  K | SCEN\_TASK\_FK1 (SCEN\_NO:NNO) | PK\_SCEN\_TASK (SCEN\_NO:NNO:SCEN\_TASK\_NO) |
| **63** | KRM | SNP\_SCEN\_TXT | SCEN\_TXT\_FK1  (SCEN\_NO:NNO:SCEN\_TASK\_NO) | PK\_SCEN\_TXT  (SCEN\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **64** | KRM | SNP\_SEQ\_SCEN | SEQ\_SCEN\_FK1 (SCEN\_NO) | PK\_SEQ\_SCEN (SCEN\_NO:SEQ\_NAME) |
| **65** | KRM | SNP\_SEQ\_SESS | SEQ\_SESS\_FK1 (SESS\_NO) | PK\_SEQ\_SESS (SESS\_NO:SEQ\_NAME) |
| **66** | KRM | SNP\_SESS\_STEP | SESS\_STEP\_FK1 (SESS\_NO) | PK\_SESS\_STEP (SESS\_NO:NNO) |
| **67** | KRM | SNP\_SESS\_TAS  K | SESS\_TASK\_FK1 (SESS\_NO:NNO) | PK\_SESS\_TASK (SESS\_NO:NNO:SCEN\_TASK\_NO) |
| **68** | KRM | SNP\_SESS\_TAS  K\_LS | SESS\_TASK\_LS\_FK  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_ NO) | PK\_SESS\_TASK\_LS  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_NO:SEQ\_NA ME) |
| **69** | KRM | SNP\_STATE2 | SNP\_STATE2\_FK1 (I\_GRP\_STATE) | AK\_SNP\_STATE (I\_GRP\_STATE:STATE\_CODE) |
| **70** | KRM | SNP\_STEP\_REP  ORT | STEP\_REPORT\_FK1  (SCEN\_NO:SCEN\_RUN\_NO) | PK\_STEP\_REPORT  (SCEN\_NO:SCEN\_RUN\_NO:NNO:NB\_RUN) |
| **71** | KRM | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | AK\_SMOD (I\_MOD:COD\_SMOD) |
| **72** | KRM | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | PK\_SUB\_MODEL (I\_MOD:I\_SMOD) |
| **73** | KRM | SNP\_TASK\_TXT | TASK\_TXT\_FK1  (SESS\_NO:NNO:SCEN\_TASK\_NO) | PK\_TASK\_TXT  (SESS\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **74** | KRM | SNP\_UE\_USED | UE\_USED\_FK2 (I\_USER\_EXIT) | PK\_UE\_USED  (I\_USER\_EXIT:I\_INSTANCE:I\_UE\_ORIG) |
| **75** | KRM | SNP\_USER\_EXI  T | USER\_EXIT\_FK1 (I\_TRT) | AK\_USER\_EXIT (I\_TRT:UE\_NAME) |
| **76** | KRM | SNP\_VAR | VAR\_FK1 (I\_PROJECT) | AK\_VAR (I\_PROJECT:VAR\_NAME) |
| **77** | KRM | SNP\_VAR\_PLA  N\_AGENT | VAR\_PLAN\_AGENT\_FK1  (I\_PLAN\_AGENT) | PK\_VAR\_PLAN\_AGENT  (I\_PLAN\_AGENT:VAR\_NAME) |
| **78** | KRM | SNP\_VAR\_SCE  N | VAR\_SCEN\_FK1 (SCEN\_NO) | PK\_VAR\_SCEN (SCEN\_NO:VAR\_NAME) |
| **79** | KRM | SNP\_VAR\_SESS | VAR\_SESS\_FK1 (SESS\_NO) | PK\_VAR\_SESS (SESS\_NO:VAR\_NAME) |
| **80** | KRM\_BIPL  ATFORM | CALCMGRDEP  LOYDETAILS | IDXCALCMGRDEPLOYDETAILS1  (OBJECTID:OBJECTTYPE) | UKCALCMGRDEPLOYDETAILS1  (OBJECTID:OBJECTTYPE:APPLICATIONID:APPLIC  ATION:APPLICATIONTYPE) |
| **81** | KRM\_BIPL | CALCMGROBJE | IDXCALCMGROBJECTLINKS1 | UKCALCMGROBJECTLINKS1 |

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|  | ATFORM | CTLINKS | (PARENTID:PARENTTYPE) | (PARENTID:PARENTTYPE:CHILDID:CHILDTYPE:C  HILDINDEX) |
| **82** | KRM\_BIPL  ATFORM | QRTZ\_FIRED\_T  RIGGERS | IDX\_QRTZ\_FT\_TRIG\_NAME  (TRIGGER\_NAME) | IDX\_QRTZ\_FT\_TRIG\_NM\_GP  (TRIGGER\_NAME:TRIGGER\_GROUP) |
| **83** | KRM\_BIPL  ATFORM | QRTZ\_TRIGGER  S | IDX\_QRTZ\_T\_NEXT\_FIRE\_TIME  (NEXT\_FIRE\_TIME) | IDX\_QRTZ\_T\_NFT\_ST  (NEXT\_FIRE\_TIME:TRIGGER\_STATE) |
| **84** | KRM\_WOR  K\_REPO | SNP\_COL | COL\_FK1 (I\_TABLE) | AK\_COL (I\_TABLE:COL\_NAME) |
| **85** | KRM\_WOR  K\_REPO | SNP\_COND | COND\_FK1 (I\_TABLE) | AK\_COND (I\_TABLE:COND\_NAME) |
| **86** | KRM\_WOR  K\_REPO | SNP\_DIAG\_PAR  AM | SNP\_DIAG\_PARAM\_FK1 (I\_DIAGRAM) | PK\_SNP\_DIAG\_PARAM  (I\_DIAGRAM:PARAM\_NAME) |
| **87** | KRM\_WOR  K\_REPO | SNP\_GRP\_STAT  E | SNP\_GRP\_STATE\_FK1 (I\_PROJECT) | AK\_SNP\_GRP\_STATE  (I\_PROJECT:GRP\_STATE\_CODE) |
| **88** | KRM\_WOR  K\_REPO | SNP\_JOIN | JOIN\_FK1 (I\_TABLE\_FK) | AK\_JOIN (I\_TABLE\_FK:FK\_NAME) |
| **89** | KRM\_WOR  K\_REPO | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | AK\_JOIN\_COL (I\_JOIN:POS) |
| **90** | KRM\_WOR  K\_REPO | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | PK\_JOIN\_COL (I\_JOIN:I\_COL\_FK) |
| **91** | KRM\_WOR  K\_REPO | SNP\_KEY | KEY\_FK1 (I\_TABLE) | AK\_KEY (I\_TABLE:KEY\_NAME) |
| **92** | KRM\_WOR  K\_REPO | SNP\_KEY\_COL | KEY\_COL\_FK1 (I\_KEY) | PK\_KEY\_COL (I\_KEY:I\_COL) |
| **93** | KRM\_WOR  K\_REPO | SNP\_LINE\_TRT | LINE\_TRT\_FK1 (I\_TRT) | PK\_LINE\_TRT (I\_TRT:ORD\_TRT) |
| **94** | KRM\_WOR  K\_REPO | SNP\_LINE\_TRT  \_UE | LINE\_TRT\_UE\_FK1 (I\_USER\_EXIT) | PK\_LINE\_TRT\_UE (I\_USER\_EXIT:I\_TRT:ORD\_TRT) |
| **95** | KRM\_WOR  K\_REPO | SNP\_LPI\_EXC\_L  OG | LPI\_ELOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_EXC\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:I\_LP\_STEP\_EXCEPT  ) |
| **96** | KRM\_WOR  K\_REPO | SNP\_LPI\_RUN | LPI\_RUN\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_RUN (I\_LP\_INST:NB\_RUN) |
| **97** | KRM\_WOR  K\_REPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_EXC\_FK (I\_LP\_INST:I\_LP\_STEP\_EXCEPT) |
| **98** | KRM\_WOR  K\_REPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_STEP\_FK (I\_LP\_INST:PAR\_I\_LP\_STEP) |
| **99** | KRM\_WOR  K\_REPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_VAR\_FK (I\_LP\_INST:VAR\_NAME) |
| **100** | KRM\_WOR  K\_REPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_STEP (I\_LP\_INST:I\_LP\_STEP) |
| **101** | KRM\_WOR  K\_REPO | SNP\_LPI\_STEP\_  LOG | LPI\_SLOG\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_LOG (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) |
| **102** | KRM\_WOR  K\_REPO | SNP\_LPI\_STEP\_  VAR | LPI\_SVAR\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_VAR  (I\_LP\_INST:I\_LP\_STEP:VAR\_NAME) |
| **103** | KRM\_WOR  K\_REPO | SNP\_LPI\_VAR | LPI\_VAR\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_VAR (I\_LP\_INST:VAR\_NAME) |
| **104** | KRM\_WOR  K\_REPO | SNP\_LPI\_VAR\_  LOG | LPI\_VLOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_VAR\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:VAR\_NAME) |
| **105** | KRM\_WOR  K\_REPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_EXC\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP\_EXCEPT) |
| **106** | KRM\_WOR  K\_REPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_STEP\_FK  (I\_LOAD\_PLAN:PAR\_I\_LP\_STEP) |
| **107** | KRM\_WOR  K\_REPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_VAR\_FK (I\_LOAD\_PLAN:VAR\_NAME) |
| **108** | KRM\_WOR  K\_REPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_STEP (I\_LOAD\_PLAN:I\_LP\_STEP) |
| **109** | KRM\_WOR  K\_REPO | SNP\_LP\_STEP\_  VAR | LP\_STVAR\_STEP\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP) | PK\_LP\_STEP\_VAR  (I\_LOAD\_PLAN:I\_LP\_STEP:VAR\_NAME) |

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| **110** | KRM\_WOR  K\_REPO | SNP\_LP\_VAR | LP\_VAR\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_VAR (I\_LOAD\_PLAN:VAR\_NAME) |
| **111** | KRM\_WOR  K\_REPO | SNP\_MISSING\_  REF | SNP\_MREF\_FK3 (ID\_OBJECT\_PK) | PK\_SNP\_MISSING\_REF  (ID\_OBJECT\_PK:ID\_OBJECT\_FK:REF\_KEY\_NAME) |
| **112** | KRM\_WOR  K\_REPO | SNP\_MOD\_FOL  DER | MOD\_FOLDER\_FK1  (PAR\_I\_MOD\_FOLDER) | AK\_MOD\_FOLDER  (PAR\_I\_MOD\_FOLDER:MOD\_FOLDER\_NAME) |
| **113** | KRM\_WOR  K\_REPO | SNP\_OBJECT\_I  D\_COL | SNP\_OID\_COL\_FK2 (I\_OBJECT\_ID) | PK\_OBJECT\_ID\_COL (I\_OBJECT\_ID:COL\_ORDER) |
| **114** | KRM\_WOR  K\_REPO | SNP\_OBJ\_DIAG | SNP\_OBJ\_DIAG\_FK1 (I\_DIAGRAM) | PK\_SNP\_OBJ\_DIAG  (I\_DIAGRAM:I\_OBJECTS:I\_INSTANCE:SYN\_NUMB) |
| **115** | KRM\_WOR  K\_REPO | SNP\_PARAM\_L  PI\_RUN | LPIRPARAM\_LPIR\_FK  (I\_LP\_INST:NB\_RUN) | PK\_PARAM\_LPI\_RUN  (I\_LP\_INST:NB\_RUN:PARAM\_NAME) |
| **116** | KRM\_WOR  K\_REPO | SNP\_PARAM\_S  ESS | PARAM\_SESS\_FK (SESS\_NO) | PK\_PARAM\_SESS (SESS\_NO:PARAM\_NAME) |
| **117** | KRM\_WOR  K\_REPO | SNP\_PARTITIO  N | IX\_PARTITION\_TABLE (I\_TABLE) | AK\_PARTITION (I\_TABLE:PARTITION\_NAME) |
| **118** | KRM\_WOR  K\_REPO | SNP\_POP\_CON  STRAINT | POP\_CONSTRAINT\_FK1 (I\_POP) | PK\_POP\_CONSTRAINT  (I\_POP:CONST\_TYPE:CONST\_NAME) |
| **119** | KRM\_WOR  K\_REPO | SNP\_POP\_MAP  PING | PMAP\_PCOL\_FK (I\_POP\_COL) | PK\_POP\_MAPPING (I\_POP\_COL:I\_DATA\_SET) |
| **120** | KRM\_WOR  K\_REPO | SNP\_SCEN\_REP  ORT | SCEN\_REPORT\_FK1 (SCEN\_NO) | PK\_SCEN\_REPORT (SCEN\_NO:SCEN\_RUN\_NO) |
| **121** | KRM\_WOR  K\_REPO | SNP\_SCEN\_STE  P | SCEN\_STEP\_FK1 (SCEN\_NO) | PK\_SCEN\_STEP (SCEN\_NO:NNO) |
| **122** | KRM\_WOR  K\_REPO | SNP\_SCEN\_TAS  K | SCEN\_TASK\_FK1 (SCEN\_NO:NNO) | PK\_SCEN\_TASK (SCEN\_NO:NNO:SCEN\_TASK\_NO) |
| **123** | KRM\_WOR  K\_REPO | SNP\_SCEN\_TXT | SCEN\_TXT\_FK1  (SCEN\_NO:NNO:SCEN\_TASK\_NO) | PK\_SCEN\_TXT  (SCEN\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **124** | KRM\_WOR  K\_REPO | SNP\_SEQ\_SCEN | SEQ\_SCEN\_FK1 (SCEN\_NO) | PK\_SEQ\_SCEN (SCEN\_NO:SEQ\_NAME) |
| **125** | KRM\_WOR  K\_REPO | SNP\_SEQ\_SESS | SEQ\_SESS\_FK1 (SESS\_NO) | PK\_SEQ\_SESS (SESS\_NO:SEQ\_NAME) |
| **126** | KRM\_WOR  K\_REPO | SNP\_SESS\_STEP | SESS\_STEP\_FK1 (SESS\_NO) | PK\_SESS\_STEP (SESS\_NO:NNO) |
| **127** | KRM\_WOR  K\_REPO | SNP\_SESS\_TAS  K | SESS\_TASK\_FK1 (SESS\_NO:NNO) | PK\_SESS\_TASK (SESS\_NO:NNO:SCEN\_TASK\_NO) |
| **128** | KRM\_WOR  K\_REPO | SNP\_SESS\_TAS  K\_LS | SESS\_TASK\_LS\_FK  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_ NO) | PK\_SESS\_TASK\_LS  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_NO:SEQ\_NA ME) |
| **129** | KRM\_WOR  K\_REPO | SNP\_STATE2 | SNP\_STATE2\_FK1 (I\_GRP\_STATE) | AK\_SNP\_STATE (I\_GRP\_STATE:STATE\_CODE) |
| **130** | KRM\_WOR  K\_REPO | SNP\_STEP\_REP  ORT | STEP\_REPORT\_FK1  (SCEN\_NO:SCEN\_RUN\_NO) | PK\_STEP\_REPORT  (SCEN\_NO:SCEN\_RUN\_NO:NNO:NB\_RUN) |
| **131** | KRM\_WOR  K\_REPO | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | AK\_SMOD (I\_MOD:COD\_SMOD) |
| **132** | KRM\_WOR  K\_REPO | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | PK\_SUB\_MODEL (I\_MOD:I\_SMOD) |
| **133** | KRM\_WOR  K\_REPO | SNP\_TASK\_TXT | TASK\_TXT\_FK1  (SESS\_NO:NNO:SCEN\_TASK\_NO) | PK\_TASK\_TXT  (SESS\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **134** | KRM\_WOR  K\_REPO | SNP\_UE\_USED | UE\_USED\_FK2 (I\_USER\_EXIT) | PK\_UE\_USED  (I\_USER\_EXIT:I\_INSTANCE:I\_UE\_ORIG) |
| **135** | KRM\_WOR  K\_REPO | SNP\_USER\_EXI  T | USER\_EXIT\_FK1 (I\_TRT) | AK\_USER\_EXIT (I\_TRT:UE\_NAME) |
| **136** | KRM\_WOR  K\_REPO | SNP\_VAR | VAR\_FK1 (I\_PROJECT) | AK\_VAR (I\_PROJECT:VAR\_NAME) |
| **137** | KRM\_WOR  K\_REPO | SNP\_VAR\_PLA  N\_AGENT | VAR\_PLAN\_AGENT\_FK1  (I\_PLAN\_AGENT) | PK\_VAR\_PLAN\_AGENT  (I\_PLAN\_AGENT:VAR\_NAME) |

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| **138** | KRM\_WOR  K\_REPO | SNP\_VAR\_SCE  N | VAR\_SCEN\_FK1 (SCEN\_NO) | PK\_VAR\_SCEN (SCEN\_NO:VAR\_NAME) |
| **139** | KRM\_WOR  K\_REPO | SNP\_VAR\_SESS | VAR\_SESS\_FK1 (SESS\_NO) | PK\_VAR\_SESS (SESS\_NO:VAR\_NAME) |
| **140** | TCB\_BIPLA  TFORM | CALCMGRDEP  LOYDETAILS | IDXCALCMGRDEPLOYDETAILS1  (OBJECTID:OBJECTTYPE) | UKCALCMGRDEPLOYDETAILS1  (OBJECTID:OBJECTTYPE:APPLICATIONID:APPLIC  ATION:APPLICATIONTYPE) |
| **141** | TCB\_BIPLA  TFORM | CALCMGROBJE  CTLINKS | IDXCALCMGROBJECTLINKS1  (PARENTID:PARENTTYPE) | UKCALCMGROBJECTLINKS1  (PARENTID:PARENTTYPE:CHILDID:CHILDTYPE:C HILDINDEX) |
| **142** | TCB\_BIPLA  TFORM | QRTZ\_FIRED\_T  RIGGERS | IDX\_QRTZ\_FT\_TRIG\_NAME  (TRIGGER\_NAME) | IDX\_QRTZ\_FT\_TRIG\_NM\_GP  (TRIGGER\_NAME:TRIGGER\_GROUP) |
| **143** | TCB\_BIPLA  TFORM | QRTZ\_TRIGGER  S | IDX\_QRTZ\_T\_NEXT\_FIRE\_TIME  (NEXT\_FIRE\_TIME) | IDX\_QRTZ\_T\_NFT\_ST  (NEXT\_FIRE\_TIME:TRIGGER\_STATE) |
| **144** | TCB\_DWH\_  HOMEBAN  KING | PLSQL\_PROFIL  ER\_DATA | PLSQL\_PROFILER\_DINDEX  (RUNID:UNIT\_NUMBER) | PK\_PLSQL\_PROFILER\_DATA  (RUNID:UNIT\_NUMBER:LINE#) |
| **145** | TCB\_DWH\_  VAS | MCO\_TCB\_MM  \_DETAILS | MCO\_TCB\_MM\_DETAILS\_ACC  (APPL\_ID) | MCO\_TCB\_MM\_DETAILS\_ALL  (APPL\_ID:YPHANHE:ASSET\_TYPE:YCCY:MCO\_SE Q\_ID) |
| **146** | TCB\_DWH\_  VAS | MCO\_TCB\_NE  W\_DAILY | IDX\_MCO\_NEW\_DAILY\_YM  (YEARMONTH) | IDX\_MCO\_DAILY\_YMONTH\_YTK  (YEARMONTH:YTAIKHOAN) |
| **147** | TCB\_DWH\_  VAS | R312\_TAB11F | IDX\_R312TAB11F\_MTH (MTH) | IDX\_R312\_TAB11F\_002 (MTH:ORDER\_) |
| **148** | TCB\_DWH\_  VAS | R\_TBL\_OT\_0001  \_DATA | IDX\_R\_TBL\_OT\_0001\_3  (BOOKING\_DATE:INPUTTER) | IDX\_R\_TBL\_OT\_0001\_1  (BOOKING\_DATE:INPUTTER:DEPARTMENT\_COD  E:COMPANY\_USER:COMPANY\_HACHTOAN) |
| **149** | TCB\_DWH\_  VAS | TMP\_TBL\_CIC\_  CMS\_COLLECTI  ON\_CB | IDX\_TMP\_TBL\_CIC\_CMS\_COLL\_CB  (ACCOUNT\_NUMBER) | IDX\_TMP\_TBL\_CIC\_CMS\_0106  (ACCOUNT\_NUMBER:CARD\_NUMBER) |
| **150** | TCB\_ETL\_R  EPO | SNP\_ACTION | SNP\_ACTION\_FK1 (I\_GRP\_ACTION) | AK\_ACTION (I\_GRP\_ACTION:ACTION\_NAME) |
| **151** | TCB\_ETL\_R  EPO | SNP\_ALLOC\_A  GENT | ALLOC\_AGENT\_FK1 (I\_CONTEXT) | PK\_ALLOC\_AGENT (I\_CONTEXT:I\_LAGENT) |
| **152** | TCB\_ETL\_R  EPO | SNP\_COL | COL\_FK1 (I\_TABLE) | AK\_COL (I\_TABLE:COL\_NAME) |
| **153** | TCB\_ETL\_R  EPO | SNP\_COND | COND\_FK1 (I\_TABLE) | AK\_COND (I\_TABLE:COND\_NAME) |
| **154** | TCB\_ETL\_R  EPO | SNP\_CONNECT  \_PROP | CONNECT\_PROP\_FK1 (I\_CONNECT) | PK\_CONNECT\_PROP (I\_CONNECT:PROP\_KEY) |
| **155** | TCB\_ETL\_R  EPO | SNP\_CONV\_DT | CONV\_DT\_FK1 (SRC\_DT) | PK\_CONV\_DT (SRC\_DT:I\_TARG\_TECHNO) |
| **156** | TCB\_ETL\_R  EPO | SNP\_DATASOU  RCE | DS\_CONNECT\_FK (I\_CONNECT) | PK\_DATASOURCE (I\_CONNECT:I\_AGENT) |
| **157** | TCB\_ETL\_R  EPO | SNP\_DIAG\_PAR  AM | SNP\_DIAG\_PARAM\_FK1 (I\_DIAGRAM) | PK\_SNP\_DIAG\_PARAM  (I\_DIAGRAM:PARAM\_NAME) |
| **158** | TCB\_ETL\_R  EPO | SNP\_DT | DT\_FK1 (I\_TECHNO) | AK\_DT1 (I\_TECHNO:DT\_DRIVER) |
| **159** | TCB\_ETL\_R  EPO | SNP\_DT | DT\_FK1 (I\_TECHNO) | AK\_DT2 (I\_TECHNO:DT\_SOURCE) |
| **160** | TCB\_ETL\_R  EPO | SNP\_GRP\_ACTI  ON | GRP\_ACTION\_FK1 (I\_TECHNO) | AK\_GRP\_ACTION (I\_TECHNO:GRP\_NAME) |
| **161** | TCB\_ETL\_R  EPO | SNP\_GRP\_ACTI  ON | GRP\_ACTION\_FK1 (I\_TECHNO) | AK\_GRP\_ACTION2 (I\_TECHNO:GRP\_CODE) |
| **162** | TCB\_ETL\_R  EPO | SNP\_GRP\_STAT  E | SNP\_GRP\_STATE\_FK1 (I\_PROJECT) | AK\_SNP\_GRP\_STATE  (I\_PROJECT:GRP\_STATE\_CODE) |
| **163** | TCB\_ETL\_R  EPO | SNP\_HOST\_MO  D | SNP\_HM\_FK1 (I\_HOST) | PK\_SNP\_HOST\_MOD2 (I\_HOST:I\_MODULE) |
| **164** | TCB\_ETL\_R | SNP\_INDEX\_TY | IDXTYPE\_TEC\_FK1 (I\_TECHNO) | AK\_INDEX\_TYPE (I\_TECHNO:INDEX\_TYPE\_CODE) |

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|  | EPO | PE |  |  |
| **165** | TCB\_ETL\_R  EPO | SNP\_INST\_OBJ | INST\_OBJ\_FK1 (I\_OBJECTS) | PK\_INST\_OBJ (I\_OBJECTS:I\_INSTANCE) |
| **166** | TCB\_ETL\_R  EPO | SNP\_JOIN | JOIN\_FK1 (I\_TABLE\_FK) | AK\_JOIN (I\_TABLE\_FK:FK\_NAME) |
| **167** | TCB\_ETL\_R  EPO | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | AK\_JOIN\_COL (I\_JOIN:POS) |
| **168** | TCB\_ETL\_R  EPO | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | PK\_JOIN\_COL (I\_JOIN:I\_COL\_FK) |
| **169** | TCB\_ETL\_R  EPO | SNP\_KEY | KEY\_FK1 (I\_TABLE) | AK\_KEY (I\_TABLE:KEY\_NAME) |
| **170** | TCB\_ETL\_R  EPO | SNP\_KEY\_COL | KEY\_COL\_FK1 (I\_KEY) | PK\_KEY\_COL (I\_KEY:I\_COL) |
| **171** | TCB\_ETL\_R  EPO | SNP\_LANG\_TE  CHNO | LANG\_TECHNO\_FK2 (I\_TECHNO) | PK\_LANG\_TECHNO (I\_TECHNO:I\_LANG) |
| **172** | TCB\_ETL\_R  EPO | SNP\_LB\_AGEN  T | SNP\_LB\_AGT\_FK1 (I\_MASTER) | PK\_LB\_AGENT (I\_MASTER:I\_SLAVE) |
| **173** | TCB\_ETL\_R  EPO | SNP\_LE\_TECH  NO | LE\_TECHNO\_FK1 (I\_LANG\_ELT) | PK\_LE\_TECHNO (I\_LANG\_ELT:I\_TECHNO) |
| **174** | TCB\_ETL\_R  EPO | SNP\_LINE\_ACT  ION | LINE\_ACTION\_FK1 (I\_ACTION) | PK\_LINE\_ACTION (I\_ACTION:ORD\_ACTION) |
| **175** | TCB\_ETL\_R  EPO | SNP\_LINE\_TRT | LINE\_TRT\_FK1 (I\_TRT) | PK\_LINE\_TRT (I\_TRT:ORD\_TRT) |
| **176** | TCB\_ETL\_R  EPO | SNP\_LINE\_TRT  \_UE | LINE\_TRT\_UE\_FK1 (I\_USER\_EXIT) | PK\_LINE\_TRT\_UE (I\_USER\_EXIT:I\_TRT:ORD\_TRT) |
| **177** | TCB\_ETL\_R  EPO | SNP\_LPI\_EXC\_L  OG | LPI\_ELOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_EXC\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:I\_LP\_STEP\_EXCEPT  ) |
| **178** | TCB\_ETL\_R  EPO | SNP\_LPI\_RUN | LPI\_RUN\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_RUN (I\_LP\_INST:NB\_RUN) |
| **179** | TCB\_ETL\_R  EPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_EXC\_FK (I\_LP\_INST:I\_LP\_STEP\_EXCEPT) |
| **180** | TCB\_ETL\_R  EPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_STEP\_FK (I\_LP\_INST:PAR\_I\_LP\_STEP) |
| **181** | TCB\_ETL\_R  EPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_VAR\_FK (I\_LP\_INST:VAR\_NAME) |
| **182** | TCB\_ETL\_R  EPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_STEP (I\_LP\_INST:I\_LP\_STEP) |
| **183** | TCB\_ETL\_R  EPO | SNP\_LPI\_STEP\_  LOG | LPI\_SLOG\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_LOG (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) |
| **184** | TCB\_ETL\_R  EPO | SNP\_LPI\_STEP\_  VAR | LPI\_SVAR\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_VAR  (I\_LP\_INST:I\_LP\_STEP:VAR\_NAME) |
| **185** | TCB\_ETL\_R  EPO | SNP\_LPI\_VAR | LPI\_VAR\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_VAR (I\_LP\_INST:VAR\_NAME) |
| **186** | TCB\_ETL\_R  EPO | SNP\_LPI\_VAR\_  LOG | LPI\_VLOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_VAR\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:VAR\_NAME) |
| **187** | TCB\_ETL\_R  EPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_EXC\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP\_EXCEPT) |
| **188** | TCB\_ETL\_R  EPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_STEP\_FK  (I\_LOAD\_PLAN:PAR\_I\_LP\_STEP) |
| **189** | TCB\_ETL\_R  EPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_VAR\_FK (I\_LOAD\_PLAN:VAR\_NAME) |
| **190** | TCB\_ETL\_R  EPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_STEP (I\_LOAD\_PLAN:I\_LP\_STEP) |
| **191** | TCB\_ETL\_R  EPO | SNP\_LP\_STEP\_  VAR | LP\_STVAR\_STEP\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP) | PK\_LP\_STEP\_VAR  (I\_LOAD\_PLAN:I\_LP\_STEP:VAR\_NAME) |
| **192** | TCB\_ETL\_R  EPO | SNP\_LP\_VAR | LP\_VAR\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_VAR (I\_LOAD\_PLAN:VAR\_NAME) |
| **193** | TCB\_ETL\_R | SNP\_MISSING\_ | SNP\_MREF\_FK3 (ID\_OBJECT\_PK) | PK\_SNP\_MISSING\_REF |

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|  | EPO | REF |  | (ID\_OBJECT\_PK:ID\_OBJECT\_FK:REF\_KEY\_NAME) |
| **194** | TCB\_ETL\_R  EPO | SNP\_MOD\_FOL  DER | MOD\_FOLDER\_FK1  (PAR\_I\_MOD\_FOLDER) | AK\_MOD\_FOLDER  (PAR\_I\_MOD\_FOLDER:MOD\_FOLDER\_NAME) |
| **195** | TCB\_ETL\_R  EPO | SNP\_MTXT\_PA  RT | MTXT\_PART\_FK1 (I\_TXT) | PK\_MTXT\_P (I\_TXT:TXT\_ORD) |
| **196** | TCB\_ETL\_R  EPO | SNP\_OBJECT\_I  D\_COL | SNP\_OID\_COL\_FK2 (I\_OBJECT\_ID) | PK\_OBJECT\_ID\_COL (I\_OBJECT\_ID:COL\_ORDER) |
| **197** | TCB\_ETL\_R  EPO | SNP\_OBJ\_DIAG | SNP\_OBJ\_DIAG\_FK1 (I\_DIAGRAM) | PK\_SNP\_OBJ\_DIAG  (I\_DIAGRAM:I\_OBJECTS:I\_INSTANCE:SYN\_NUMB) |
| **198** | TCB\_ETL\_R  EPO | SNP\_PARAM\_L  PI\_RUN | LPIRPARAM\_LPIR\_FK  (I\_LP\_INST:NB\_RUN) | PK\_PARAM\_LPI\_RUN  (I\_LP\_INST:NB\_RUN:PARAM\_NAME) |
| **199** | TCB\_ETL\_R  EPO | SNP\_PARAM\_S  ESS | PARAM\_SESS\_FK (SESS\_NO) | PK\_PARAM\_SESS (SESS\_NO:PARAM\_NAME) |
| **200** | TCB\_ETL\_R  EPO | SNP\_PARTITIO  N | IX\_PARTITION\_TABLE (I\_TABLE) | AK\_PARTITION (I\_TABLE:PARTITION\_NAME) |
| **201** | TCB\_ETL\_R  EPO | SNP\_POP\_CON  STRAINT | POP\_CONSTRAINT\_FK1 (I\_POP) | PK\_POP\_CONSTRAINT  (I\_POP:CONST\_TYPE:CONST\_NAME) |
| **202** | TCB\_ETL\_R  EPO | SNP\_POP\_MAP  PING | PMAP\_PCOL\_FK (I\_POP\_COL) | PK\_POP\_MAPPING (I\_POP\_COL:I\_DATA\_SET) |
| **203** | TCB\_ETL\_R  EPO | SNP\_PROF\_ME  TH | PROF\_METH\_FK1 (I\_PROF) | PK\_PROF\_METH (I\_PROF:I\_METH) |
| **204** | TCB\_ETL\_R  EPO | SNP\_PSCHEMA | PSCHEMA\_FK1 (I\_CONNECT) | AK\_PSCHEMA  (I\_CONNECT:CATALOG\_NAME:SCHEMA\_NAME) |
| **205** | TCB\_ETL\_R  EPO | SNP\_PSCHEMA  \_CONT | PSCHEMA\_CONT\_FK1 (I\_CONTEXT) | PK\_PSCHEMA\_CONT (I\_CONTEXT:I\_LSCHEMA) |
| **206** | TCB\_ETL\_R  EPO | SNP\_SCEN\_REP  ORT | SCEN\_REPORT\_FK1 (SCEN\_NO) | PK\_SCEN\_REPORT (SCEN\_NO:SCEN\_RUN\_NO) |
| **207** | TCB\_ETL\_R  EPO | SNP\_SCEN\_STE  P | SCEN\_STEP\_FK1 (SCEN\_NO) | PK\_SCEN\_STEP (SCEN\_NO:NNO) |
| **208** | TCB\_ETL\_R  EPO | SNP\_SCEN\_TAS  K | SCEN\_TASK\_FK1 (SCEN\_NO:NNO) | PK\_SCEN\_TASK (SCEN\_NO:NNO:SCEN\_TASK\_NO) |
| **209** | TCB\_ETL\_R  EPO | SNP\_SCEN\_TXT | SCEN\_TXT\_FK1  (SCEN\_NO:NNO:SCEN\_TASK\_NO) | PK\_SCEN\_TXT  (SCEN\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **210** | TCB\_ETL\_R  EPO | SNP\_SEQ\_SCEN | SEQ\_SCEN\_FK1 (SCEN\_NO) | PK\_SEQ\_SCEN (SCEN\_NO:SEQ\_NAME) |
| **211** | TCB\_ETL\_R  EPO | SNP\_SEQ\_SESS | SEQ\_SESS\_FK1 (SESS\_NO) | PK\_SEQ\_SESS (SESS\_NO:SEQ\_NAME) |
| **212** | TCB\_ETL\_R  EPO | SNP\_SESS\_STEP | SESS\_STEP\_FK1 (SESS\_NO) | PK\_SESS\_STEP (SESS\_NO:NNO) |
| **213** | TCB\_ETL\_R  EPO | SNP\_SESS\_TAS  K | SESS\_TASK\_FK1 (SESS\_NO:NNO) | PK\_SESS\_TASK (SESS\_NO:NNO:SCEN\_TASK\_NO) |
| **214** | TCB\_ETL\_R  EPO | SNP\_SESS\_TAS  K\_LS | SESS\_TASK\_LS\_FK  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_ NO) | PK\_SESS\_TASK\_LS  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_NO:SEQ\_NA ME) |
| **215** | TCB\_ETL\_R  EPO | SNP\_STATE2 | SNP\_STATE2\_FK1 (I\_GRP\_STATE) | AK\_SNP\_STATE (I\_GRP\_STATE:STATE\_CODE) |
| **216** | TCB\_ETL\_R  EPO | SNP\_STEP\_REP  ORT | STEP\_REPORT\_FK1  (SCEN\_NO:SCEN\_RUN\_NO) | PK\_STEP\_REPORT  (SCEN\_NO:SCEN\_RUN\_NO:NNO:NB\_RUN) |
| **217** | TCB\_ETL\_R  EPO | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | AK\_SMOD (I\_MOD:COD\_SMOD) |
| **218** | TCB\_ETL\_R  EPO | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | PK\_SUB\_MODEL (I\_MOD:I\_SMOD) |
| **219** | TCB\_ETL\_R  EPO | SNP\_TASK\_TXT | TASK\_TXT\_FK1  (SESS\_NO:NNO:SCEN\_TASK\_NO) | PK\_TASK\_TXT  (SESS\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **220** | TCB\_ETL\_R  EPO | SNP\_UE\_USED | UE\_USED\_FK2 (I\_USER\_EXIT) | PK\_UE\_USED  (I\_USER\_EXIT:I\_INSTANCE:I\_UE\_ORIG) |
| **221** | TCB\_ETL\_R | SNP\_USER\_EXI | USER\_EXIT\_FK1 (I\_TRT) | AK\_USER\_EXIT (I\_TRT:UE\_NAME) |

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|  | EPO | T |  |  |
| **222** | TCB\_ETL\_R  EPO | SNP\_USER\_ME  TH | USER\_METH\_FK1 (I\_WUSER) | PK\_USER\_METH (I\_WUSER:I\_METH) |
| **223** | TCB\_ETL\_R  EPO | SNP\_USER\_OBJ  \_METH | USER\_OBJ\_METH\_FK1 (I\_METH) | AK\_USER\_OBJ\_METH  (I\_METH:I\_WUSER:I\_CONTEXT:I\_OBJECTS:I\_INSTA NCE) |
| **224** | TCB\_ETL\_R  EPO | SNP\_USER\_PRO  F | USER\_PROF\_FK1 (I\_WUSER) | PK\_USER\_PROF (I\_WUSER:I\_PROF) |
| **225** | TCB\_ETL\_R  EPO | SNP\_VAR | VAR\_FK1 (I\_PROJECT) | AK\_VAR (I\_PROJECT:VAR\_NAME) |
| **226** | TCB\_ETL\_R  EPO | SNP\_VAR\_PLA  N\_AGENT | VAR\_PLAN\_AGENT\_FK1  (I\_PLAN\_AGENT) | PK\_VAR\_PLAN\_AGENT  (I\_PLAN\_AGENT:VAR\_NAME) |
| **227** | TCB\_ETL\_R  EPO | SNP\_VAR\_SCE  N | VAR\_SCEN\_FK1 (SCEN\_NO) | PK\_VAR\_SCEN (SCEN\_NO:VAR\_NAME) |
| **228** | TCB\_ETL\_R  EPO | SNP\_VAR\_SESS | VAR\_SESS\_FK1 (SESS\_NO) | PK\_VAR\_SESS (SESS\_NO:VAR\_NAME) |
| **229** | TCB\_LIVE | HBK\_BALANCE | IDX\_HBK\_BAL\_ACCT (ACCOUNT\_ID) | PK\_HBK\_BAL (ACCOUNT\_ID:CUST\_ID) |
| **230** | TCB\_LIVE | TBL\_SYNCT24\_  HBK\_BALANCE | IDX\_SYNCT24\_HBK\_BALANCE\_ACC  (ACCOUNT\_ID) | IDX\_SYNCT24\_HBK\_BALANCE\_AC\_CUS  (ACCOUNT\_ID:CUST\_ID) |
| **231** | TCB\_LIVE | TBL\_SYNCT24\_  HBK\_FMP\_ACC  OUNT | IDX\_SYNCT24\_HBK\_FMP\_ACC  (ACCOUNT\_ID) | IDX\_SYNCT24\_HBK\_FMP\_ACC\_CUS  (ACCOUNT\_ID:CUST\_ID) |
| **232** | TCB\_LIVE2  012 | HBK\_BALANCE | IDX\_HBK\_BAL\_ACCT (ACCOUNT\_ID) | PK\_HBK\_BAL (ACCOUNT\_ID:CUST\_ID) |
| **233** | TCB\_LIVE2  012 | STMT\_ENTRY | STMT\_ENTRY\_BOOKING\_DATE  (BOOKING\_DATE) | IDX\_FACT\_STMT\_ENTRY  (BOOKING\_DATE:CUSTOMER\_ID:PRODUCT\_CATE  GORY:COMPANY\_CODE:CURRENCY:ACCOUNT\_  OFFICER:ACCOUNT\_NUMBER:DEPARTMENT\_CO  DE:TRANSACTION\_CODE:TRANS\_REFERENCE) |
| **234** | TCB\_LIVE\_  REPO | SNP\_ACTION | SNP\_ACTION\_FK1 (I\_GRP\_ACTION) | AK\_ACTION (I\_GRP\_ACTION:ACTION\_NAME) |
| **235** | TCB\_LIVE\_  REPO | SNP\_ALLOC\_A  GENT | ALLOC\_AGENT\_FK1 (I\_CONTEXT) | PK\_ALLOC\_AGENT (I\_CONTEXT:I\_LAGENT) |
| **236** | TCB\_LIVE\_  REPO | SNP\_COL | COL\_FK1 (I\_TABLE) | AK\_COL (I\_TABLE:COL\_NAME) |
| **237** | TCB\_LIVE\_  REPO | SNP\_COND | COND\_FK1 (I\_TABLE) | AK\_COND (I\_TABLE:COND\_NAME) |
| **238** | TCB\_LIVE\_  REPO | SNP\_CONNECT  \_PROP | CONNECT\_PROP\_FK1 (I\_CONNECT) | PK\_CONNECT\_PROP (I\_CONNECT:PROP\_KEY) |
| **239** | TCB\_LIVE\_  REPO | SNP\_CONV\_DT | CONV\_DT\_FK1 (SRC\_DT) | PK\_CONV\_DT (SRC\_DT:I\_TARG\_TECHNO) |
| **240** | TCB\_LIVE\_  REPO | SNP\_DATASOU  RCE | DS\_CONNECT\_FK (I\_CONNECT) | PK\_DATASOURCE (I\_CONNECT:I\_AGENT) |
| **241** | TCB\_LIVE\_  REPO | SNP\_DIAG\_PAR  AM | SNP\_DIAG\_PARAM\_FK1 (I\_DIAGRAM) | PK\_SNP\_DIAG\_PARAM  (I\_DIAGRAM:PARAM\_NAME) |
| **242** | TCB\_LIVE\_  REPO | SNP\_DT | DT\_FK1 (I\_TECHNO) | AK\_DT1 (I\_TECHNO:DT\_DRIVER) |
| **243** | TCB\_LIVE\_  REPO | SNP\_DT | DT\_FK1 (I\_TECHNO) | AK\_DT2 (I\_TECHNO:DT\_SOURCE) |
| **244** | TCB\_LIVE\_  REPO | SNP\_GRP\_ACTI  ON | GRP\_ACTION\_FK1 (I\_TECHNO) | AK\_GRP\_ACTION (I\_TECHNO:GRP\_NAME) |
| **245** | TCB\_LIVE\_  REPO | SNP\_GRP\_ACTI  ON | GRP\_ACTION\_FK1 (I\_TECHNO) | AK\_GRP\_ACTION2 (I\_TECHNO:GRP\_CODE) |
| **246** | TCB\_LIVE\_  REPO | SNP\_GRP\_STAT  E | SNP\_GRP\_STATE\_FK1 (I\_PROJECT) | AK\_SNP\_GRP\_STATE  (I\_PROJECT:GRP\_STATE\_CODE) |
| **247** | TCB\_LIVE\_  REPO | SNP\_HOST\_MO  D | SNP\_HM\_FK1 (I\_HOST) | PK\_SNP\_HOST\_MOD2 (I\_HOST:I\_MODULE) |
| **248** | TCB\_LIVE\_  REPO | SNP\_INDEX\_TY  PE | IDXTYPE\_TEC\_FK1 (I\_TECHNO) | AK\_INDEX\_TYPE (I\_TECHNO:INDEX\_TYPE\_CODE) |

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| **249** | TCB\_LIVE\_  REPO | SNP\_INST\_OBJ | INST\_OBJ\_FK1 (I\_OBJECTS) | PK\_INST\_OBJ (I\_OBJECTS:I\_INSTANCE) |
| **250** | TCB\_LIVE\_  REPO | SNP\_JOIN | JOIN\_FK1 (I\_TABLE\_FK) | AK\_JOIN (I\_TABLE\_FK:FK\_NAME) |
| **251** | TCB\_LIVE\_  REPO | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | AK\_JOIN\_COL (I\_JOIN:POS) |
| **252** | TCB\_LIVE\_  REPO | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | PK\_JOIN\_COL (I\_JOIN:I\_COL\_FK) |
| **253** | TCB\_LIVE\_  REPO | SNP\_KEY | KEY\_FK1 (I\_TABLE) | AK\_KEY (I\_TABLE:KEY\_NAME) |
| **254** | TCB\_LIVE\_  REPO | SNP\_KEY\_COL | KEY\_COL\_FK1 (I\_KEY) | PK\_KEY\_COL (I\_KEY:I\_COL) |
| **255** | TCB\_LIVE\_  REPO | SNP\_LANG\_TE  CHNO | LANG\_TECHNO\_FK2 (I\_TECHNO) | PK\_LANG\_TECHNO (I\_TECHNO:I\_LANG) |
| **256** | TCB\_LIVE\_  REPO | SNP\_LB\_AGEN  T | SNP\_LB\_AGT\_FK1 (I\_MASTER) | PK\_LB\_AGENT (I\_MASTER:I\_SLAVE) |
| **257** | TCB\_LIVE\_  REPO | SNP\_LE\_TECH  NO | LE\_TECHNO\_FK1 (I\_LANG\_ELT) | PK\_LE\_TECHNO (I\_LANG\_ELT:I\_TECHNO) |
| **258** | TCB\_LIVE\_  REPO | SNP\_LINE\_ACT  ION | LINE\_ACTION\_FK1 (I\_ACTION) | PK\_LINE\_ACTION (I\_ACTION:ORD\_ACTION) |
| **259** | TCB\_LIVE\_  REPO | SNP\_LINE\_TRT | LINE\_TRT\_FK1 (I\_TRT) | PK\_LINE\_TRT (I\_TRT:ORD\_TRT) |
| **260** | TCB\_LIVE\_  REPO | SNP\_LINE\_TRT  \_UE | LINE\_TRT\_UE\_FK1 (I\_USER\_EXIT) | PK\_LINE\_TRT\_UE (I\_USER\_EXIT:I\_TRT:ORD\_TRT) |
| **261** | TCB\_LIVE\_  REPO | SNP\_LPI\_EXC\_L  OG | LPI\_ELOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_EXC\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:I\_LP\_STEP\_EXCEPT  ) |
| **262** | TCB\_LIVE\_  REPO | SNP\_LPI\_RUN | LPI\_RUN\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_RUN (I\_LP\_INST:NB\_RUN) |
| **263** | TCB\_LIVE\_  REPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_EXC\_FK (I\_LP\_INST:I\_LP\_STEP\_EXCEPT) |
| **264** | TCB\_LIVE\_  REPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_STEP\_FK (I\_LP\_INST:PAR\_I\_LP\_STEP) |
| **265** | TCB\_LIVE\_  REPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_VAR\_FK (I\_LP\_INST:VAR\_NAME) |
| **266** | TCB\_LIVE\_  REPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_STEP (I\_LP\_INST:I\_LP\_STEP) |
| **267** | TCB\_LIVE\_  REPO | SNP\_LPI\_STEP\_  LOG | LPI\_SLOG\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_LOG (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) |
| **268** | TCB\_LIVE\_  REPO | SNP\_LPI\_STEP\_  VAR | LPI\_SVAR\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_VAR  (I\_LP\_INST:I\_LP\_STEP:VAR\_NAME) |
| **269** | TCB\_LIVE\_  REPO | SNP\_LPI\_VAR | LPI\_VAR\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_VAR (I\_LP\_INST:VAR\_NAME) |
| **270** | TCB\_LIVE\_  REPO | SNP\_LPI\_VAR\_  LOG | LPI\_VLOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_VAR\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:VAR\_NAME) |
| **271** | TCB\_LIVE\_  REPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_EXC\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP\_EXCEPT) |
| **272** | TCB\_LIVE\_  REPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_STEP\_FK  (I\_LOAD\_PLAN:PAR\_I\_LP\_STEP) |
| **273** | TCB\_LIVE\_  REPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_VAR\_FK (I\_LOAD\_PLAN:VAR\_NAME) |
| **274** | TCB\_LIVE\_  REPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_STEP (I\_LOAD\_PLAN:I\_LP\_STEP) |
| **275** | TCB\_LIVE\_  REPO | SNP\_LP\_STEP\_  VAR | LP\_STVAR\_STEP\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP) | PK\_LP\_STEP\_VAR  (I\_LOAD\_PLAN:I\_LP\_STEP:VAR\_NAME) |
| **276** | TCB\_LIVE\_  REPO | SNP\_LP\_VAR | LP\_VAR\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_VAR (I\_LOAD\_PLAN:VAR\_NAME) |
| **277** | TCB\_LIVE\_  REPO | SNP\_MISSING\_  REF | SNP\_MREF\_FK3 (ID\_OBJECT\_PK) | PK\_SNP\_MISSING\_REF  (ID\_OBJECT\_PK:ID\_OBJECT\_FK:REF\_KEY\_NAME) |

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| **278** | TCB\_LIVE\_  REPO | SNP\_MOD\_FOL  DER | MOD\_FOLDER\_FK1  (PAR\_I\_MOD\_FOLDER) | AK\_MOD\_FOLDER  (PAR\_I\_MOD\_FOLDER:MOD\_FOLDER\_NAME) |
| **279** | TCB\_LIVE\_  REPO | SNP\_MTXT\_PA  RT | MTXT\_PART\_FK1 (I\_TXT) | PK\_MTXT\_P (I\_TXT:TXT\_ORD) |
| **280** | TCB\_LIVE\_  REPO | SNP\_OBJECT\_I  D\_COL | SNP\_OID\_COL\_FK2 (I\_OBJECT\_ID) | PK\_OBJECT\_ID\_COL (I\_OBJECT\_ID:COL\_ORDER) |
| **281** | TCB\_LIVE\_  REPO | SNP\_OBJ\_DIAG | SNP\_OBJ\_DIAG\_FK1 (I\_DIAGRAM) | PK\_SNP\_OBJ\_DIAG  (I\_DIAGRAM:I\_OBJECTS:I\_INSTANCE:SYN\_NUMB) |
| **282** | TCB\_LIVE\_  REPO | SNP\_PARAM\_L  PI\_RUN | LPIRPARAM\_LPIR\_FK  (I\_LP\_INST:NB\_RUN) | PK\_PARAM\_LPI\_RUN  (I\_LP\_INST:NB\_RUN:PARAM\_NAME) |
| **283** | TCB\_LIVE\_  REPO | SNP\_PARAM\_S  ESS | PARAM\_SESS\_FK (SESS\_NO) | PK\_PARAM\_SESS (SESS\_NO:PARAM\_NAME) |
| **284** | TCB\_LIVE\_  REPO | SNP\_PARTITIO  N | IX\_PARTITION\_TABLE (I\_TABLE) | AK\_PARTITION (I\_TABLE:PARTITION\_NAME) |
| **285** | TCB\_LIVE\_  REPO | SNP\_POP\_CON  STRAINT | POP\_CONSTRAINT\_FK1 (I\_POP) | PK\_POP\_CONSTRAINT  (I\_POP:CONST\_TYPE:CONST\_NAME) |
| **286** | TCB\_LIVE\_  REPO | SNP\_POP\_MAP  PING | PMAP\_PCOL\_FK (I\_POP\_COL) | PK\_POP\_MAPPING (I\_POP\_COL:I\_DATA\_SET) |
| **287** | TCB\_LIVE\_  REPO | SNP\_PROF\_ME  TH | PROF\_METH\_FK1 (I\_PROF) | PK\_PROF\_METH (I\_PROF:I\_METH) |
| **288** | TCB\_LIVE\_  REPO | SNP\_PSCHEMA | PSCHEMA\_FK1 (I\_CONNECT) | AK\_PSCHEMA  (I\_CONNECT:CATALOG\_NAME:SCHEMA\_NAME) |
| **289** | TCB\_LIVE\_  REPO | SNP\_PSCHEMA  \_CONT | PSCHEMA\_CONT\_FK1 (I\_CONTEXT) | PK\_PSCHEMA\_CONT (I\_CONTEXT:I\_LSCHEMA) |
| **290** | TCB\_LIVE\_  REPO | SNP\_SCEN\_REP  ORT | SCEN\_REPORT\_FK1 (SCEN\_NO) | PK\_SCEN\_REPORT (SCEN\_NO:SCEN\_RUN\_NO) |
| **291** | TCB\_LIVE\_  REPO | SNP\_SCEN\_STE  P | SCEN\_STEP\_FK1 (SCEN\_NO) | PK\_SCEN\_STEP (SCEN\_NO:NNO) |
| **292** | TCB\_LIVE\_  REPO | SNP\_SCEN\_TAS  K | SCEN\_TASK\_FK1 (SCEN\_NO:NNO) | PK\_SCEN\_TASK (SCEN\_NO:NNO:SCEN\_TASK\_NO) |
| **293** | TCB\_LIVE\_  REPO | SNP\_SCEN\_TXT | SCEN\_TXT\_FK1  (SCEN\_NO:NNO:SCEN\_TASK\_NO) | PK\_SCEN\_TXT  (SCEN\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **294** | TCB\_LIVE\_  REPO | SNP\_SEQ\_SCEN | SEQ\_SCEN\_FK1 (SCEN\_NO) | PK\_SEQ\_SCEN (SCEN\_NO:SEQ\_NAME) |
| **295** | TCB\_LIVE\_  REPO | SNP\_SEQ\_SESS | SEQ\_SESS\_FK1 (SESS\_NO) | PK\_SEQ\_SESS (SESS\_NO:SEQ\_NAME) |
| **296** | TCB\_LIVE\_  REPO | SNP\_SESS\_STEP | SESS\_STEP\_FK1 (SESS\_NO) | PK\_SESS\_STEP (SESS\_NO:NNO) |
| **297** | TCB\_LIVE\_  REPO | SNP\_SESS\_TAS  K | SESS\_TASK\_FK1 (SESS\_NO:NNO) | PK\_SESS\_TASK (SESS\_NO:NNO:SCEN\_TASK\_NO) |
| **298** | TCB\_LIVE\_  REPO | SNP\_SESS\_TAS  K\_LS | SESS\_TASK\_LS\_FK  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_ NO) | PK\_SESS\_TASK\_LS  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_NO:SEQ\_NA ME) |
| **299** | TCB\_LIVE\_  REPO | SNP\_STATE2 | SNP\_STATE2\_FK1 (I\_GRP\_STATE) | AK\_SNP\_STATE (I\_GRP\_STATE:STATE\_CODE) |
| **300** | TCB\_LIVE\_  REPO | SNP\_STEP\_REP  ORT | STEP\_REPORT\_FK1  (SCEN\_NO:SCEN\_RUN\_NO) | PK\_STEP\_REPORT  (SCEN\_NO:SCEN\_RUN\_NO:NNO:NB\_RUN) |
| **301** | TCB\_LIVE\_  REPO | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | AK\_SMOD (I\_MOD:COD\_SMOD) |
| **302** | TCB\_LIVE\_  REPO | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | PK\_SUB\_MODEL (I\_MOD:I\_SMOD) |
| **303** | TCB\_LIVE\_  REPO | SNP\_TASK\_TXT | TASK\_TXT\_FK1  (SESS\_NO:NNO:SCEN\_TASK\_NO) | PK\_TASK\_TXT  (SESS\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **304** | TCB\_LIVE\_  REPO | SNP\_UE\_USED | UE\_USED\_FK2 (I\_USER\_EXIT) | PK\_UE\_USED  (I\_USER\_EXIT:I\_INSTANCE:I\_UE\_ORIG) |
| **305** | TCB\_LIVE\_  REPO | SNP\_USER\_EXI  T | USER\_EXIT\_FK1 (I\_TRT) | AK\_USER\_EXIT (I\_TRT:UE\_NAME) |

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| **306** | TCB\_LIVE\_  REPO | SNP\_USER\_ME  TH | USER\_METH\_FK1 (I\_WUSER) | PK\_USER\_METH (I\_WUSER:I\_METH) |
| **307** | TCB\_LIVE\_  REPO | SNP\_USER\_OBJ  \_METH | USER\_OBJ\_METH\_FK1 (I\_METH) | AK\_USER\_OBJ\_METH  (I\_METH:I\_WUSER:I\_CONTEXT:I\_OBJECTS:I\_INSTA NCE) |
| **308** | TCB\_LIVE\_  REPO | SNP\_USER\_PRO  F | USER\_PROF\_FK1 (I\_WUSER) | PK\_USER\_PROF (I\_WUSER:I\_PROF) |
| **309** | TCB\_LIVE\_  REPO | SNP\_VAR | VAR\_FK1 (I\_PROJECT) | AK\_VAR (I\_PROJECT:VAR\_NAME) |
| **310** | TCB\_LIVE\_  REPO | SNP\_VAR\_PLA  N\_AGENT | VAR\_PLAN\_AGENT\_FK1  (I\_PLAN\_AGENT) | PK\_VAR\_PLAN\_AGENT  (I\_PLAN\_AGENT:VAR\_NAME) |
| **311** | TCB\_LIVE\_  REPO | SNP\_VAR\_SCE  N | VAR\_SCEN\_FK1 (SCEN\_NO) | PK\_VAR\_SCEN (SCEN\_NO:VAR\_NAME) |
| **312** | TCB\_LIVE\_  REPO | SNP\_VAR\_SESS | VAR\_SESS\_FK1 (SESS\_NO) | PK\_VAR\_SESS (SESS\_NO:VAR\_NAME) |
| **313** | TCB\_LIVE\_  WORK | SNP\_COL | COL\_FK1 (I\_TABLE) | AK\_COL (I\_TABLE:COL\_NAME) |
| **314** | TCB\_LIVE\_  WORK | SNP\_COND | COND\_FK1 (I\_TABLE) | AK\_COND (I\_TABLE:COND\_NAME) |
| **315** | TCB\_LIVE\_  WORK | SNP\_DIAG\_PAR  AM | SNP\_DIAG\_PARAM\_FK1 (I\_DIAGRAM) | PK\_SNP\_DIAG\_PARAM  (I\_DIAGRAM:PARAM\_NAME) |
| **316** | TCB\_LIVE\_  WORK | SNP\_GRP\_STAT  E | SNP\_GRP\_STATE\_FK1 (I\_PROJECT) | AK\_SNP\_GRP\_STATE  (I\_PROJECT:GRP\_STATE\_CODE) |
| **317** | TCB\_LIVE\_  WORK | SNP\_JOIN | JOIN\_FK1 (I\_TABLE\_FK) | AK\_JOIN (I\_TABLE\_FK:FK\_NAME) |
| **318** | TCB\_LIVE\_  WORK | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | AK\_JOIN\_COL (I\_JOIN:POS) |
| **319** | TCB\_LIVE\_  WORK | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | PK\_JOIN\_COL (I\_JOIN:I\_COL\_FK) |
| **320** | TCB\_LIVE\_  WORK | SNP\_KEY | KEY\_FK1 (I\_TABLE) | AK\_KEY (I\_TABLE:KEY\_NAME) |
| **321** | TCB\_LIVE\_  WORK | SNP\_KEY\_COL | KEY\_COL\_FK1 (I\_KEY) | PK\_KEY\_COL (I\_KEY:I\_COL) |
| **322** | TCB\_LIVE\_  WORK | SNP\_LINE\_TRT | LINE\_TRT\_FK1 (I\_TRT) | PK\_LINE\_TRT (I\_TRT:ORD\_TRT) |
| **323** | TCB\_LIVE\_  WORK | SNP\_LINE\_TRT  \_UE | LINE\_TRT\_UE\_FK1 (I\_USER\_EXIT) | PK\_LINE\_TRT\_UE (I\_USER\_EXIT:I\_TRT:ORD\_TRT) |
| **324** | TCB\_LIVE\_  WORK | SNP\_LPI\_EXC\_L  OG | LPI\_ELOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_EXC\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:I\_LP\_STEP\_EXCEPT  ) |
| **325** | TCB\_LIVE\_  WORK | SNP\_LPI\_RUN | LPI\_RUN\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_RUN (I\_LP\_INST:NB\_RUN) |
| **326** | TCB\_LIVE\_  WORK | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_EXC\_FK (I\_LP\_INST:I\_LP\_STEP\_EXCEPT) |
| **327** | TCB\_LIVE\_  WORK | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_STEP\_FK (I\_LP\_INST:PAR\_I\_LP\_STEP) |
| **328** | TCB\_LIVE\_  WORK | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_VAR\_FK (I\_LP\_INST:VAR\_NAME) |
| **329** | TCB\_LIVE\_  WORK | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_STEP (I\_LP\_INST:I\_LP\_STEP) |
| **330** | TCB\_LIVE\_  WORK | SNP\_LPI\_STEP\_  LOG | LPI\_SLOG\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_LOG (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) |
| **331** | TCB\_LIVE\_  WORK | SNP\_LPI\_STEP\_  VAR | LPI\_SVAR\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_VAR  (I\_LP\_INST:I\_LP\_STEP:VAR\_NAME) |
| **332** | TCB\_LIVE\_  WORK | SNP\_LPI\_VAR | LPI\_VAR\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_VAR (I\_LP\_INST:VAR\_NAME) |
| **333** | TCB\_LIVE\_  WORK | SNP\_LPI\_VAR\_  LOG | LPI\_VLOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_VAR\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:VAR\_NAME) |
| **334** | TCB\_LIVE\_ | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_EXC\_FK |

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|  | WORK |  |  | (I\_LOAD\_PLAN:I\_LP\_STEP\_EXCEPT) |
| **335** | TCB\_LIVE\_  WORK | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_STEP\_FK  (I\_LOAD\_PLAN:PAR\_I\_LP\_STEP) |
| **336** | TCB\_LIVE\_  WORK | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_VAR\_FK (I\_LOAD\_PLAN:VAR\_NAME) |
| **337** | TCB\_LIVE\_  WORK | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_STEP (I\_LOAD\_PLAN:I\_LP\_STEP) |
| **338** | TCB\_LIVE\_  WORK | SNP\_LP\_STEP\_  VAR | LP\_STVAR\_STEP\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP) | PK\_LP\_STEP\_VAR  (I\_LOAD\_PLAN:I\_LP\_STEP:VAR\_NAME) |
| **339** | TCB\_LIVE\_  WORK | SNP\_LP\_VAR | LP\_VAR\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_VAR (I\_LOAD\_PLAN:VAR\_NAME) |
| **340** | TCB\_LIVE\_  WORK | SNP\_MISSING\_  REF | SNP\_MREF\_FK3 (ID\_OBJECT\_PK) | PK\_SNP\_MISSING\_REF  (ID\_OBJECT\_PK:ID\_OBJECT\_FK:REF\_KEY\_NAME) |
| **341** | TCB\_LIVE\_  WORK | SNP\_MOD\_FOL  DER | MOD\_FOLDER\_FK1  (PAR\_I\_MOD\_FOLDER) | AK\_MOD\_FOLDER  (PAR\_I\_MOD\_FOLDER:MOD\_FOLDER\_NAME) |
| **342** | TCB\_LIVE\_  WORK | SNP\_OBJECT\_I  D\_COL | SNP\_OID\_COL\_FK2 (I\_OBJECT\_ID) | PK\_OBJECT\_ID\_COL (I\_OBJECT\_ID:COL\_ORDER) |
| **343** | TCB\_LIVE\_  WORK | SNP\_OBJ\_DIAG | SNP\_OBJ\_DIAG\_FK1 (I\_DIAGRAM) | PK\_SNP\_OBJ\_DIAG  (I\_DIAGRAM:I\_OBJECTS:I\_INSTANCE:SYN\_NUMB) |
| **344** | TCB\_LIVE\_  WORK | SNP\_PARAM\_L  PI\_RUN | LPIRPARAM\_LPIR\_FK  (I\_LP\_INST:NB\_RUN) | PK\_PARAM\_LPI\_RUN  (I\_LP\_INST:NB\_RUN:PARAM\_NAME) |
| **345** | TCB\_LIVE\_  WORK | SNP\_PARAM\_S  ESS | PARAM\_SESS\_FK (SESS\_NO) | PK\_PARAM\_SESS (SESS\_NO:PARAM\_NAME) |
| **346** | TCB\_LIVE\_  WORK | SNP\_PARTITIO  N | IX\_PARTITION\_TABLE (I\_TABLE) | AK\_PARTITION (I\_TABLE:PARTITION\_NAME) |
| **347** | TCB\_LIVE\_  WORK | SNP\_POP\_CON  STRAINT | POP\_CONSTRAINT\_FK1 (I\_POP) | PK\_POP\_CONSTRAINT  (I\_POP:CONST\_TYPE:CONST\_NAME) |
| **348** | TCB\_LIVE\_  WORK | SNP\_POP\_MAP  PING | PMAP\_PCOL\_FK (I\_POP\_COL) | PK\_POP\_MAPPING (I\_POP\_COL:I\_DATA\_SET) |
| **349** | TCB\_LIVE\_  WORK | SNP\_SCEN\_REP  ORT | SCEN\_REPORT\_FK1 (SCEN\_NO) | PK\_SCEN\_REPORT (SCEN\_NO:SCEN\_RUN\_NO) |
| **350** | TCB\_LIVE\_  WORK | SNP\_SCEN\_STE  P | SCEN\_STEP\_FK1 (SCEN\_NO) | PK\_SCEN\_STEP (SCEN\_NO:NNO) |
| **351** | TCB\_LIVE\_  WORK | SNP\_SCEN\_TAS  K | SCEN\_TASK\_FK1 (SCEN\_NO:NNO) | PK\_SCEN\_TASK (SCEN\_NO:NNO:SCEN\_TASK\_NO) |
| **352** | TCB\_LIVE\_  WORK | SNP\_SCEN\_TXT | SCEN\_TXT\_FK1  (SCEN\_NO:NNO:SCEN\_TASK\_NO) | PK\_SCEN\_TXT  (SCEN\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **353** | TCB\_LIVE\_  WORK | SNP\_SEQ\_SCEN | SEQ\_SCEN\_FK1 (SCEN\_NO) | PK\_SEQ\_SCEN (SCEN\_NO:SEQ\_NAME) |
| **354** | TCB\_LIVE\_  WORK | SNP\_SEQ\_SESS | SEQ\_SESS\_FK1 (SESS\_NO) | PK\_SEQ\_SESS (SESS\_NO:SEQ\_NAME) |
| **355** | TCB\_LIVE\_  WORK | SNP\_SESS\_STEP | SESS\_STEP\_FK1 (SESS\_NO) | PK\_SESS\_STEP (SESS\_NO:NNO) |
| **356** | TCB\_LIVE\_  WORK | SNP\_SESS\_TAS  K | SESS\_TASK\_FK1 (SESS\_NO:NNO) | PK\_SESS\_TASK (SESS\_NO:NNO:SCEN\_TASK\_NO) |
| **357** | TCB\_LIVE\_  WORK | SNP\_SESS\_TAS  K\_LS | SESS\_TASK\_LS\_FK  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_ NO) | PK\_SESS\_TASK\_LS  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_NO:SEQ\_NA ME) |
| **358** | TCB\_LIVE\_  WORK | SNP\_STATE2 | SNP\_STATE2\_FK1 (I\_GRP\_STATE) | AK\_SNP\_STATE (I\_GRP\_STATE:STATE\_CODE) |
| **359** | TCB\_LIVE\_  WORK | SNP\_STEP\_REP  ORT | STEP\_REPORT\_FK1  (SCEN\_NO:SCEN\_RUN\_NO) | PK\_STEP\_REPORT  (SCEN\_NO:SCEN\_RUN\_NO:NNO:NB\_RUN) |
| **360** | TCB\_LIVE\_  WORK | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | AK\_SMOD (I\_MOD:COD\_SMOD) |
| **361** | TCB\_LIVE\_  WORK | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | PK\_SUB\_MODEL (I\_MOD:I\_SMOD) |
| **362** | TCB\_LIVE\_  WORK | SNP\_TASK\_TXT | TASK\_TXT\_FK1  (SESS\_NO:NNO:SCEN\_TASK\_NO) | PK\_TASK\_TXT  (SESS\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ |

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| **363** | TCB\_LIVE\_  WORK | SNP\_UE\_USED | UE\_USED\_FK2 (I\_USER\_EXIT) | PK\_UE\_USED  (I\_USER\_EXIT:I\_INSTANCE:I\_UE\_ORIG) |
| **364** | TCB\_LIVE\_  WORK | SNP\_USER\_EXI  T | USER\_EXIT\_FK1 (I\_TRT) | AK\_USER\_EXIT (I\_TRT:UE\_NAME) |
| **365** | TCB\_LIVE\_  WORK | SNP\_VAR | VAR\_FK1 (I\_PROJECT) | AK\_VAR (I\_PROJECT:VAR\_NAME) |
| **366** | TCB\_LIVE\_  WORK | SNP\_VAR\_PLA  N\_AGENT | VAR\_PLAN\_AGENT\_FK1  (I\_PLAN\_AGENT) | PK\_VAR\_PLAN\_AGENT  (I\_PLAN\_AGENT:VAR\_NAME) |
| **367** | TCB\_LIVE\_  WORK | SNP\_VAR\_SCE  N | VAR\_SCEN\_FK1 (SCEN\_NO) | PK\_VAR\_SCEN (SCEN\_NO:VAR\_NAME) |
| **368** | TCB\_LIVE\_  WORK | SNP\_VAR\_SESS | VAR\_SESS\_FK1 (SESS\_NO) | PK\_VAR\_SESS (SESS\_NO:VAR\_NAME) |
| **369** | TCB\_MBV | TBL\_MBV\_DAIL  Y\_INTEREST\_D  ETAIL | MBV\_DAILY\_INT\_DETAIL\_IDX\_01  (VALUE\_DATE:TCB\_ACCOUNT) | MBV\_DAILY\_INTEREST\_DETAIL\_PK  (VALUE\_DATE:TCB\_ACCOUNT:TRANS\_TYPE) |
| **370** | TCB\_MBV | TBL\_MBV\_TRA  NS\_DAILY\_TO\_  T24 | IDX\_MBV\_TRANS\_T24\_VALUE\_DATE  (VALUE\_DATE) | PK\_MBV\_TRANS\_DAILY\_T24\_ID  (VALUE\_DATE:TRANS\_ID) |
| **371** | TCB\_ODI\_  MASTER | SNP\_ALLOC\_A  GENT | ALLOC\_AGENT\_FK1 (I\_CONTEXT) | PK\_ALLOC\_AGENT (I\_CONTEXT:I\_LAGENT) |
| **372** | TCB\_ODI\_  MASTER | SNP\_CONNECT  \_PROP | CONNECT\_PROP\_FK1 (I\_CONNECT) | PK\_CONNECT\_PROP (I\_CONNECT:PROP\_KEY) |
| **373** | TCB\_ODI\_  MASTER | SNP\_CONV\_DT | CONV\_DT\_FK1 (SRC\_DT) | PK\_CONV\_DT (SRC\_DT:I\_TARG\_TECHNO) |
| **374** | TCB\_ODI\_  MASTER | SNP\_DT | DT\_FK1 (I\_TECHNO) | AK\_DT1 (I\_TECHNO:DT\_DRIVER) |
| **375** | TCB\_ODI\_  MASTER | SNP\_DT | DT\_FK1 (I\_TECHNO) | AK\_DT2 (I\_TECHNO:DT\_SOURCE) |
| **376** | TCB\_ODI\_  MASTER | SNP\_GRP\_ACTI  ON | GRP\_ACTION\_FK1 (I\_TECHNO) | AK\_GRP\_ACTION (I\_TECHNO:GRP\_NAME) |
| **377** | TCB\_ODI\_  MASTER | SNP\_GRP\_ACTI  ON | GRP\_ACTION\_FK1 (I\_TECHNO) | AK\_GRP\_ACTION2 (I\_TECHNO:GRP\_CODE) |
| **378** | TCB\_ODI\_  MASTER | SNP\_HOST\_MO  D | SNP\_HM\_FK1 (I\_HOST) | PK\_SNP\_HOST\_MOD2 (I\_HOST:I\_MODULE) |
| **379** | TCB\_ODI\_  MASTER | SNP\_INST\_OBJ | INST\_OBJ\_FK1 (I\_OBJECTS) | PK\_INST\_OBJ (I\_OBJECTS:I\_INSTANCE) |
| **380** | TCB\_ODI\_  MASTER | SNP\_LANG\_TE  CHNO | LANG\_TECHNO\_FK2 (I\_TECHNO) | PK\_LANG\_TECHNO (I\_TECHNO:I\_LANG) |
| **381** | TCB\_ODI\_  MASTER | SNP\_LB\_AGEN  T | SNP\_LB\_AGT\_FK1 (I\_MASTER) | PK\_LB\_AGENT (I\_MASTER:I\_SLAVE) |
| **382** | TCB\_ODI\_  MASTER | SNP\_LE\_TECH  NO | LE\_TECHNO\_FK1 (I\_LANG\_ELT) | PK\_LE\_TECHNO (I\_LANG\_ELT:I\_TECHNO) |
| **383** | TCB\_ODI\_  MASTER | SNP\_LINE\_ACT  ION | LINE\_ACTION\_FK1 (I\_ACTION) | PK\_LINE\_ACTION (I\_ACTION:ORD\_ACTION) |
| **384** | TCB\_ODI\_  MASTER | SNP\_MTXT\_PA  RT | MTXT\_PART\_FK1 (I\_TXT) | PK\_MTXT\_P (I\_TXT:TXT\_ORD) |
| **385** | TCB\_ODI\_  MASTER | SNP\_PROF\_ME  TH | PROF\_METH\_FK1 (I\_PROF) | PK\_PROF\_METH (I\_PROF:I\_METH) |
| **386** | TCB\_ODI\_  MASTER | SNP\_PSCHEMA | PSCHEMA\_FK1 (I\_CONNECT) | AK\_PSCHEMA  (I\_CONNECT:CATALOG\_NAME:SCHEMA\_NAME) |
| **387** | TCB\_ODI\_  MASTER | SNP\_PSCHEMA  \_CONT | PSCHEMA\_CONT\_FK1 (I\_CONTEXT) | PK\_PSCHEMA\_CONT (I\_CONTEXT:I\_LSCHEMA) |
| **388** | TCB\_ODI\_  MASTER | SNP\_USER\_ME  TH | USER\_METH\_FK1 (I\_WUSER) | PK\_USER\_METH (I\_WUSER:I\_METH) |
| **389** | TCB\_ODI\_  MASTER | SNP\_USER\_OBJ  \_METH | USER\_OBJ\_METH\_FK1 (I\_METH) | AK\_USER\_OBJ\_METH  (I\_METH:I\_WUSER:I\_CONTEXT:I\_OBJECTS:I\_INSTA NCE) |
| **390** | TCB\_ODI\_ | SNP\_USER\_PRE | USER\_PREF\_FK1 (I\_WUSER) | PK\_USER\_PREF (I\_WUSER:I\_PREF) |

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| **391** | TCB\_ODI\_  MASTER | SNP\_USER\_PRO  F | USER\_PROF\_FK1 (I\_WUSER) | PK\_USER\_PROF (I\_WUSER:I\_PROF) |
| **392** | TCB\_ODI\_  MASTER\_11  G | SNP\_ACTION | SNP\_ACTION\_FK1 (I\_GRP\_ACTION) | AK\_ACTION (I\_GRP\_ACTION:ACTION\_NAME) |
| **393** | TCB\_ODI\_  MASTER\_11  G | SNP\_ALLOC\_A  GENT | ALLOC\_AGENT\_FK1 (I\_CONTEXT) | PK\_ALLOC\_AGENT (I\_CONTEXT:I\_LAGENT) |
| **394** | TCB\_ODI\_  MASTER\_11  G | SNP\_CONNECT  \_PROP | CONNECT\_PROP\_FK1 (I\_CONNECT) | PK\_CONNECT\_PROP (I\_CONNECT:PROP\_KEY) |
| **395** | TCB\_ODI\_  MASTER\_11  G | SNP\_CONV\_DT | CONV\_DT\_FK1 (SRC\_DT) | PK\_CONV\_DT (SRC\_DT:I\_TARG\_TECHNO) |
| **396** | TCB\_ODI\_  MASTER\_11  G | SNP\_DATASOU  RCE | DS\_CONNECT\_FK (I\_CONNECT) | PK\_DATASOURCE (I\_CONNECT:I\_AGENT) |
| **397** | TCB\_ODI\_  MASTER\_11  G | SNP\_DT | DT\_FK1 (I\_TECHNO) | AK\_DT1 (I\_TECHNO:DT\_DRIVER) |
| **398** | TCB\_ODI\_  MASTER\_11  G | SNP\_DT | DT\_FK1 (I\_TECHNO) | AK\_DT2 (I\_TECHNO:DT\_SOURCE) |
| **399** | TCB\_ODI\_  MASTER\_11  G | SNP\_GRP\_ACTI  ON | GRP\_ACTION\_FK1 (I\_TECHNO) | AK\_GRP\_ACTION (I\_TECHNO:GRP\_NAME) |
| **400** | TCB\_ODI\_  MASTER\_11  G | SNP\_GRP\_ACTI  ON | GRP\_ACTION\_FK1 (I\_TECHNO) | AK\_GRP\_ACTION2 (I\_TECHNO:GRP\_CODE) |
| **401** | TCB\_ODI\_  MASTER\_11  G | SNP\_HOST\_MO  D | SNP\_HM\_FK1 (I\_HOST) | PK\_SNP\_HOST\_MOD2 (I\_HOST:I\_MODULE) |
| **402** | TCB\_ODI\_  MASTER\_11  G | SNP\_INDEX\_TY  PE | IDXTYPE\_TEC\_FK1 (I\_TECHNO) | AK\_INDEX\_TYPE (I\_TECHNO:INDEX\_TYPE\_CODE) |
| **403** | TCB\_ODI\_  MASTER\_11  G | SNP\_INST\_OBJ | INST\_OBJ\_FK1 (I\_OBJECTS) | PK\_INST\_OBJ (I\_OBJECTS:I\_INSTANCE) |
| **404** | TCB\_ODI\_  MASTER\_11  G | SNP\_LANG\_TE  CHNO | LANG\_TECHNO\_FK2 (I\_TECHNO) | PK\_LANG\_TECHNO (I\_TECHNO:I\_LANG) |
| **405** | TCB\_ODI\_  MASTER\_11  G | SNP\_LB\_AGEN  T | SNP\_LB\_AGT\_FK1 (I\_MASTER) | PK\_LB\_AGENT (I\_MASTER:I\_SLAVE) |
| **406** | TCB\_ODI\_  MASTER\_11  G | SNP\_LE\_TECH  NO | LE\_TECHNO\_FK1 (I\_LANG\_ELT) | PK\_LE\_TECHNO (I\_LANG\_ELT:I\_TECHNO) |
| **407** | TCB\_ODI\_  MASTER\_11  G | SNP\_LINE\_ACT  ION | LINE\_ACTION\_FK1 (I\_ACTION) | PK\_LINE\_ACTION (I\_ACTION:ORD\_ACTION) |
| **408** | TCB\_ODI\_  MASTER\_11  G | SNP\_MTXT\_PA  RT | MTXT\_PART\_FK1 (I\_TXT) | PK\_MTXT\_P (I\_TXT:TXT\_ORD) |
| **409** | TCB\_ODI\_  MASTER\_11  G | SNP\_PROF\_ME  TH | PROF\_METH\_FK1 (I\_PROF) | PK\_PROF\_METH (I\_PROF:I\_METH) |
| **410** | TCB\_ODI\_  MASTER\_11 | SNP\_PSCHEMA | PSCHEMA\_FK1 (I\_CONNECT) | AK\_PSCHEMA  (I\_CONNECT:CATALOG\_NAME:SCHEMA\_NAME) |

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| **411** | TCB\_ODI\_  MASTER\_11  G | SNP\_PSCHEMA  \_CONT | PSCHEMA\_CONT\_FK1 (I\_CONTEXT) | PK\_PSCHEMA\_CONT (I\_CONTEXT:I\_LSCHEMA) |
| **412** | TCB\_ODI\_  MASTER\_11  G | SNP\_USER\_ME  TH | USER\_METH\_FK1 (I\_WUSER) | PK\_USER\_METH (I\_WUSER:I\_METH) |
| **413** | TCB\_ODI\_  MASTER\_11  G | SNP\_USER\_OBJ  \_METH | USER\_OBJ\_METH\_FK1 (I\_METH) | AK\_USER\_OBJ\_METH  (I\_METH:I\_WUSER:I\_CONTEXT:I\_OBJECTS:I\_INSTA NCE) |
| **414** | TCB\_ODI\_  MASTER\_11  G | SNP\_USER\_PRO  F | USER\_PROF\_FK1 (I\_WUSER) | PK\_USER\_PROF (I\_WUSER:I\_PROF) |
| **415** | TCB\_ODI\_  WORK | SNP\_COL | COL\_FK1 (I\_TABLE) | AK\_COL (I\_TABLE:COL\_NAME) |
| **416** | TCB\_ODI\_  WORK | SNP\_COND | COND\_FK2 (I\_MOD) | AK\_COND (I\_MOD:COND\_NAME) |
| **417** | TCB\_ODI\_  WORK | SNP\_DIAG\_PAR  AM | SNP\_DIAG\_PARAM\_FK1 (I\_DIAGRAM) | PK\_SNP\_DIAG\_PARAM  (I\_DIAGRAM:PARAM\_NAME) |
| **418** | TCB\_ODI\_  WORK | SNP\_GRP\_STAT  E | SNP\_GRP\_STATE\_FK1 (I\_PROJECT) | AK\_SNP\_GRP\_STATE  (I\_PROJECT:GRP\_STATE\_CODE) |
| **419** | TCB\_ODI\_  WORK | SNP\_JOIN | JOIN\_FK1 (I\_TABLE\_FK) | AK\_JOIN (I\_TABLE\_FK:FK\_NAME) |
| **420** | TCB\_ODI\_  WORK | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | AK\_JOIN\_COL (I\_JOIN:POS) |
| **421** | TCB\_ODI\_  WORK | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | PK\_JOIN\_COL (I\_JOIN:I\_COL\_FK) |
| **422** | TCB\_ODI\_  WORK | SNP\_KEY | KEY\_FK1 (I\_TABLE) | AK\_KEY (I\_TABLE:KEY\_NAME) |
| **423** | TCB\_ODI\_  WORK | SNP\_KEY\_COL | KEY\_COL\_FK1 (I\_KEY) | AK\_KEY\_COL (I\_KEY:POS) |
| **424** | TCB\_ODI\_  WORK | SNP\_KEY\_COL | KEY\_COL\_FK1 (I\_KEY) | PK\_KEY\_COL (I\_KEY:I\_COL) |
| **425** | TCB\_ODI\_  WORK | SNP\_LINE\_TRT | LINE\_TRT\_FK1 (I\_TRT) | PK\_LINE\_TRT (I\_TRT:ORD\_TRT) |
| **426** | TCB\_ODI\_  WORK | SNP\_LINE\_TRT  \_UE | LINE\_TRT\_UE\_FK1 (I\_USER\_EXIT) | PK\_LINE\_TRT\_UE (I\_USER\_EXIT:I\_TRT:ORD\_TRT) |
| **427** | TCB\_ODI\_  WORK | SNP\_MISSING\_  REF | SNP\_MREF\_FK3 (ID\_OBJECT\_PK) | PK\_SNP\_MISSING\_REF  (ID\_OBJECT\_PK:ID\_OBJECT\_FK:REF\_KEY\_NAME) |
| **428** | TCB\_ODI\_  WORK | SNP\_MOD\_FOL  DER | MOD\_FOLDER\_FK1  (PAR\_I\_MOD\_FOLDER) | AK\_MOD\_FOLDER  (PAR\_I\_MOD\_FOLDER:MOD\_FOLDER\_NAME) |
| **429** | TCB\_ODI\_  WORK | SNP\_OBJECT\_I  D\_COL | SNP\_OID\_COL\_FK2 (I\_OBJECT\_ID) | PK\_OBJECT\_ID\_COL (I\_OBJECT\_ID:COL\_ORDER) |
| **430** | TCB\_ODI\_  WORK | SNP\_OBJ\_DIAG | SNP\_OBJ\_DIAG\_FK1 (I\_DIAGRAM) | PK\_SNP\_OBJ\_DIAG  (I\_DIAGRAM:I\_OBJECTS:I\_INSTANCE:SYN\_NUMB) |
| **431** | TCB\_ODI\_  WORK | SNP\_POP | POP\_FK3 (I\_TABLE) | POP\_FK2 (I\_TABLE:KEY\_NAME) |
| **432** | TCB\_ODI\_  WORK | SNP\_POP\_CON  STRAINT | POP\_CONSTRAINT\_FK1 (I\_POP) | PK\_POP\_CONSTRAINT  (I\_POP:CONST\_TYPE:CONST\_NAME) |
| **433** | TCB\_ODI\_  WORK | SNP\_POP\_CON  TEXT | SPOP\_CONTEXT\_FK1 (I\_POP) | PK\_POP\_CONTEXT (I\_POP:CONTEXT\_CODE) |
| **434** | TCB\_ODI\_  WORK | SNP\_REV\_COL | REV\_COL\_FK1 (I\_MOD:TABLE\_NAME) | PK\_REV\_COL (I\_MOD:TABLE\_NAME:COL\_NAME) |
| **435** | TCB\_ODI\_  WORK | SNP\_REV\_CON  D | REV\_COND\_FK1  (I\_MOD:TABLE\_NAME) | PK\_REV\_COND  (I\_MOD:TABLE\_NAME:COND\_NAME) |
| **436** | TCB\_ODI\_  WORK | SNP\_REV\_JOIN  \_COL | REV\_JOIN\_COL\_FK1  (I\_MOD:FK\_NAME) | PK\_REV\_JOIN\_COL  (I\_MOD:FK\_NAME:FK\_COL\_NAME) |
| **437** | TCB\_ODI\_  WORK | SNP\_REV\_KEY | REV\_KEY\_FK1 (I\_MOD:TABLE\_NAME) | PK\_REV\_KEY (I\_MOD:TABLE\_NAME:KEY\_NAME) |

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| **438** | TCB\_ODI\_  WORK | SNP\_REV\_KEY\_  COL | REV\_KEY\_COL\_FK1  (I\_MOD:TABLE\_NAME:KEY\_NAME) | PK\_REV\_KEY\_COL  (I\_MOD:TABLE\_NAME:KEY\_NAME:COL\_NAME) |
| **439** | TCB\_ODI\_  WORK | SNP\_SCEN\_REP  ORT | SCEN\_REPORT\_FK1 (SCEN\_NO) | PK\_SCEN\_REPORT (SCEN\_NO:SCEN\_RUN\_NO) |
| **440** | TCB\_ODI\_  WORK | SNP\_SCEN\_STE  P | SCEN\_STEP\_FK1 (SCEN\_NO) | PK\_SCEN\_STEP (SCEN\_NO:NNO) |
| **441** | TCB\_ODI\_  WORK | SNP\_SCEN\_TAS  K | SCEN\_TASK\_FK1 (SCEN\_NO:NNO) | PK\_SCEN\_TASK (SCEN\_NO:NNO:SCEN\_TASK\_NO) |
| **442** | TCB\_ODI\_  WORK | SNP\_SCEN\_TXT | SCEN\_TXT\_FK1  (SCEN\_NO:NNO:SCEN\_TASK\_NO) | PK\_SCEN\_TXT  (SCEN\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **443** | TCB\_ODI\_  WORK | SNP\_SEQ\_SCEN | SEQ\_SCEN\_FK1 (SCEN\_NO) | PK\_SEQ\_SCEN (SCEN\_NO:SEQ\_NAME) |
| **444** | TCB\_ODI\_  WORK | SNP\_SEQ\_SESS | SEQ\_SESS\_FK1 (SESS\_NO) | PK\_SEQ\_SESS (SESS\_NO:SEQ\_NAME) |
| **445** | TCB\_ODI\_  WORK | SNP\_SESS\_STEP | SESS\_STEP\_FK1 (SESS\_NO) | PK\_SESS\_STEP (SESS\_NO:NNO) |
| **446** | TCB\_ODI\_  WORK | SNP\_SESS\_TAS  K | SESS\_TASK\_FK1 (SESS\_NO:NNO) | PK\_SESS\_TASK (SESS\_NO:NNO:SCEN\_TASK\_NO) |
| **447** | TCB\_ODI\_  WORK | SNP\_STATE2 | SNP\_STATE2\_FK1 (I\_GRP\_STATE) | AK\_SNP\_STATE (I\_GRP\_STATE:STATE\_CODE) |
| **448** | TCB\_ODI\_  WORK | SNP\_STEP\_REP  ORT | STEP\_REPORT\_FK1  (SCEN\_NO:SCEN\_RUN\_NO) | PK\_STEP\_REPORT  (SCEN\_NO:SCEN\_RUN\_NO:NNO:NB\_RUN) |
| **449** | TCB\_ODI\_  WORK | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | AK\_SMOD (I\_MOD:COD\_SMOD) |
| **450** | TCB\_ODI\_  WORK | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | PK\_SUB\_MODEL (I\_MOD:I\_SMOD) |
| **451** | TCB\_ODI\_  WORK | SNP\_TASK\_TXT | TASK\_TXT\_FK1  (SESS\_NO:NNO:SCEN\_TASK\_NO) | PK\_TASK\_TXT  (SESS\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **452** | TCB\_ODI\_  WORK | SNP\_UE\_USED | UE\_USED\_FK2 (I\_USER\_EXIT) | PK\_UE\_USED  (I\_USER\_EXIT:I\_INSTANCE:I\_UE\_ORIG) |
| **453** | TCB\_ODI\_  WORK | SNP\_USER\_EXI  T | USER\_EXIT\_FK1 (I\_TRT) | AK\_USER\_EXIT (I\_TRT:UE\_NAME) |
| **454** | TCB\_ODI\_  WORK | SNP\_VAR | VAR\_FK1 (I\_PROJECT) | AK\_VAR (I\_PROJECT:VAR\_NAME) |
| **455** | TCB\_ODI\_  WORK | SNP\_VAR\_PLA  N\_AGENT | VAR\_PLAN\_AGENT\_FK1  (I\_PLAN\_AGENT) | PK\_VAR\_PLAN\_AGENT  (I\_PLAN\_AGENT:VAR\_NAME) |
| **456** | TCB\_ODI\_  WORK | SNP\_VAR\_SCE  N | VAR\_SCEN\_FK1 (SCEN\_NO) | PK\_VAR\_SCEN (SCEN\_NO:VAR\_NAME) |
| **457** | TCB\_ODI\_  WORK | SNP\_VAR\_SESS | VAR\_SESS\_FK1 (SESS\_NO) | PK\_VAR\_SESS (SESS\_NO:VAR\_NAME) |
| **458** | TCB\_ODI\_  WORK\_11G | SNP\_COL | COL\_FK1 (I\_TABLE) | AK\_COL (I\_TABLE:COL\_NAME) |
| **459** | TCB\_ODI\_  WORK\_11G | SNP\_COND | COND\_FK1 (I\_TABLE) | AK\_COND (I\_TABLE:COND\_NAME) |
| **460** | TCB\_ODI\_  WORK\_11G | SNP\_DIAG\_PAR  AM | SNP\_DIAG\_PARAM\_FK1 (I\_DIAGRAM) | PK\_SNP\_DIAG\_PARAM  (I\_DIAGRAM:PARAM\_NAME) |
| **461** | TCB\_ODI\_  WORK\_11G | SNP\_GRP\_STAT  E | SNP\_GRP\_STATE\_FK1 (I\_PROJECT) | AK\_SNP\_GRP\_STATE  (I\_PROJECT:GRP\_STATE\_CODE) |
| **462** | TCB\_ODI\_  WORK\_11G | SNP\_JOIN | JOIN\_FK1 (I\_TABLE\_FK) | AK\_JOIN (I\_TABLE\_FK:FK\_NAME) |
| **463** | TCB\_ODI\_  WORK\_11G | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | AK\_JOIN\_COL (I\_JOIN:POS) |
| **464** | TCB\_ODI\_  WORK\_11G | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | PK\_JOIN\_COL (I\_JOIN:I\_COL\_FK) |
| **465** | TCB\_ODI\_  WORK\_11G | SNP\_KEY | KEY\_FK1 (I\_TABLE) | AK\_KEY (I\_TABLE:KEY\_NAME) |
| **466** | TCB\_ODI\_ | SNP\_KEY\_COL | KEY\_COL\_FK1 (I\_KEY) | PK\_KEY\_COL (I\_KEY:I\_COL) |

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|  | WORK\_11G |  |  |  |
| **467** | TCB\_ODI\_  WORK\_11G | SNP\_LINE\_TRT | LINE\_TRT\_FK1 (I\_TRT) | PK\_LINE\_TRT (I\_TRT:ORD\_TRT) |
| **468** | TCB\_ODI\_  WORK\_11G | SNP\_LINE\_TRT  \_UE | LINE\_TRT\_UE\_FK1 (I\_USER\_EXIT) | PK\_LINE\_TRT\_UE (I\_USER\_EXIT:I\_TRT:ORD\_TRT) |
| **469** | TCB\_ODI\_  WORK\_11G | SNP\_LPI\_EXC\_L  OG | LPI\_ELOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_EXC\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:I\_LP\_STEP\_EXCEPT  ) |
| **470** | TCB\_ODI\_  WORK\_11G | SNP\_LPI\_RUN | LPI\_RUN\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_RUN (I\_LP\_INST:NB\_RUN) |
| **471** | TCB\_ODI\_  WORK\_11G | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_EXC\_FK (I\_LP\_INST:I\_LP\_STEP\_EXCEPT) |
| **472** | TCB\_ODI\_  WORK\_11G | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_STEP\_FK (I\_LP\_INST:PAR\_I\_LP\_STEP) |
| **473** | TCB\_ODI\_  WORK\_11G | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_VAR\_FK (I\_LP\_INST:VAR\_NAME) |
| **474** | TCB\_ODI\_  WORK\_11G | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_STEP (I\_LP\_INST:I\_LP\_STEP) |
| **475** | TCB\_ODI\_  WORK\_11G | SNP\_LPI\_STEP\_  LOG | LPI\_SLOG\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_LOG (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) |
| **476** | TCB\_ODI\_  WORK\_11G | SNP\_LPI\_STEP\_  VAR | LPI\_SVAR\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_VAR  (I\_LP\_INST:I\_LP\_STEP:VAR\_NAME) |
| **477** | TCB\_ODI\_  WORK\_11G | SNP\_LPI\_VAR | LPI\_VAR\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_VAR (I\_LP\_INST:VAR\_NAME) |
| **478** | TCB\_ODI\_  WORK\_11G | SNP\_LPI\_VAR\_  LOG | LPI\_VLOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_VAR\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:VAR\_NAME) |
| **479** | TCB\_ODI\_  WORK\_11G | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_EXC\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP\_EXCEPT) |
| **480** | TCB\_ODI\_  WORK\_11G | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_STEP\_FK  (I\_LOAD\_PLAN:PAR\_I\_LP\_STEP) |
| **481** | TCB\_ODI\_  WORK\_11G | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_VAR\_FK (I\_LOAD\_PLAN:VAR\_NAME) |
| **482** | TCB\_ODI\_  WORK\_11G | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_STEP (I\_LOAD\_PLAN:I\_LP\_STEP) |
| **483** | TCB\_ODI\_  WORK\_11G | SNP\_LP\_STEP\_  VAR | LP\_STVAR\_STEP\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP) | PK\_LP\_STEP\_VAR  (I\_LOAD\_PLAN:I\_LP\_STEP:VAR\_NAME) |
| **484** | TCB\_ODI\_  WORK\_11G | SNP\_LP\_VAR | LP\_VAR\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_VAR (I\_LOAD\_PLAN:VAR\_NAME) |
| **485** | TCB\_ODI\_  WORK\_11G | SNP\_MISSING\_  REF | SNP\_MREF\_FK3 (ID\_OBJECT\_PK) | PK\_SNP\_MISSING\_REF  (ID\_OBJECT\_PK:ID\_OBJECT\_FK:REF\_KEY\_NAME) |
| **486** | TCB\_ODI\_  WORK\_11G | SNP\_MOD\_FOL  DER | MOD\_FOLDER\_FK1  (PAR\_I\_MOD\_FOLDER) | AK\_MOD\_FOLDER  (PAR\_I\_MOD\_FOLDER:MOD\_FOLDER\_NAME) |
| **487** | TCB\_ODI\_  WORK\_11G | SNP\_OBJECT\_I  D\_COL | SNP\_OID\_COL\_FK2 (I\_OBJECT\_ID) | PK\_OBJECT\_ID\_COL (I\_OBJECT\_ID:COL\_ORDER) |
| **488** | TCB\_ODI\_  WORK\_11G | SNP\_OBJ\_DIAG | SNP\_OBJ\_DIAG\_FK1 (I\_DIAGRAM) | PK\_SNP\_OBJ\_DIAG  (I\_DIAGRAM:I\_OBJECTS:I\_INSTANCE:SYN\_NUMB) |
| **489** | TCB\_ODI\_  WORK\_11G | SNP\_PARAM\_L  PI\_RUN | LPIRPARAM\_LPIR\_FK  (I\_LP\_INST:NB\_RUN) | PK\_PARAM\_LPI\_RUN  (I\_LP\_INST:NB\_RUN:PARAM\_NAME) |
| **490** | TCB\_ODI\_  WORK\_11G | SNP\_PARAM\_S  ESS | PARAM\_SESS\_FK (SESS\_NO) | PK\_PARAM\_SESS (SESS\_NO:PARAM\_NAME) |
| **491** | TCB\_ODI\_  WORK\_11G | SNP\_PARTITIO  N | IX\_PARTITION\_TABLE (I\_TABLE) | AK\_PARTITION (I\_TABLE:PARTITION\_NAME) |
| **492** | TCB\_ODI\_  WORK\_11G | SNP\_POP\_CON  STRAINT | POP\_CONSTRAINT\_FK1 (I\_POP) | PK\_POP\_CONSTRAINT  (I\_POP:CONST\_TYPE:CONST\_NAME) |
| **493** | TCB\_ODI\_  WORK\_11G | SNP\_POP\_MAP  PING | PMAP\_PCOL\_FK (I\_POP\_COL) | PK\_POP\_MAPPING (I\_POP\_COL:I\_DATA\_SET) |
| **494** | TCB\_ODI\_  WORK\_11G | SNP\_SCEN\_REP  ORT | SCEN\_REPORT\_FK1 (SCEN\_NO) | PK\_SCEN\_REPORT (SCEN\_NO:SCEN\_RUN\_NO) |
| **495** | TCB\_ODI\_ | SNP\_SCEN\_STE | SCEN\_STEP\_FK1 (SCEN\_NO) | PK\_SCEN\_STEP (SCEN\_NO:NNO) |

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|  | WORK\_11G | P |  |  |
| **496** | TCB\_ODI\_  WORK\_11G | SNP\_SCEN\_TAS  K | SCEN\_TASK\_FK1 (SCEN\_NO:NNO) | PK\_SCEN\_TASK (SCEN\_NO:NNO:SCEN\_TASK\_NO) |
| **497** | TCB\_ODI\_  WORK\_11G | SNP\_SCEN\_TXT | SCEN\_TXT\_FK1  (SCEN\_NO:NNO:SCEN\_TASK\_NO) | PK\_SCEN\_TXT  (SCEN\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **498** | TCB\_ODI\_  WORK\_11G | SNP\_SEQ\_SCEN | SEQ\_SCEN\_FK1 (SCEN\_NO) | PK\_SEQ\_SCEN (SCEN\_NO:SEQ\_NAME) |
| **499** | TCB\_ODI\_  WORK\_11G | SNP\_SEQ\_SESS | SEQ\_SESS\_FK1 (SESS\_NO) | PK\_SEQ\_SESS (SESS\_NO:SEQ\_NAME) |
| **500** | TCB\_ODI\_  WORK\_11G | SNP\_SESS\_STEP | SESS\_STEP\_FK1 (SESS\_NO) | PK\_SESS\_STEP (SESS\_NO:NNO) |
| **501** | TCB\_ODI\_  WORK\_11G | SNP\_SESS\_TAS  K | SESS\_TASK\_FK1 (SESS\_NO:NNO) | PK\_SESS\_TASK (SESS\_NO:NNO:SCEN\_TASK\_NO) |
| **502** | TCB\_ODI\_  WORK\_11G | SNP\_SESS\_TAS  K\_LS | SESS\_TASK\_LS\_FK  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_ NO) | PK\_SESS\_TASK\_LS  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_NO:SEQ\_NA ME) |
| **503** | TCB\_ODI\_  WORK\_11G | SNP\_STATE2 | SNP\_STATE2\_FK1 (I\_GRP\_STATE) | AK\_SNP\_STATE (I\_GRP\_STATE:STATE\_CODE) |
| **504** | TCB\_ODI\_  WORK\_11G | SNP\_STEP\_REP  ORT | STEP\_REPORT\_FK1  (SCEN\_NO:SCEN\_RUN\_NO) | PK\_STEP\_REPORT  (SCEN\_NO:SCEN\_RUN\_NO:NNO:NB\_RUN) |
| **505** | TCB\_ODI\_  WORK\_11G | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | AK\_SMOD (I\_MOD:COD\_SMOD) |
| **506** | TCB\_ODI\_  WORK\_11G | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | PK\_SUB\_MODEL (I\_MOD:I\_SMOD) |
| **507** | TCB\_ODI\_  WORK\_11G | SNP\_TASK\_TXT | TASK\_TXT\_FK1  (SESS\_NO:NNO:SCEN\_TASK\_NO) | PK\_TASK\_TXT  (SESS\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **508** | TCB\_ODI\_  WORK\_11G | SNP\_UE\_USED | UE\_USED\_FK2 (I\_USER\_EXIT) | PK\_UE\_USED  (I\_USER\_EXIT:I\_INSTANCE:I\_UE\_ORIG) |
| **509** | TCB\_ODI\_  WORK\_11G | SNP\_USER\_EXI  T | USER\_EXIT\_FK1 (I\_TRT) | AK\_USER\_EXIT (I\_TRT:UE\_NAME) |
| **510** | TCB\_ODI\_  WORK\_11G | SNP\_VAR | VAR\_FK1 (I\_PROJECT) | AK\_VAR (I\_PROJECT:VAR\_NAME) |
| **511** | TCB\_ODI\_  WORK\_11G | SNP\_VAR\_PLA  N\_AGENT | VAR\_PLAN\_AGENT\_FK1  (I\_PLAN\_AGENT) | PK\_VAR\_PLAN\_AGENT  (I\_PLAN\_AGENT:VAR\_NAME) |
| **512** | TCB\_ODI\_  WORK\_11G | SNP\_VAR\_SCE  N | VAR\_SCEN\_FK1 (SCEN\_NO) | PK\_VAR\_SCEN (SCEN\_NO:VAR\_NAME) |
| **513** | TCB\_ODI\_  WORK\_11G | SNP\_VAR\_SESS | VAR\_SESS\_FK1 (SESS\_NO) | PK\_VAR\_SESS (SESS\_NO:VAR\_NAME) |
| **514** | TEST\_KRM | SNP\_COL | COL\_FK1 (I\_TABLE) | AK\_COL (I\_TABLE:COL\_NAME) |
| **515** | TEST\_KRM | SNP\_COND | COND\_FK1 (I\_TABLE) | AK\_COND (I\_TABLE:COND\_NAME) |
| **516** | TEST\_KRM | SNP\_DIAG\_PAR  AM | SNP\_DIAG\_PARAM\_FK1 (I\_DIAGRAM) | PK\_SNP\_DIAG\_PARAM  (I\_DIAGRAM:PARAM\_NAME) |
| **517** | TEST\_KRM | SNP\_GRP\_STAT  E | SNP\_GRP\_STATE\_FK1 (I\_PROJECT) | AK\_SNP\_GRP\_STATE  (I\_PROJECT:GRP\_STATE\_CODE) |
| **518** | TEST\_KRM | SNP\_JOIN | JOIN\_FK1 (I\_TABLE\_FK) | AK\_JOIN (I\_TABLE\_FK:FK\_NAME) |
| **519** | TEST\_KRM | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | AK\_JOIN\_COL (I\_JOIN:POS) |
| **520** | TEST\_KRM | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | PK\_JOIN\_COL (I\_JOIN:I\_COL\_FK) |
| **521** | TEST\_KRM | SNP\_KEY | KEY\_FK1 (I\_TABLE) | AK\_KEY (I\_TABLE:KEY\_NAME) |
| **522** | TEST\_KRM | SNP\_KEY\_COL | KEY\_COL\_FK1 (I\_KEY) | PK\_KEY\_COL (I\_KEY:I\_COL) |
| **523** | TEST\_KRM | SNP\_LINE\_TRT | LINE\_TRT\_FK1 (I\_TRT) | PK\_LINE\_TRT (I\_TRT:ORD\_TRT) |
| **524** | TEST\_KRM | SNP\_LINE\_TRT  \_UE | LINE\_TRT\_UE\_FK1 (I\_USER\_EXIT) | PK\_LINE\_TRT\_UE (I\_USER\_EXIT:I\_TRT:ORD\_TRT) |
| **525** | TEST\_KRM | SNP\_LPI\_EXC\_L  OG | LPI\_ELOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_EXC\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:I\_LP\_STEP\_EXCEPT  ) |
| **526** | TEST\_KRM | SNP\_LPI\_RUN | LPI\_RUN\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_RUN (I\_LP\_INST:NB\_RUN) |
| **527** | TEST\_KRM | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_EXC\_FK (I\_LP\_INST:I\_LP\_STEP\_EXCEPT) |

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| **528** | TEST\_KRM | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_STEP\_FK (I\_LP\_INST:PAR\_I\_LP\_STEP) |
| **529** | TEST\_KRM | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_VAR\_FK (I\_LP\_INST:VAR\_NAME) |
| **530** | TEST\_KRM | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_STEP (I\_LP\_INST:I\_LP\_STEP) |
| **531** | TEST\_KRM | SNP\_LPI\_STEP\_  LOG | LPI\_SLOG\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_LOG (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) |
| **532** | TEST\_KRM | SNP\_LPI\_STEP\_  VAR | LPI\_SVAR\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_VAR  (I\_LP\_INST:I\_LP\_STEP:VAR\_NAME) |
| **533** | TEST\_KRM | SNP\_LPI\_VAR | LPI\_VAR\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_VAR (I\_LP\_INST:VAR\_NAME) |
| **534** | TEST\_KRM | SNP\_LPI\_VAR\_  LOG | LPI\_VLOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_VAR\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:VAR\_NAME) |
| **535** | TEST\_KRM | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_EXC\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP\_EXCEPT) |
| **536** | TEST\_KRM | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_STEP\_FK  (I\_LOAD\_PLAN:PAR\_I\_LP\_STEP) |
| **537** | TEST\_KRM | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_VAR\_FK (I\_LOAD\_PLAN:VAR\_NAME) |
| **538** | TEST\_KRM | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_STEP (I\_LOAD\_PLAN:I\_LP\_STEP) |
| **539** | TEST\_KRM | SNP\_LP\_STEP\_  VAR | LP\_STVAR\_STEP\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP) | PK\_LP\_STEP\_VAR  (I\_LOAD\_PLAN:I\_LP\_STEP:VAR\_NAME) |
| **540** | TEST\_KRM | SNP\_LP\_VAR | LP\_VAR\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_VAR (I\_LOAD\_PLAN:VAR\_NAME) |
| **541** | TEST\_KRM | SNP\_MISSING\_  REF | SNP\_MREF\_FK3 (ID\_OBJECT\_PK) | PK\_SNP\_MISSING\_REF  (ID\_OBJECT\_PK:ID\_OBJECT\_FK:REF\_KEY\_NAME) |
| **542** | TEST\_KRM | SNP\_MOD\_FOL  DER | MOD\_FOLDER\_FK1  (PAR\_I\_MOD\_FOLDER) | AK\_MOD\_FOLDER  (PAR\_I\_MOD\_FOLDER:MOD\_FOLDER\_NAME) |
| **543** | TEST\_KRM | SNP\_OBJECT\_I  D\_COL | SNP\_OID\_COL\_FK2 (I\_OBJECT\_ID) | PK\_OBJECT\_ID\_COL (I\_OBJECT\_ID:COL\_ORDER) |
| **544** | TEST\_KRM | SNP\_OBJ\_DIAG | SNP\_OBJ\_DIAG\_FK1 (I\_DIAGRAM) | PK\_SNP\_OBJ\_DIAG  (I\_DIAGRAM:I\_OBJECTS:I\_INSTANCE:SYN\_NUMB) |
| **545** | TEST\_KRM | SNP\_PARAM\_L  PI\_RUN | LPIRPARAM\_LPIR\_FK  (I\_LP\_INST:NB\_RUN) | PK\_PARAM\_LPI\_RUN  (I\_LP\_INST:NB\_RUN:PARAM\_NAME) |
| **546** | TEST\_KRM | SNP\_PARAM\_S  ESS | PARAM\_SESS\_FK (SESS\_NO) | PK\_PARAM\_SESS (SESS\_NO:PARAM\_NAME) |
| **547** | TEST\_KRM | SNP\_PARTITIO  N | IX\_PARTITION\_TABLE (I\_TABLE) | AK\_PARTITION (I\_TABLE:PARTITION\_NAME) |
| **548** | TEST\_KRM | SNP\_POP\_CON  STRAINT | POP\_CONSTRAINT\_FK1 (I\_POP) | PK\_POP\_CONSTRAINT  (I\_POP:CONST\_TYPE:CONST\_NAME) |
| **549** | TEST\_KRM | SNP\_POP\_MAP  PING | PMAP\_PCOL\_FK (I\_POP\_COL) | PK\_POP\_MAPPING (I\_POP\_COL:I\_DATA\_SET) |
| **550** | TEST\_KRM | SNP\_SCEN\_REP  ORT | SCEN\_REPORT\_FK1 (SCEN\_NO) | PK\_SCEN\_REPORT (SCEN\_NO:SCEN\_RUN\_NO) |
| **551** | TEST\_KRM | SNP\_SCEN\_STE  P | SCEN\_STEP\_FK1 (SCEN\_NO) | PK\_SCEN\_STEP (SCEN\_NO:NNO) |
| **552** | TEST\_KRM | SNP\_SCEN\_TAS  K | SCEN\_TASK\_FK1 (SCEN\_NO:NNO) | PK\_SCEN\_TASK (SCEN\_NO:NNO:SCEN\_TASK\_NO) |
| **553** | TEST\_KRM | SNP\_SCEN\_TXT | SCEN\_TXT\_FK1  (SCEN\_NO:NNO:SCEN\_TASK\_NO) | PK\_SCEN\_TXT  (SCEN\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **554** | TEST\_KRM | SNP\_SEQ\_SCEN | SEQ\_SCEN\_FK1 (SCEN\_NO) | PK\_SEQ\_SCEN (SCEN\_NO:SEQ\_NAME) |
| **555** | TEST\_KRM | SNP\_SEQ\_SESS | SEQ\_SESS\_FK1 (SESS\_NO) | PK\_SEQ\_SESS (SESS\_NO:SEQ\_NAME) |
| **556** | TEST\_KRM | SNP\_SESS\_STEP | SESS\_STEP\_FK1 (SESS\_NO) | PK\_SESS\_STEP (SESS\_NO:NNO) |
| **557** | TEST\_KRM | SNP\_SESS\_TAS  K | SESS\_TASK\_FK1 (SESS\_NO:NNO) | PK\_SESS\_TASK (SESS\_NO:NNO:SCEN\_TASK\_NO) |
| **558** | TEST\_KRM | SNP\_SESS\_TAS  K\_LS | SESS\_TASK\_LS\_FK  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_ NO) | PK\_SESS\_TASK\_LS  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_NO:SEQ\_NA ME) |
| **559** | TEST\_KRM | SNP\_STATE2 | SNP\_STATE2\_FK1 (I\_GRP\_STATE) | AK\_SNP\_STATE (I\_GRP\_STATE:STATE\_CODE) |
| **560** | TEST\_KRM | SNP\_STEP\_REP  ORT | STEP\_REPORT\_FK1  (SCEN\_NO:SCEN\_RUN\_NO) | PK\_STEP\_REPORT  (SCEN\_NO:SCEN\_RUN\_NO:NNO:NB\_RUN) |
| **561** | TEST\_KRM | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | AK\_SMOD (I\_MOD:COD\_SMOD) |

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| **562** | TEST\_KRM | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | PK\_SUB\_MODEL (I\_MOD:I\_SMOD) |
| **563** | TEST\_KRM | SNP\_TASK\_TXT | TASK\_TXT\_FK1  (SESS\_NO:NNO:SCEN\_TASK\_NO) | PK\_TASK\_TXT  (SESS\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **564** | TEST\_KRM | SNP\_UE\_USED | UE\_USED\_FK2 (I\_USER\_EXIT) | PK\_UE\_USED  (I\_USER\_EXIT:I\_INSTANCE:I\_UE\_ORIG) |
| **565** | TEST\_KRM | SNP\_USER\_EXI  T | USER\_EXIT\_FK1 (I\_TRT) | AK\_USER\_EXIT (I\_TRT:UE\_NAME) |
| **566** | TEST\_KRM | SNP\_VAR | VAR\_FK1 (I\_PROJECT) | AK\_VAR (I\_PROJECT:VAR\_NAME) |
| **567** | TEST\_KRM | SNP\_VAR\_PLA  N\_AGENT | VAR\_PLAN\_AGENT\_FK1  (I\_PLAN\_AGENT) | PK\_VAR\_PLAN\_AGENT  (I\_PLAN\_AGENT:VAR\_NAME) |
| **568** | TEST\_KRM | SNP\_VAR\_SCE  N | VAR\_SCEN\_FK1 (SCEN\_NO) | PK\_VAR\_SCEN (SCEN\_NO:VAR\_NAME) |
| **569** | TEST\_KRM | SNP\_VAR\_SESS | VAR\_SESS\_FK1 (SESS\_NO) | PK\_VAR\_SESS (SESS\_NO:VAR\_NAME) |
| **570** | TEST\_ODI\_  REPO | SNP\_ACTION | SNP\_ACTION\_FK1 (I\_GRP\_ACTION) | AK\_ACTION (I\_GRP\_ACTION:ACTION\_NAME) |
| **571** | TEST\_ODI\_  REPO | SNP\_ALLOC\_A  GENT | ALLOC\_AGENT\_FK1 (I\_CONTEXT) | PK\_ALLOC\_AGENT (I\_CONTEXT:I\_LAGENT) |
| **572** | TEST\_ODI\_  REPO | SNP\_COL | COL\_FK1 (I\_TABLE) | AK\_COL (I\_TABLE:COL\_NAME) |
| **573** | TEST\_ODI\_  REPO | SNP\_COND | COND\_FK1 (I\_TABLE) | AK\_COND (I\_TABLE:COND\_NAME) |
| **574** | TEST\_ODI\_  REPO | SNP\_CONNECT  \_PROP | CONNECT\_PROP\_FK1 (I\_CONNECT) | PK\_CONNECT\_PROP (I\_CONNECT:PROP\_KEY) |
| **575** | TEST\_ODI\_  REPO | SNP\_CONV\_DT | CONV\_DT\_FK1 (SRC\_DT) | PK\_CONV\_DT (SRC\_DT:I\_TARG\_TECHNO) |
| **576** | TEST\_ODI\_  REPO | SNP\_DATASOU  RCE | DS\_CONNECT\_FK (I\_CONNECT) | PK\_DATASOURCE (I\_CONNECT:I\_AGENT) |
| **577** | TEST\_ODI\_  REPO | SNP\_DIAG\_PAR  AM | SNP\_DIAG\_PARAM\_FK1 (I\_DIAGRAM) | PK\_SNP\_DIAG\_PARAM  (I\_DIAGRAM:PARAM\_NAME) |
| **578** | TEST\_ODI\_  REPO | SNP\_DT | DT\_FK1 (I\_TECHNO) | AK\_DT1 (I\_TECHNO:DT\_DRIVER) |
| **579** | TEST\_ODI\_  REPO | SNP\_DT | DT\_FK1 (I\_TECHNO) | AK\_DT2 (I\_TECHNO:DT\_SOURCE) |
| **580** | TEST\_ODI\_  REPO | SNP\_GRP\_ACTI  ON | GRP\_ACTION\_FK1 (I\_TECHNO) | AK\_GRP\_ACTION (I\_TECHNO:GRP\_NAME) |
| **581** | TEST\_ODI\_  REPO | SNP\_GRP\_ACTI  ON | GRP\_ACTION\_FK1 (I\_TECHNO) | AK\_GRP\_ACTION2 (I\_TECHNO:GRP\_CODE) |
| **582** | TEST\_ODI\_  REPO | SNP\_GRP\_STAT  E | SNP\_GRP\_STATE\_FK1 (I\_PROJECT) | AK\_SNP\_GRP\_STATE  (I\_PROJECT:GRP\_STATE\_CODE) |
| **583** | TEST\_ODI\_  REPO | SNP\_HOST\_MO  D | SNP\_HM\_FK1 (I\_HOST) | PK\_SNP\_HOST\_MOD2 (I\_HOST:I\_MODULE) |
| **584** | TEST\_ODI\_  REPO | SNP\_INDEX\_TY  PE | IDXTYPE\_TEC\_FK1 (I\_TECHNO) | AK\_INDEX\_TYPE (I\_TECHNO:INDEX\_TYPE\_CODE) |
| **585** | TEST\_ODI\_  REPO | SNP\_INST\_OBJ | INST\_OBJ\_FK1 (I\_OBJECTS) | PK\_INST\_OBJ (I\_OBJECTS:I\_INSTANCE) |
| **586** | TEST\_ODI\_  REPO | SNP\_JOIN | JOIN\_FK1 (I\_TABLE\_FK) | AK\_JOIN (I\_TABLE\_FK:FK\_NAME) |
| **587** | TEST\_ODI\_  REPO | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | AK\_JOIN\_COL (I\_JOIN:POS) |
| **588** | TEST\_ODI\_  REPO | SNP\_JOIN\_COL | JOIN\_COL\_FK1 (I\_JOIN) | PK\_JOIN\_COL (I\_JOIN:I\_COL\_FK) |
| **589** | TEST\_ODI\_  REPO | SNP\_KEY | KEY\_FK1 (I\_TABLE) | AK\_KEY (I\_TABLE:KEY\_NAME) |
| **590** | TEST\_ODI\_  REPO | SNP\_KEY\_COL | KEY\_COL\_FK1 (I\_KEY) | PK\_KEY\_COL (I\_KEY:I\_COL) |
| **591** | TEST\_ODI\_  REPO | SNP\_LANG\_TE  CHNO | LANG\_TECHNO\_FK2 (I\_TECHNO) | PK\_LANG\_TECHNO (I\_TECHNO:I\_LANG) |

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| **592** | TEST\_ODI\_  REPO | SNP\_LB\_AGEN  T | SNP\_LB\_AGT\_FK1 (I\_MASTER) | PK\_LB\_AGENT (I\_MASTER:I\_SLAVE) |
| **593** | TEST\_ODI\_  REPO | SNP\_LE\_TECH  NO | LE\_TECHNO\_FK1 (I\_LANG\_ELT) | PK\_LE\_TECHNO (I\_LANG\_ELT:I\_TECHNO) |
| **594** | TEST\_ODI\_  REPO | SNP\_LINE\_ACT  ION | LINE\_ACTION\_FK1 (I\_ACTION) | PK\_LINE\_ACTION (I\_ACTION:ORD\_ACTION) |
| **595** | TEST\_ODI\_  REPO | SNP\_LINE\_TRT | LINE\_TRT\_FK1 (I\_TRT) | PK\_LINE\_TRT (I\_TRT:ORD\_TRT) |
| **596** | TEST\_ODI\_  REPO | SNP\_LINE\_TRT  \_UE | LINE\_TRT\_UE\_FK1 (I\_USER\_EXIT) | PK\_LINE\_TRT\_UE (I\_USER\_EXIT:I\_TRT:ORD\_TRT) |
| **597** | TEST\_ODI\_  REPO | SNP\_LPI\_EXC\_L  OG | LPI\_ELOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_EXC\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:I\_LP\_STEP\_EXCEPT  ) |
| **598** | TEST\_ODI\_  REPO | SNP\_LPI\_RUN | LPI\_RUN\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_RUN (I\_LP\_INST:NB\_RUN) |
| **599** | TEST\_ODI\_  REPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_EXC\_FK (I\_LP\_INST:I\_LP\_STEP\_EXCEPT) |
| **600** | TEST\_ODI\_  REPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_STEP\_FK (I\_LP\_INST:PAR\_I\_LP\_STEP) |
| **601** | TEST\_ODI\_  REPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | LPI\_STEP\_VAR\_FK (I\_LP\_INST:VAR\_NAME) |
| **602** | TEST\_ODI\_  REPO | SNP\_LPI\_STEP | LPI\_STEP\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_STEP (I\_LP\_INST:I\_LP\_STEP) |
| **603** | TEST\_ODI\_  REPO | SNP\_LPI\_STEP\_  LOG | LPI\_SLOG\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_LOG (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) |
| **604** | TEST\_ODI\_  REPO | SNP\_LPI\_STEP\_  VAR | LPI\_SVAR\_STEP\_FK  (I\_LP\_INST:I\_LP\_STEP) | PK\_LPI\_STEP\_VAR  (I\_LP\_INST:I\_LP\_STEP:VAR\_NAME) |
| **605** | TEST\_ODI\_  REPO | SNP\_LPI\_VAR | LPI\_VAR\_LPI\_FK (I\_LP\_INST) | PK\_LPI\_VAR (I\_LP\_INST:VAR\_NAME) |
| **606** | TEST\_ODI\_  REPO | SNP\_LPI\_VAR\_  LOG | LPI\_VLOG\_SLOG\_FK  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN) | PK\_LPI\_VAR\_LOG  (I\_LP\_INST:I\_LP\_STEP:NB\_RUN:VAR\_NAME) |
| **607** | TEST\_ODI\_  REPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_EXC\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP\_EXCEPT) |
| **608** | TEST\_ODI\_  REPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_STEP\_FK  (I\_LOAD\_PLAN:PAR\_I\_LP\_STEP) |
| **609** | TEST\_ODI\_  REPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | LP\_STEP\_VAR\_FK (I\_LOAD\_PLAN:VAR\_NAME) |
| **610** | TEST\_ODI\_  REPO | SNP\_LP\_STEP | LP\_STEP\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_STEP (I\_LOAD\_PLAN:I\_LP\_STEP) |
| **611** | TEST\_ODI\_  REPO | SNP\_LP\_STEP\_  VAR | LP\_STVAR\_STEP\_FK  (I\_LOAD\_PLAN:I\_LP\_STEP) | PK\_LP\_STEP\_VAR  (I\_LOAD\_PLAN:I\_LP\_STEP:VAR\_NAME) |
| **612** | TEST\_ODI\_  REPO | SNP\_LP\_VAR | LP\_VAR\_LP\_FK (I\_LOAD\_PLAN) | PK\_LP\_VAR (I\_LOAD\_PLAN:VAR\_NAME) |
| **613** | TEST\_ODI\_  REPO | SNP\_MISSING\_  REF | SNP\_MREF\_FK3 (ID\_OBJECT\_PK) | PK\_SNP\_MISSING\_REF  (ID\_OBJECT\_PK:ID\_OBJECT\_FK:REF\_KEY\_NAME) |
| **614** | TEST\_ODI\_  REPO | SNP\_MOD\_FOL  DER | MOD\_FOLDER\_FK1  (PAR\_I\_MOD\_FOLDER) | AK\_MOD\_FOLDER  (PAR\_I\_MOD\_FOLDER:MOD\_FOLDER\_NAME) |
| **615** | TEST\_ODI\_  REPO | SNP\_MTXT\_PA  RT | MTXT\_PART\_FK1 (I\_TXT) | PK\_MTXT\_P (I\_TXT:TXT\_ORD) |
| **616** | TEST\_ODI\_  REPO | SNP\_OBJECT\_I  D\_COL | SNP\_OID\_COL\_FK2 (I\_OBJECT\_ID) | PK\_OBJECT\_ID\_COL (I\_OBJECT\_ID:COL\_ORDER) |
| **617** | TEST\_ODI\_  REPO | SNP\_OBJ\_DIAG | SNP\_OBJ\_DIAG\_FK1 (I\_DIAGRAM) | PK\_SNP\_OBJ\_DIAG  (I\_DIAGRAM:I\_OBJECTS:I\_INSTANCE:SYN\_NUMB) |
| **618** | TEST\_ODI\_  REPO | SNP\_PARAM\_L  PI\_RUN | LPIRPARAM\_LPIR\_FK  (I\_LP\_INST:NB\_RUN) | PK\_PARAM\_LPI\_RUN  (I\_LP\_INST:NB\_RUN:PARAM\_NAME) |
| **619** | TEST\_ODI\_  REPO | SNP\_PARAM\_S  ESS | PARAM\_SESS\_FK (SESS\_NO) | PK\_PARAM\_SESS (SESS\_NO:PARAM\_NAME) |
| **620** | TEST\_ODI\_  REPO | SNP\_PARTITIO  N | IX\_PARTITION\_TABLE (I\_TABLE) | AK\_PARTITION (I\_TABLE:PARTITION\_NAME) |

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| **621** | TEST\_ODI\_  REPO | SNP\_POP\_CON  STRAINT | POP\_CONSTRAINT\_FK1 (I\_POP) | PK\_POP\_CONSTRAINT  (I\_POP:CONST\_TYPE:CONST\_NAME) |
| **622** | TEST\_ODI\_  REPO | SNP\_POP\_MAP  PING | PMAP\_PCOL\_FK (I\_POP\_COL) | PK\_POP\_MAPPING (I\_POP\_COL:I\_DATA\_SET) |
| **623** | TEST\_ODI\_  REPO | SNP\_PROF\_ME  TH | PROF\_METH\_FK1 (I\_PROF) | PK\_PROF\_METH (I\_PROF:I\_METH) |
| **624** | TEST\_ODI\_  REPO | SNP\_PSCHEMA | PSCHEMA\_FK1 (I\_CONNECT) | AK\_PSCHEMA  (I\_CONNECT:CATALOG\_NAME:SCHEMA\_NAME) |
| **625** | TEST\_ODI\_  REPO | SNP\_PSCHEMA  \_CONT | PSCHEMA\_CONT\_FK1 (I\_CONTEXT) | PK\_PSCHEMA\_CONT (I\_CONTEXT:I\_LSCHEMA) |
| **626** | TEST\_ODI\_  REPO | SNP\_SCEN\_REP  ORT | SCEN\_REPORT\_FK1 (SCEN\_NO) | PK\_SCEN\_REPORT (SCEN\_NO:SCEN\_RUN\_NO) |
| **627** | TEST\_ODI\_  REPO | SNP\_SCEN\_STE  P | SCEN\_STEP\_FK1 (SCEN\_NO) | PK\_SCEN\_STEP (SCEN\_NO:NNO) |
| **628** | TEST\_ODI\_  REPO | SNP\_SCEN\_TAS  K | SCEN\_TASK\_FK1 (SCEN\_NO:NNO) | PK\_SCEN\_TASK (SCEN\_NO:NNO:SCEN\_TASK\_NO) |
| **629** | TEST\_ODI\_  REPO | SNP\_SCEN\_TXT | SCEN\_TXT\_FK1  (SCEN\_NO:NNO:SCEN\_TASK\_NO) | PK\_SCEN\_TXT  (SCEN\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **630** | TEST\_ODI\_  REPO | SNP\_SEQ\_SCEN | SEQ\_SCEN\_FK1 (SCEN\_NO) | PK\_SEQ\_SCEN (SCEN\_NO:SEQ\_NAME) |
| **631** | TEST\_ODI\_  REPO | SNP\_SEQ\_SESS | SEQ\_SESS\_FK1 (SESS\_NO) | PK\_SEQ\_SESS (SESS\_NO:SEQ\_NAME) |
| **632** | TEST\_ODI\_  REPO | SNP\_SESS\_STEP | SESS\_STEP\_FK1 (SESS\_NO) | PK\_SESS\_STEP (SESS\_NO:NNO) |
| **633** | TEST\_ODI\_  REPO | SNP\_SESS\_TAS  K | SESS\_TASK\_FK1 (SESS\_NO:NNO) | PK\_SESS\_TASK (SESS\_NO:NNO:SCEN\_TASK\_NO) |
| **634** | TEST\_ODI\_  REPO | SNP\_SESS\_TAS  K\_LS | SESS\_TASK\_LS\_FK  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_ NO) | PK\_SESS\_TASK\_LS  (SESS\_NO:NNO:NB\_RUN:SCEN\_TASK\_NO:SEQ\_NA ME) |
| **635** | TEST\_ODI\_  REPO | SNP\_STATE2 | SNP\_STATE2\_FK1 (I\_GRP\_STATE) | AK\_SNP\_STATE (I\_GRP\_STATE:STATE\_CODE) |
| **636** | TEST\_ODI\_  REPO | SNP\_STEP\_REP  ORT | STEP\_REPORT\_FK1  (SCEN\_NO:SCEN\_RUN\_NO) | PK\_STEP\_REPORT  (SCEN\_NO:SCEN\_RUN\_NO:NNO:NB\_RUN) |
| **637** | TEST\_ODI\_  REPO | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | AK\_SMOD (I\_MOD:COD\_SMOD) |
| **638** | TEST\_ODI\_  REPO | SNP\_SUB\_MOD  EL | SUB\_MODEL\_FK1 (I\_MOD) | PK\_SUB\_MODEL (I\_MOD:I\_SMOD) |
| **639** | TEST\_ODI\_  REPO | SNP\_TASK\_TXT | TASK\_TXT\_FK1  (SESS\_NO:NNO:SCEN\_TASK\_NO) | PK\_TASK\_TXT  (SESS\_NO:NNO:SCEN\_TASK\_NO:ORD\_TYPE:TXT\_ ORD) |
| **640** | TEST\_ODI\_  REPO | SNP\_UE\_USED | UE\_USED\_FK2 (I\_USER\_EXIT) | PK\_UE\_USED  (I\_USER\_EXIT:I\_INSTANCE:I\_UE\_ORIG) |
| **641** | TEST\_ODI\_  REPO | SNP\_USER\_EXI  T | USER\_EXIT\_FK1 (I\_TRT) | AK\_USER\_EXIT (I\_TRT:UE\_NAME) |
| **642** | TEST\_ODI\_  REPO | SNP\_USER\_ME  TH | USER\_METH\_FK1 (I\_WUSER) | PK\_USER\_METH (I\_WUSER:I\_METH) |
| **643** | TEST\_ODI\_  REPO | SNP\_USER\_OBJ  \_METH | USER\_OBJ\_METH\_FK1 (I\_METH) | AK\_USER\_OBJ\_METH  (I\_METH:I\_WUSER:I\_CONTEXT:I\_OBJECTS:I\_INSTA NCE) |
| **644** | TEST\_ODI\_  REPO | SNP\_USER\_PRO  F | USER\_PROF\_FK1 (I\_WUSER) | PK\_USER\_PROF (I\_WUSER:I\_PROF) |
| **645** | TEST\_ODI\_  REPO | SNP\_VAR | VAR\_FK1 (I\_PROJECT) | AK\_VAR (I\_PROJECT:VAR\_NAME) |
| **646** | TEST\_ODI\_  REPO | SNP\_VAR\_PLA  N\_AGENT | VAR\_PLAN\_AGENT\_FK1  (I\_PLAN\_AGENT) | PK\_VAR\_PLAN\_AGENT  (I\_PLAN\_AGENT:VAR\_NAME) |
| **647** | TEST\_ODI\_  REPO | SNP\_VAR\_SCE  N | VAR\_SCEN\_FK1 (SCEN\_NO) | PK\_VAR\_SCEN (SCEN\_NO:VAR\_NAME) |
| **648** | TEST\_ODI\_ | SNP\_VAR\_SESS | VAR\_SESS\_FK1 (SESS\_NO) | PK\_VAR\_SESS (SESS\_NO:VAR\_NAME) |
|  | REPO |  |  |  |

**Recommendation**: Drop redundant index to reduce overhead on DML & release storage space.

## Tables candidate for partitioning

These table has size larger than 10GB & can be partitioned for better query performance.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **OWNER** | **TABLE NAME** | **MB** | **NUM ROWS** | **LAST\_ANALYZED** |
| **DWH** | ACCOUNT\_IPL | 21444 | 4105838 | 2016-09-12/16:24:50 |
| **DWH** | INFO\_CARD | 12637 | 4054452 | 2016-01-23/18:36:57 |
| **DWH2015** | BK\_RE\_CRF\_SBVGL | 47921 | 168337026 | 2016-01-06/01:52:49 |
| **DWH2015** | GROUP\_ACCOUNT | 42497 | 890844702 | 2016-01-06/03:44:04 |
| **DWH2015** | CONSOLIDATE\_ASST\_LIAB | 39274 | 88394971 | 2016-01-06/03:35:43 |
| **DWH2015** | DEPO\_WITHDRA | 21522 | 17962247 | 2016-01-06/03:38:26 |
| **DWH2015** | CMS\_CONTRACTINTEREST | 12517 | 123789313 | 2016-01-06/01:57:14 |
| **EDW\_DMT** | CNL\_TXN\_ANL\_FCT\_BK2 | 14831 | 183582440 | 2014-08-02/14:15:12 |
| **EDW\_DMT** | CST\_INSIGHT\_ANL\_FCT\_BK2 | 11487 | 32545466 | 2014-07-31/00:15:15 |
| **KRM\_APP** | NIRESTXN | 16172 | 86799163 | 2013-09-25/16:36:08 |
| **TCB\_DWH\_VAS** | R310\_TAB\_2 | 64164 | 69430031 | 2013-09-20/01:48:22 |
| **TCB\_DWH\_VAS** | R304\_TAB\_MIS | 54667 | 568091821 | 2013-09-07/21:44:55 |
| **TCB\_DWH\_VAS** | R\_TBL\_LN\_0002\_04 | 38946 | 151270460 | 2013-08-27/23:31:10 |
| **TCB\_DWH\_VAS** | R306\_TAB1 | 33573 | 333890861 | 2013-08-19/06:20:01 |
| **TCB\_DWH\_VAS** | R301\_TAB\_MIS | 16247 | 121968150 | 2013-09-07/20:39:29 |
| **TCB\_DWH\_VAS** | R\_TBL\_000019\_STMT | 16131 | 23903955 | 2013-08-19/11:49:29 |
| **TCB\_DWH\_VAS** | R318\_TAB1 | 10731 | 109951663 | 2013-08-19/08:26:47 |

**Recommendation**: Partition large table to reduce full table scan time.

## Table partitioned but index non-partitioned

Tables below are partitioned but some of its index is not partition. This is ineffective as index cannot utilize benefit of smaller tree in case index is also partition. Index tree is bigger & when there is maintaining operation, index will be invalid if UPDATE GLOBAL INDEX option is not used.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **OWNER** | **INDEX\_NAME** | **TABLE\_NAME** | **NUM ROWS** | **DISTINCT**  **KEYS** |
| **TCB\_DWH\_VAS** | IDX\_MCO\_NEW\_TK | MCO\_TCB\_NEW | 1,075,267,021 | 286 |
| **TCB\_DWH\_VAS** | IDX\_MCO\_NEW\_YM | MCO\_TCB\_NEW | 1,075,267,021 | 22 |
| **TCB\_DWH\_VAS** | IDX\_MCO\_YMONTH\_YNGA  YBC | MCO\_TCB\_NEW | 1,075,267,021 | 614 |
| **DWH2015** | IDX\_ACCOUNT\_C\_CUSTOM  ER | ACCOUNT | 953,357,391 | 2,756,352 |
| **DWH2015** | PK\_ACCOUNT\_C | ACCOUNT | 953,357,391 | 926,294,317 |

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| --- | --- | --- | --- | --- |
| **DWH2015** | PK\_PROTOCOL | PROTOCOL | 422,349,774 | 410,720,347 |
| **DWH2015** | PK\_CMSTR | CMS\_TRANSACTION | 408,885,684 | 387,700,834 |
| **DWH2015** | IDX\_STMT\_ENTRY\_BD\_ACC | STMT\_ENTRY | 321,757,811 | 75,329,594 |
| **DWH2015** | IDX\_STMT\_ENTRY\_BD\_CUS | STMT\_ENTRY | 321,757,811 | 57,213,570 |
| **DWH2015** | PK\_IDX\_STMT\_ENTRY\_ID | STMT\_ENTRY | 321,757,811 | 318,623,941 |
| **DWH2015** | STMT\_ENTRY\_BOOKING\_D  ATE | STMT\_ENTRY | 321,757,811 | 298 |
| **DWH** | PK\_CMSTR | CMS\_TRANSACTION | 234,151,068 | 409,246,106 |
| **TCB\_DWH\_VAS** | IDX\_LINE\_NO | R312\_TAB11F | 218,848,210 | 616 |
| **TCB\_DWH\_VAS** | IDX\_R312TAB11F\_MTH | R312\_TAB11F | 218,848,210 | 35 |
| **TCB\_DWH\_VAS** | IDX\_R312\_TAB11F\_001 | R312\_TAB11F | 218,848,210 | 29,078 |
| **TCB\_DWH\_VAS** | IDX\_R312\_TAB11F\_002 | R312\_TAB11F | 218,848,210 | 175 |
| **TCB\_DWH\_VAS** | IDX\_R312\_TAB11F\_003 | R312\_TAB11F | 218,848,210 | 20 |
| **TCB\_DWH\_VAS** | IDX\_SYSTEM\_DATE | R312\_TAB11F | 218,848,210 | 930 |
| **DWH2015** | PK\_ECB\_TSD | EB\_CONTRACT\_BALANCES  \_TSD | 207,010,329 | 218,701,255 |
| **DWH2015** | IDX\_RCSE\_BKDATE\_CUS | RE\_CONSOL\_SPEC\_ENTRY | 171,602,295 | 71,266,890 |
| **DWH2015** | IDX\_RCSE\_BOOKING\_DATE | RE\_CONSOL\_SPEC\_ENTRY | 171,602,295 | 367 |
| **DWH2015** | PK\_RCSE | RE\_CONSOL\_SPEC\_ENTRY | 171,602,295 | 179,715,362 |
| **DWH2015** | CATEG\_BOOKINGDATE | CATEG\_ENTRY | 166,843,694 | 298 |
| **DWH2015** | IDX\_FACT\_CATEG\_ENTRY | CATEG\_ENTRY | 166,843,694 | 88,780,953 |
| **DWH2015** | PK\_CATEG | CATEG\_ENTRY | 166,843,694 | 166,963,001 |
| **DWH** | IDX\_STMT\_ENTRY\_BD\_ACC | STMT\_ENTRY | 162,033,055 | 30,847,096 |
| **DWH** | IDX\_STMT\_ENTRY\_BD\_CUS | STMT\_ENTRY | 162,033,055 | 26,899,923 |
| **DWH** | PK\_STMT\_ENTRY\_ID\_CONS  T | STMT\_ENTRY | 162,033,055 | 155,718,971 |
| **KRM\_RPT** | PORT\_FTP\_ALL\_IDX | KRM\_SYN\_PORT\_FTP\_ALL | 148,629,814 | 151,872,501 |
| **KRM\_RPT** | PORT\_FTP\_ALL\_TP\_ADJ5\_I  D\_IDX | KRM\_SYN\_PORT\_FTP\_ALL | 148,629,814 | 1 |
| **KRM\_RPT** | PORT\_FTP\_ALL\_U\_COCODE  \_IDX | KRM\_SYN\_PORT\_FTP\_ALL | 148,629,814 | 332 |
| **KRM\_RPT** | PORT\_FTP\_ALL\_U\_SOGIAO  DICH\_IDX | KRM\_SYN\_PORT\_FTP\_ALL | 148,629,814 | 3,249 |
| **DWH2015** | LMM\_ACCOUNT\_BALANC  ES\_DATE | LMM\_ACCOUNT\_BALANCE  S | 140,633,160 | 298 |
| **DWH2015** | PK\_IDX\_LMM\_ACC\_BAL | LMM\_ACCOUNT\_BALANCE  S | 140,633,160 | 146,337,779 |
| **DWH** | PK\_CMS\_COLLECTIONCEN  TRALBANK\_C | CMS\_COLLECTIONCENTRA  LBANK | 128,103,870 | 125,605,140 |
| **DWH2015** | PK\_CMS\_COLLECTIONCEN  TRALBANK\_C | CMS\_COLLECTIONCENTRA  LBANK | 117,906,046 | 116,619,911 |
| **KRM\_APP** | FTP\_OUT\_IDX11 | FTP\_OUT | 90,143,676 | 32 |
| **KRM\_APP** | FTP\_OUT\_UIDX1 | FTP\_OUT | 90,143,676 | 89,895,671 |
| **DWH2015** | IDX\_RSLC\_PDATE | RE\_STAT\_LINE\_CONT | 77,184,851 | 298 |
| **DWH2015** | PK\_RSLC | RE\_STAT\_LINE\_CONT | 77,184,851 | 72,421,466 |
| **DWH** | PK\_PROTOCOL | PROTOCOL | 64,378,450 | 64,867,360 |
| **DWH2015** | PK\_PDB | PD\_BALANCES | 56,192,956 | 56,615,748 |
| **TCB\_DWH\_VAS** | IDX\_SDBQ\_CONTID | SDBQ\_DETAILS | 54,634,729 | 5,898,888 |
| **TCB\_DWH\_VAS** | IDX\_SDBQ\_YEARMONTH | SDBQ\_DETAILS | 54,634,729 | 24 |
| **DWH2015** | IDX\_FT\_PROCESSDATE\_CR | FUNDS\_TRANSFER | 53,171,345 | 16,804,319 |

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|  | EDITACC |  |  |  |
| **DWH2015** | IDX\_FT\_PROCESSDATE\_DE  BITACC | FUNDS\_TRANSFER | 53,171,345 | 26,479,581 |
| **DWH2015** | IDX\_FT\_PROCESSING\_DATE | FUNDS\_TRANSFER | 53,171,345 | 363 |
| **DWH2015** | IDX\_FT\_REF | FUNDS\_TRANSFER | 53,171,345 | 55,457,414 |
| **DWH2015** | IDX\_TXN\_LOG\_TCB\_SV\_ID | TXN\_LOG\_TCB\_SV | 44,927,854 | 558,544 |
| **DWH2015** | IDX\_TXN\_LOG\_TCB\_SV\_WD | TXN\_LOG\_TCB\_SV | 44,927,854 | 298 |
| **TCB\_DWH\_VAS** | IDX\_R\_TBL\_OT\_0001\_1 | R\_TBL\_OT\_0001\_DATA | 29,608,979 | 1,035,087 |
| **TCB\_DWH\_VAS** | IDX\_R\_TBL\_OT\_0001\_2 | R\_TBL\_OT\_0001\_DATA | 29,608,979 | 481,745 |
| **TCB\_DWH\_VAS** | IDX\_R\_TBL\_OT\_0001\_3 | R\_TBL\_OT\_0001\_DATA | 29,608,979 | 514,613 |
| **DWH2015** | IDX\_POS\_PROCESS\_DATE | POS\_MVMT\_LWORK\_DAY | 28,129,940 | 298 |
| **DWH2015** | PK\_PMLD | POS\_MVMT\_LWORK\_DAY | 28,129,940 | 27,627,114 |
| **DWH2015** | IDX\_FACT\_RSLB | RE\_STAT\_LINE\_BAL | 27,762,517 | 326 |
| **DWH2015** | IDX\_RSLB\_PED | RE\_STAT\_LINE\_BAL | 27,762,517 | 298 |
| **DWH2015** | PK\_RSLB | RE\_STAT\_LINE\_BAL | 27,762,517 | 28,901,383 |
| **DWH2015** | RSLB\_PROCESS\_DATE | RE\_STAT\_LINE\_BAL | 27,762,517 | 298 |
| **DWH** | IDX\_FT\_PROCESSDATE\_CR  EDITACC | FUNDS\_TRANSFER | 26,586,724 | 7,939,320 |
| **DWH** | IDX\_FT\_PROCESSDATE\_DE  BITACC | FUNDS\_TRANSFER | 26,586,724 | 13,588,348 |
| **DWH** | IDX\_FT\_PROCESSING\_DATE | FUNDS\_TRANSFER | 26,586,724 | 210 |
| **DWH** | IDX\_FT\_REF | FUNDS\_TRANSFER | 26,586,724 | 26,489,927 |
| **TCB\_DWH\_VAS** | IDX\_R\_TBL\_CM\_0001\_1 | R\_TBL\_CM\_0001 | 24,460,324 | 18,317,562 |
| **TCB\_DWH\_VAS** | IDX\_R\_TBL\_CM\_0001\_2 | R\_TBL\_CM\_0001 | 24,460,324 | 11,667,768 |
| **TCB\_DWH\_VAS** | TBL\_R\_PRD\_000001\_IDX1 | TBL\_R\_PRD\_000001 | 24,217,961 | 12,065,076 |
| **TCB\_DWH\_VAS** | TBL\_R\_PRD\_000001\_IDX2 | TBL\_R\_PRD\_000001 | 24,217,961 | 7,176,030 |
| **DWH2015** | PK\_LIM\_TSD | LIMIT\_TSD | 21,716,157 | 20,827,890 |
| **DWH2015** | PK\_PDP | PD\_PAYMENT\_DUE | 18,301,595 | 18,528,354 |
| **DWH** | PK\_LIM\_TSD | LIMIT\_TSD | 14,256,527 | 13,123,077 |
| **DWH** | IDX\_FACT\_CATEG\_ENTRY | CATEG\_ENTRY | 10,566,799 | 5,087,888 |
| **DWH** | PK\_CATEG\_CONST | CATEG\_ENTRY | 10,566,799 | 10,499,178 |
| **DWH** | IDX\_RCSE\_BKDATE\_CUS | RE\_CONSOL\_SPEC\_ENTRY | 10,230,303 | 3,958,214 |
| **DWH** | PK\_RCSE\_CONST | RE\_CONSOL\_SPEC\_ENTRY | 10,230,303 | 9,542,417 |
| **DWH2015** | PK\_CUS\_TSD | CUSTOMER\_TSD | 10,112,488 | 9,975,187 |
| **DWH2015** | IDX\_AC\_CHARGE\_REQUES  T | AC\_CHARGE\_REQUEST | 9,928,956 | 9,923,461 |
| **DWH** | LMM\_ACCOUNT\_BALANC  ES\_DATE | LMM\_ACCOUNT\_BALANCE  S | 8,467,318 | 158 |
| **DWH2015** | PK\_DNCI | DC\_NEW\_COLLECTION\_ITE  M | 7,992,974 | 8,204,457 |
| **DWH2015** | PK\_LMM\_SCH\_TSD | LMM\_SCHEDULES\_TSD | 7,870,436 | 7,745,642 |
| **DWH2015** | PK\_LMMSD\_TSD | LMM\_SCHEDULE\_DATES\_T  SD | 6,752,492 | 6,255,056 |
| **DWH** | IDX\_TXN\_LOG\_TCB\_SV\_ID | TXN\_LOG\_TCB\_SV | 5,993,830 | 68,862 |
| **DWH** | PK\_CUS\_TSD\_CONST | CUSTOMER\_TSD | 5,529,189 | 5,535,815 |
| **DWH2015** | PK\_MM\_TSD | MM\_MONEY\_MARKET\_TSD | 5,515,362 | 5,880,863 |
| **DWH** | PK\_MM\_TSD | MM\_MONEY\_MARKET\_TSD | 4,689,850 | 4,581,870 |
| **TCB\_LIVE2012** | IDX\_ORDER\_ID\_BK | HOMEBANKING\_BK | 4,493,641 | 593,652 |
| **TCB\_LIVE2012** | IDX\_STMT\_ENTRY\_ID\_BK | HOMEBANKING\_BK | 4,493,641 | 4,493,641 |
| **TCB\_LIVE2012** | IDX\_TRANS\_ENTRY\_ID\_BK | HOMEBANKING\_BK | 4,493,641 | 4,493,641 |

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| **DWH** | PK\_RSLC\_CONST | RE\_STAT\_LINE\_CONT | 4,447,404 | 4,284,929 |
| **DWH2015** | PK\_QLT\_TSD | QUANLYTHE\_TSD | 2,977,319 | 2,913,263 |
| **DWH** | PK\_QLT\_TSD\_CONST | QUANLYTHE\_TSD | 2,850,124 | 2,685,478 |
| **DWH** | IDX\_FACT\_RSLB | RE\_STAT\_LINE\_BAL | 2,730,020 | 296 |
| **DWH** | IDX\_RSLB\_PED | RE\_STAT\_LINE\_BAL | 2,730,020 | 38 |
| **DWH** | PK\_RSLB | RE\_STAT\_LINE\_BAL | 2,730,020 | 2,735,110 |
| **KRM\_RPT** | TST\_PORT\_FTP\_IDX | KRM\_SYN\_PORT\_FTP\_ALL\_  TST | 2,553,042 | 2,553,042 |
| **KRM\_RPT** | TST\_PORT\_FTP\_U\_COCODE  \_IDX | KRM\_SYN\_PORT\_FTP\_ALL\_  TST | 2,553,042 | 329 |
| **KRM\_RPT** | TST\_PORT\_FTP\_U\_SOGIAO  DICH\_IDX | KRM\_SYN\_PORT\_FTP\_ALL\_  TST | 2,553,042 | 493 |
| **KRM\_RPT** | TST\_PORT\_TP\_ADJ5\_ID\_IDX | KRM\_SYN\_PORT\_FTP\_ALL\_  TST | 2,553,042 | 1 |
| **DWH** | PK\_PMLD | POS\_MVMT\_LWORK\_DAY | 2,507,690 | 2,611,990 |
| **DWH** | PK\_LD\_TSD\_CONST | LD\_LOANS\_AND\_DEPOSITS  \_TSD | 2,149,505 | 2,181,691 |
| **DWH2015** | PK\_ACLE\_TSD | AC\_LOCKED\_EVENTS\_TSD | 2,113,854 | 2,240,689 |
| **DWH2015** | PK\_LD\_TSD | LD\_LOANS\_AND\_DEPOSITS  \_TSD | 1,699,443 | 1,743,481 |
| **DWH2015** | PK\_LSD\_TSD | LD\_SCHEDULE\_DEFINE\_TS  D | 1,510,525 | 1,485,063 |
| **DWH** | PK\_CITCB\_TSD\_CONST | CHOICE\_INTEREST\_TCB\_TS  D | 1,434,348 | 1,437,230 |
| **DWH2015** | PK\_CITCB\_TSD | CHOICE\_INTEREST\_TCB\_TS  D | 1,434,149 | 1,425,286 |
| **DWH** | PK\_ACLE\_TSD\_CONST | AC\_LOCKED\_EVENTS\_TSD | 1,425,380 | 1,468,597 |
| **DWH** | PK\_PDP\_CONST | PD\_PAYMENT\_DUE | 1,279,379 | 1,279,015 |
| **DWH** | PK\_LMM\_SCH\_TSD\_CONST | LMM\_SCHEDULES\_TSD | 1,220,188 | 1,244,140 |
| **DWH** | PK\_AZA\_TSD\_CONST | AZ\_ACCOUNT\_TSD | 923,770 | 877,916 |
| **DWH** | PK\_LSD\_TSD\_CONST | LD\_SCHEDULE\_DEFINE\_TS  D | 881,578 | 881,578 |
| **DWH2015** | IDX\_EB\_SYSTEM\_DATE | EB\_SYSTEM\_SUMMARY\_TC  B\_SV | 835,141 | 297 |
| **DWH** | PK\_LMMSD\_TSD\_CONST | LMM\_SCHEDULE\_DATES\_T  SD | 821,252 | 821,252 |
| **DWH2015** | PK\_AZA\_TSD | AZ\_ACCOUNT\_TSD | 550,050 | 550,050 |
| **DWH** | PK\_DNCI\_CONST | DC\_NEW\_COLLECTION\_ITE  M | 524,536 | 524,536 |
| **DWH2015** | PK\_COLL\_TSD | COLLATERAL\_TSD | 481,699 | 481,699 |
| **DWH2015** | PK\_ACACCT\_LINK\_TSD | AC\_ACCOUNT\_LINK\_TSD | 432,480 | 432,480 |
| **DWH2015** | PK\_USE\_TSD | USERTBL\_TSD | 372,937 | 372,937 |
| **DWH** | PK\_COLL\_TSD\_CONST | COLLATERAL\_TSD | 343,908 | 343,908 |
| **DWH** | PK\_QLPQ\_TCB\_TSD\_CONST | QUANLY\_PHATQUA\_TCB\_T  SD | 299,676 | 299,676 |
| **DWH2015** | IDX\_FACT\_SEC\_POS | SECURITY\_POSITION | 219,072 | 802 |
| **DWH2015** | PK\_SECP | SECURITY\_POSITION | 219,072 | 219,072 |
| **DWH2015** | PK\_QLPQ\_TCB\_TSD | QUANLY\_PHATQUA\_TCB\_T  SD | 211,492 | 211,492 |
| **DWH2015** | PK\_FX\_TSD | FOREX\_TSD | 158,852 | 158,852 |
| **KRM\_RPT** | FTP\_BASE\_MKB\_IDX | KRM\_SYN\_PORT\_TODAY\_M | 146,709 | 234,159 |

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|  |  | KB |  |  |
| **KRM\_RPT** | FTP\_BASE\_MKB\_U\_COCOD  E\_IDX | KRM\_SYN\_PORT\_TODAY\_M  KB | 146,709 | 10 |
| **DWH** | PK\_DCV\_UUDAI\_TSD | DCV\_UDLS\_DACBIET\_TCB\_  TSD | 112,370 | 112,423 |
| **DWH2015** | PK\_SAM\_TSD | SEC\_ACC\_MASTER\_TSD | 106,033 | 106,033 |
| **DWH2015** | PK\_EB\_SYSTEM\_SUMMARY | EB\_SYSTEM\_SUMMARY | 101,666 | 101,666 |
| **DWH2015** | PK\_PI | PERIODIC\_INTEREST | 85,086 | 85,086 |
| **DWH** | PK\_USE\_TSD\_CONST | USERTBL\_TSD | 80,281 | 80,281 |
| **DWH** | IDX\_FACT\_SEC\_POS | SECURITY\_POSITION | 33,400 | 802 |
| **DWH** | PK\_SECP | SECURITY\_POSITION | 33,400 | 33,402 |
| **DWH2015** | PK\_DCV\_UUDAI\_TSD | DCV\_UDLS\_DACBIET\_TCB\_  TSD | 31,271 | 31,271 |
| **DWH** | PK\_FX\_TSD | FOREX\_TSD | 26,060 | 26,354 |
| **DWH** | PK\_ACACCT\_LINK\_TSD\_CO  NST | AC\_ACCOUNT\_LINK\_TSD | 23,744 | 23,744 |
| **DWH** | PK\_SAM\_TSD | SEC\_ACC\_MASTER\_TSD | 14,025 | 13,870 |
| **DWH2015** | PK\_ACCOUNT\_CLOSURE\_T  SD | ACCOUNT\_CLOSURE\_TSD | 7,533 | 7,533 |
| **DWH** | PK\_EB\_SYSTEM\_SUMMARY  \_CONST | EB\_SYSTEM\_SUMMARY | 7,075 | 7,075 |
| **DWH** | PK\_PI\_CONST | PERIODIC\_INTEREST | 4,828 | 4,828 |
| **DWH2015** | PK\_TRA\_TSD | TRANSACTION\_CODE\_TSD | 1,484 | 1,484 |
| **DWH** | PK\_ACCOUNT\_CLOSURE\_T  SD\_CONST | ACCOUNT\_CLOSURE\_TSD | 955 | 955 |
| **DWH2015** | PK\_PDPA\_TSD | PD\_PARAMETER\_TSD | 894 | 894 |
| **DWH2015** | PK\_EBSS | EB\_SYSTEM\_SUMMARY\_TC  B | 297 | 297 |
| **TCB\_LIVE2012** | IDX\_FACT\_STMT\_ENTRY | STMT\_ENTRY | 143 | 143 |
| **TCB\_LIVE2012** | IDX\_STMT\_ENTRY\_STATUS | STMT\_ENTRY | 143 | 0 |
| **TCB\_LIVE2012** | PK\_SE | STMT\_ENTRY | 143 | 143 |
| **TCB\_LIVE2012** | STMT\_ENTRY\_BOOKING\_D  ATE | STMT\_ENTRY | 143 | 1 |
| **DWH** | PK\_PDPA\_TSD | PD\_PARAMETER\_TSD | 114 | 114 |
| **DWH** | PK\_SADG\_TSD | SA\_DATA\_GROUP\_TSD | 57 | 57 |
| **DWH2015** | PK\_SADG\_TSD | SA\_DATA\_GROUP\_TSD | 57 | 57 |
| **DWH** | PK\_SAR\_TSD | SA\_RATIOS\_TSD | 39 | 39 |
| **DWH2015** | PK\_SAR\_TSD | SA\_RATIOS\_TSD | 39 | 39 |
| **DWH2015** | PK\_AZPP\_TSD | AZ\_PRODUCT\_PARAMETER  \_TSD | 36 | 36 |
| **DWH** | PK\_AZPP\_TSD | AZ\_PRODUCT\_PARAMETER  \_TSD | 25 | 25 |
| **DWH** | PK\_SASD\_TSD | SA\_SCORE\_DATA\_TSD | 18 | 18 |
| **DWH2015** | PK\_SASD\_TSD | SA\_SCORE\_DATA\_TSD | 18 | 18 |
| **DWH** | PK\_SAHT\_TSD | SA\_HANG\_TCB\_TSD | 17 | 17 |
| **DWH2015** | PK\_SAHT\_TSD | SA\_HANG\_TCB\_TSD | 17 | 17 |
| **DWH2015** | PK\_COMPCHK\_TSD | COMPANY\_CHECK\_TSD | 15 | 15 |
| **DWH** | PK\_PDA\_TSD | PD\_AMOUNT\_TYPE\_TSD | 10 | 10 |
| **DWH2015** | PK\_PDA\_TSD | PD\_AMOUNT\_TYPE\_TSD | 10 | 10 |
| **DWH** | PK\_COMPCHK\_TSD\_CONST | COMPANY\_CHECK\_TSD | 8 | 8 |

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| **DWH** | PK\_SALT\_TSD | SA\_LHCONGVIEC\_TCB\_TSD | 8 | 8 |
| **DWH2015** | PK\_SALT\_TSD | SA\_LHCONGVIEC\_TCB\_TSD | 8 | 8 |
| **DWH** | PK\_SATD\_TSD | SA\_TDHOCVAN\_TCB\_TSD | 5 | 5 |
| **DWH2015** | PK\_SATD\_TSD | SA\_TDHOCVAN\_TCB\_TSD | 5 | 5 |
| **DWH** | PK\_SANT\_TSD | SA\_NOICUTRU\_TCB\_TSD | 4 | 4 |
| **DWH** | PK\_SAPHT\_TSD | SA\_PHUONGTIEN\_TCB\_TSD | 4 | 4 |
| **DWH** | PK\_SAUT\_TSD | SA\_UYTINGD\_TCB\_TSD | 4 | 4 |
| **DWH** | PK\_SAVT\_TSD | SA\_VTCONGTAC\_TCB\_TSD | 4 | 4 |
| **DWH2015** | PK\_SANT\_TSD | SA\_NOICUTRU\_TCB\_TSD | 4 | 4 |
| **DWH2015** | PK\_SAPHT\_TSD | SA\_PHUONGTIEN\_TCB\_TSD | 4 | 4 |
| **DWH2015** | PK\_SAUT\_TSD | SA\_UYTINGD\_TCB\_TSD | 4 | 4 |
| **DWH2015** | PK\_SAVT\_TSD | SA\_VTCONGTAC\_TCB\_TSD | 4 | 4 |
| **DWH** | PK\_SATT\_TSD | SA\_TTHONNHAN\_TCB\_TSD | 3 | 3 |
| **DWH2015** | PK\_SATT\_TSD | SA\_TTHONNHAN\_TCB\_TSD | 3 | 3 |
| **DWH** | PK\_SAPT\_TSD | SA\_PTTHONGTIN\_TCB\_TSD | 2 | 2 |
| **DWH** | PK\_SAQT\_TSD | SA\_QHETCB1\_TCB\_TSD | 2 | 2 |
| **DWH2015** | PK\_SAPT\_TSD | SA\_PTTHONGTIN\_TCB\_TSD | 2 | 2 |
| **DWH2015** | PK\_SAQT\_TSD | SA\_QHETCB1\_TCB\_TSD | 2 | 2 |
| **DWH** | IDX\_FACT\_SC\_POS\_ASSET\_  SV | SC\_POS\_ASSET\_SV | 0 | 0 |
| **DWH** | PK\_SCPASV\_CONST | SC\_POS\_ASSET\_SV | 0 | 0 |
| **DWH2015** | PK\_BALM | BALANCE\_MOVEMENT | 0 | 0 |
| **DWH2015** | PK\_SASL\_TSD | SA\_SCORE\_LIMIT\_TSD | 0 | 0 |
| **DWH2015** | PK\_SASP\_TSD | SA\_SCORE\_PARAMETER\_TS  D | 0 | 0 |
| **DWH2015** | IDX\_FACT\_SC\_POS\_ASSET\_  SV | SC\_POS\_ASSET\_SV | 0 | 0 |
| **DWH2015** | PK\_SCPASV | SC\_POS\_ASSET\_SV | 0 | 0 |
| **KRM\_RPT** | PORT\_FTP\_BASE\_IDX | KRM\_SUM\_PORT\_FTP | 0 | 0 |
| **KRM\_RPT** | PORT\_FTP\_BASE\_TP\_ADJ5\_I  D\_IDX | KRM\_SUM\_PORT\_FTP | 0 | 0 |
| **KRM\_RPT** | PORT\_FTP\_BASE\_U\_COCOD  E\_IDX | KRM\_SUM\_PORT\_FTP | 0 | 0 |
| **KRM\_RPT** | PORT\_FTP\_BASE\_U\_SOGIA  ODICH\_IDX | KRM\_SUM\_PORT\_FTP | 0 | 0 |
| **TCB\_DWH\_CEB2** | JNTTRANS\_IDX | JNTTRANS | 0 | 0 |
| **DWH** | PK\_BALANCE\_MOVEMENT | BALANCE\_MOVEMENT |  |  |
| **DWH** | PK\_EB\_CONTRACT\_BALAN  CES | EB\_CONTRACT\_BALANCES  \_TEMP3 |  | 13,784,711 |
| **DWH** | IDX\_MSG\_OSBV1\_QUERY\_O  P | ESB\_MESSAGES\_OSBV1\_QU  ERY |  | 0 |
| **DWH** | IDX\_MSG\_OSBV1\_QUERY\_R  EQ | ESB\_MESSAGES\_OSBV1\_QU  ERY |  | 0 |
| **DWH** | IDX\_MSG\_OSBV1\_QUERY\_SI  D | ESB\_MESSAGES\_OSBV1\_QU  ERY |  | 0 |
| **DWH** | PK\_SASL\_TSD | SA\_SCORE\_LIMIT\_TSD |  |  |
| **DWH** | PK\_SASP\_TSD | SA\_SCORE\_PARAMETER\_TS  D |  |  |
| **DWH2013** | IDX\_ACCOUNT\_PROCESS\_  DATE | ACCOUNT |  | 302 |

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| **DWH2013** | PK\_ACCOUNT\_C | ACCOUNT |  | 1,090,267,520 |
| **DWH2013** | PK\_ACCOUNT\_C\_CUSTOM  ER | ACCOUNT |  | 2,647,148 |
| **DWH2013** | PK\_ACCOUNT\_CLOSURE\_T  SD | ACCOUNT\_CLOSURE\_TSD |  | 2,139 |
| **DWH2013** | PK\_ACCA\_TSD | ACCT\_ACTIVITY\_TSD |  | 86,859,316 |
| **DWH2013** | PK\_ACACCT\_LINK\_TSD | AC\_ACCOUNT\_LINK\_TSD |  | 568,455 |
| **DWH2013** | PK\_AC\_CHARGE\_REQUEST | AC\_CHARGE\_REQUEST |  | 6,651,601 |
| **DWH2013** | PK\_ACLE\_TSD | AC\_LOCKED\_EVENTS\_TSD |  | 788,169 |
| **DWH2013** | PK\_AZA\_TSD | AZ\_ACCOUNT\_TSD |  | 332,737 |
| **DWH2013** | PK\_AZPP\_TSD | AZ\_PRODUCT\_PARAMETER  \_TSD |  | 22 |
| **DWH2013** | PK\_BALM | BALANCE\_MOVEMENT |  | 0 |
| **DWH2013** | CATEG\_BOOKINGDATE | CATEG\_ENTRY |  | 303 |
| **DWH2013** | IDX\_FACT\_CATEG\_ENTRY | CATEG\_ENTRY |  | 71,340,261 |
| **DWH2013** | PK\_CATEG | CATEG\_ENTRY |  | 153,284,586 |
| **DWH2013** | PK\_CITCB\_TSD | CHOICE\_INTEREST\_TCB\_TS  D |  | 1,421,834 |
| **DWH2013** | PK\_CMS\_COLLECTIONCEN  TRALBANK\_C | CMS\_COLLECTIONCENTRA  LBANK |  | 14,848,257 |
| **DWH2013** | PK\_CMSTR | CMS\_TRANSACTION |  | 299,408,889 |
| **DWH2013** | PK\_COLL\_TSD | COLLATERAL\_TSD |  | 379,420 |
| **DWH2013** | PK\_COMPCHK\_TSD | COMPANY\_CHECK\_TSD |  | 28 |
| **DWH2013** | PK\_COMP\_TSD | COMPANY\_TSD |  | 2,247 |
| **DWH2013** | PK\_CCY\_TSD | CURRENCY\_TSD |  | 3,759 |
| **DWH2013** | PK\_CUS\_TSD | CUSTOMER\_TSD |  | 4,107,663 |
| **DWH2013** | PK\_DCV\_UUDAI\_TSD | DCV\_UDLS\_DACBIET\_TCB\_  TSD |  | 27,254 |
| **DWH2013** | PK\_DNCI | DC\_NEW\_COLLECTION\_ITE  M |  | 5,186,472 |
| **DWH2013** | PK\_EB\_SYSTEM\_SUMMARY | EB\_SYSTEM\_SUMMARY |  | 100,128 |
| **DWH2013** | PK\_EBSS | EB\_SYSTEM\_SUMMARY\_TC  B |  | 302 |
| **DWH2013** | IDX\_EB\_SYSTEM\_DATE | EB\_SYSTEM\_SUMMARY\_TC  B\_SV |  | 302 |
| **DWH2013** | PK\_FX\_TSD | FOREX\_TSD |  | 192,941 |
| **DWH2013** | PK\_FTCT\_TSD | FT\_COMMISSION\_TYPE\_TS  D |  | 2,888 |
| **DWH2013** | IDX\_FT\_PROCESSDATE\_CR  EDITACC | FUNDS\_TRANSFER |  | 13,555,168 |
| **DWH2013** | IDX\_FT\_PROCESSDATE\_DE  BITACC | FUNDS\_TRANSFER |  | 20,759,089 |
| **DWH2013** | IDX\_FT\_PROCESSING\_DATE | FUNDS\_TRANSFER |  | 305 |
| **DWH2013** | IDX\_FT\_REF | FUNDS\_TRANSFER |  | 42,497,318 |
| **DWH2013** | PK\_IND\_TSD | INDUSTRY\_TSD |  | 389 |
| **DWH2013** | PK\_LD\_TSD | LD\_LOANS\_AND\_DEPOSITS  \_TSD |  | 1,214,842 |
| **DWH2013** | PK\_LSD\_TSD | LD\_SCHEDULE\_DEFINE\_TS  D |  | 751,086 |
| **DWH2013** | PK\_LC\_TSD | LETTER\_OF\_CREDIT\_TSD |  | 51,423 |
| **DWH2013** | PK\_LIM\_TSD | LIMIT\_TSD |  | 20,476,690 |

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| --- | --- | --- | --- | --- |
| **DWH2013** | LMM\_ACCOUNT\_BALANC  ES\_CONT | LMM\_ACCOUNT\_BALANCE  S |  | 1,420,966 |
| **DWH2013** | LMM\_ACCOUNT\_BALANC  ES\_DATE | LMM\_ACCOUNT\_BALANCE  S |  | 302 |
| **DWH2013** | PK\_LMM | LMM\_ACCOUNT\_BALANCE  S |  | 132,210,859 |
| **DWH2013** | PK\_LMM\_SCH\_TSD | LMM\_SCHEDULES\_TSD |  | 7,879,312 |
| **DWH2013** | PK\_LMMSD\_TSD | LMM\_SCHEDULE\_DATES\_T  SD |  | 6,614,991 |
| **DWH2013** | PK\_MM\_TSD | MM\_MONEY\_MARKET\_TSD |  | 5,807,621 |
| **DWH2013** | PK\_PDA\_TSD | PD\_AMOUNT\_TYPE\_TSD |  | 10 |
| **DWH2013** | PK\_PDB | PD\_BALANCES |  | 27,685,849 |
| **DWH2013** | PK\_PDPA\_TSD | PD\_PARAMETER\_TSD |  | 906 |
| **DWH2013** | PK\_PI | PERIODIC\_INTEREST |  | 78,001 |
| **DWH2013** | IDX\_POS\_PROCESS\_DATE | POS\_MVMT\_LWORK\_DAY |  | 302 |
| **DWH2013** | PK\_PMLD | POS\_MVMT\_LWORK\_DAY |  | 27,450,733 |
| **DWH2013** | PK\_PRT\_TSD | PRODUCT\_TCB\_TSD |  | 695 |
| **DWH2013** | PK\_PROTOCOL | PROTOCOL |  | 71,978,636 |
| **DWH2013** | PK\_QLT\_TSD | QUANLYTHE\_TSD |  | 2,061,740 |
| **DWH2013** | PK\_QLPQ\_TCB\_TSD | QUANLY\_PHATQUA\_TCB\_T  SD |  | 1,039,297 |
| **DWH2013** | IDX\_RCSE\_BKDATE\_CUS | RE\_CONSOL\_SPEC\_ENTRY |  | 66,208,964 |
| **DWH2013** | IDX\_RCSE\_BOOKING\_DATE | RE\_CONSOL\_SPEC\_ENTRY |  | 304 |
| **DWH2013** | PK\_RCSE | RE\_CONSOL\_SPEC\_ENTRY |  | 156,037,283 |
| **DWH2013** | IDX\_FACT\_RSLB | RE\_STAT\_LINE\_BAL |  | 340 |
| **DWH2013** | IDX\_RSLB\_PED | RE\_STAT\_LINE\_BAL |  | 302 |
| **DWH2013** | PK\_RSLB | RE\_STAT\_LINE\_BAL |  | 31,020,791 |
| **DWH2013** | RSLB\_PROCESS\_DATE | RE\_STAT\_LINE\_BAL |  | 302 |
| **DWH2013** | PK\_SADG\_TSD | SA\_DATA\_GROUP\_TSD |  | 50 |
| **DWH2013** | PK\_SADT\_TSD | SA\_DATA\_TYPES\_TSD |  | 157 |
| **DWH2013** | PK\_SAHT\_TSD | SA\_HANG\_TCB\_TSD |  | 16 |
| **DWH2013** | PK\_SALT\_TSD | SA\_LHCONGVIEC\_TCB\_TSD |  | 8 |
| **DWH2013** | PK\_SANT\_TSD | SA\_NOICUTRU\_TCB\_TSD |  | 4 |
| **DWH2013** | PK\_SAPHT\_TSD | SA\_PHUONGTIEN\_TCB\_TSD |  | 4 |
| **DWH2013** | PK\_SAPT\_TSD | SA\_PTTHONGTIN\_TCB\_TSD |  | 2 |
| **DWH2013** | PK\_SAQT\_TSD | SA\_QHETCB1\_TCB\_TSD |  | 2 |
| **DWH2013** | PK\_SAR\_TSD | SA\_RATIOS\_TSD |  | 38 |
| **DWH2013** | PK\_SASD\_TSD | SA\_SCORE\_DATA\_TSD |  | 16 |
| **DWH2013** | PK\_SASL\_TSD | SA\_SCORE\_LIMIT\_TSD |  | 0 |
| **DWH2013** | PK\_SASP\_TSD | SA\_SCORE\_PARAMETER\_TS  D |  | 0 |
| **DWH2013** | PK\_SATD\_TSD | SA\_TDHOCVAN\_TCB\_TSD |  | 5 |
| **DWH2013** | PK\_SATT\_TSD | SA\_TTHONNHAN\_TCB\_TSD |  | 3 |
| **DWH2013** | PK\_SAUT\_TSD | SA\_UYTINGD\_TCB\_TSD |  | 4 |
| **DWH2013** | PK\_SAVT\_TSD | SA\_VTCONGTAC\_TCB\_TSD |  | 4 |
| **DWH2013** | IDX\_FACT\_SC\_POS\_ASSET\_  SV | SC\_POS\_ASSET\_SV |  | 0 |
| **DWH2013** | PK\_SCPASV | SC\_POS\_ASSET\_SV |  | 0 |
| **DWH2013** | PK\_SECTOR\_TSD | SECTOR\_TSD |  | 168 |
| **DWH2013** | PK\_SECM\_TSD | SECURITY\_MASTER\_TSD |  | 341 |

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| --- | --- | --- | --- | --- |
| **DWH2013** | IDX\_FACT\_SEC\_POS | SECURITY\_POSITION |  | 284 |
| **DWH2013** | PK\_SECP | SECURITY\_POSITION |  | 8,254 |
| **DWH2013** | PK\_SAM\_TSD | SEC\_ACC\_MASTER\_TSD |  | 91,237 |
| **DWH2013** | IDX\_STMT\_ENTRY\_BD\_ACC | STMT\_ENTRY |  | 62,236,828 |
| **DWH2013** | IDX\_STMT\_ENTRY\_BD\_CUS | STMT\_ENTRY |  | 49,258,774 |
| **DWH2013** | PK\_SE | STMT\_ENTRY |  | 306,985,266 |
| **DWH2013** | STMT\_ENTRY\_BOOKING\_D  ATE | STMT\_ENTRY |  | 302 |
| **DWH2013** | PK\_TRA\_TSD | TRANSACTION\_CODE\_TSD |  | 745 |
| **DWH2013** | PK\_USE\_TSD | USERTBL\_TSD |  | 1,246,373 |
| **DWH2014** | IDX\_ACCOUNT\_C\_CUSTOM  ER | ACCOUNT |  | 2,690,912 |
| **DWH2014** | PK\_ACCOUNT\_C | ACCOUNT |  | 1,012,498,718 |
| **DWH2014** | PK\_ACCOUNT\_CLOSURE\_T  SD | ACCOUNT\_CLOSURE\_TSD |  | 3,645 |
| **DWH2014** | PK\_ACACCT\_LINK\_TSD | AC\_ACCOUNT\_LINK\_TSD |  | 491,048 |
| **DWH2014** | IDX\_AC\_CHARGE\_REQUES  T | AC\_CHARGE\_REQUEST |  | 8,128,134 |
| **DWH2014** | PK\_ACLE\_TSD | AC\_LOCKED\_EVENTS\_TSD |  | 1,277,086 |
| **DWH2014** | PK\_AZA\_TSD | AZ\_ACCOUNT\_TSD |  | 420,677 |
| **DWH2014** | PK\_AZPP\_TSD | AZ\_PRODUCT\_PARAMETER  \_TSD |  | 29 |
| **DWH2014** | PK\_BALM | BALANCE\_MOVEMENT |  | 0 |
| **DWH2014** | CATEG\_BOOKINGDATE | CATEG\_ENTRY |  | 297 |
| **DWH2014** | IDX\_FACT\_CATEG\_ENTRY | CATEG\_ENTRY |  | 81,007,518 |
| **DWH2014** | PK\_CATEG | CATEG\_ENTRY |  | 162,459,114 |
| **DWH2014** | PK\_CITCB\_TSD | CHOICE\_INTEREST\_TCB\_TS  D |  | 1,434,114 |
| **DWH2014** | PK\_CMS\_COLLECTIONCEN  TRALBANK\_C | CMS\_COLLECTIONCENTRA  LBANK |  | 53,816,310 |
| **DWH2014** | PK\_CMSTR | CMS\_TRANSACTION |  | 297,532,199 |
| **DWH2014** | PK\_COLL\_TSD | COLLATERAL\_TSD |  | 380,278 |
| **DWH2014** | PK\_COMPCHK\_TSD | COMPANY\_CHECK\_TSD |  | 15 |
| **DWH2014** | PK\_CUS\_TSD | CUSTOMER\_TSD |  | 4,897,457 |
| **DWH2014** | PK\_DCV\_UUDAI\_TSD | DCV\_UDLS\_DACBIET\_TCB\_  TSD |  | 28,234 |
| **DWH2014** | PK\_DNCI | DC\_NEW\_COLLECTION\_ITE  M |  | 6,049,187 |
| **DWH2014** | PK\_ECB\_TSD | EB\_CONTRACT\_BALANCES  \_TSD |  | 70,056,045 |
| **DWH2014** | PK\_EB\_SYSTEM\_SUMMARY | EB\_SYSTEM\_SUMMARY |  | 100,354 |
| **DWH2014** | PK\_EBSS | EB\_SYSTEM\_SUMMARY\_TC  B |  | 297 |
| **DWH2014** | IDX\_EB\_SYSTEM\_DATE | EB\_SYSTEM\_SUMMARY\_TC  B\_SV |  | 297 |
| **DWH2014** | PK\_FX\_TSD | FOREX\_TSD |  | 144,100 |
| **DWH2014** | IDX\_FT\_PROCESSDATE\_CR  EDITACC | FUNDS\_TRANSFER |  | 14,923,566 |
| **DWH2014** | IDX\_FT\_PROCESSDATE\_DE  BITACC | FUNDS\_TRANSFER |  | 22,387,431 |
| **DWH2014** | IDX\_FT\_PROCESSING\_DATE | FUNDS\_TRANSFER |  | 369 |

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| --- | --- | --- | --- | --- |
| **DWH2014** | IDX\_FT\_REF | FUNDS\_TRANSFER |  | 46,423,587 |
| **DWH2014** | PK\_LD\_TSD | LD\_LOANS\_AND\_DEPOSITS  \_TSD |  | 1,386,900 |
| **DWH2014** | PK\_LSD\_TSD | LD\_SCHEDULE\_DEFINE\_TS  D |  | 931,244 |
| **DWH2014** | PK\_LIM\_TSD | LIMIT\_TSD |  | 19,463,623 |
| **DWH2014** | LMM\_ACCOUNT\_BALANC  ES\_DATE | LMM\_ACCOUNT\_BALANCE  S |  | 297 |
| **DWH2014** | PK\_IDX\_LMM\_ACC\_BAL | LMM\_ACCOUNT\_BALANCE  S |  | 143,308,445 |
| **DWH2014** | PK\_LMM\_SCH\_TSD | LMM\_SCHEDULES\_TSD |  | 7,854,773 |
| **DWH2014** | PK\_LMMSD\_TSD | LMM\_SCHEDULE\_DATES\_T  SD |  | 6,778,020 |
| **DWH2014** | PK\_MM\_TSD | MM\_MONEY\_MARKET\_TSD |  | 5,963,075 |
| **DWH2014** | PK\_PDA\_TSD | PD\_AMOUNT\_TYPE\_TSD |  | 10 |
| **DWH2014** | PK\_PDB | PD\_BALANCES |  | 40,463,241 |
| **DWH2014** | PK\_PDPA\_TSD | PD\_PARAMETER\_TSD |  | 891 |
| **DWH2014** | PK\_PDP | PD\_PAYMENT\_DUE |  | 13,223,892 |
| **DWH2014** | PK\_PI | PERIODIC\_INTEREST |  | 82,761 |
| **DWH2014** | IDX\_POS\_PROCESS\_DATE | POS\_MVMT\_LWORK\_DAY |  | 297 |
| **DWH2014** | PK\_PMLD | POS\_MVMT\_LWORK\_DAY |  | 26,695,216 |
| **DWH2014** | PK\_PROTOCOL | PROTOCOL |  | 368,838,939 |
| **DWH2014** | PK\_QLT\_TSD | QUANLYTHE\_TSD |  | 1,975,599 |
| **DWH2014** | PK\_QLPQ\_TCB\_TSD | QUANLY\_PHATQUA\_TCB\_T  SD |  | 1,006,153 |
| **DWH2014** | IDX\_RCSE\_BKDATE\_CUS | RE\_CONSOL\_SPEC\_ENTRY |  | 68,772,286 |
| **DWH2014** | IDX\_RCSE\_BOOKING\_DATE | RE\_CONSOL\_SPEC\_ENTRY |  | 344 |
| **DWH2014** | PK\_RCSE | RE\_CONSOL\_SPEC\_ENTRY |  | 167,992,024 |
| **DWH2014** | IDX\_FACT\_RSLB | RE\_STAT\_LINE\_BAL |  | 374 |
| **DWH2014** | IDX\_RSLB\_PED | RE\_STAT\_LINE\_BAL |  | 297 |
| **DWH2014** | PK\_RSLB | RE\_STAT\_LINE\_BAL |  | 29,260,867 |
| **DWH2014** | RSLB\_PROCESS\_DATE | RE\_STAT\_LINE\_BAL |  | 297 |
| **DWH2014** | IDX\_RSLC\_PDATE | RE\_STAT\_LINE\_CONT |  | 297 |
| **DWH2014** | PK\_RSLC | RE\_STAT\_LINE\_CONT |  | 76,259,327 |
| **DWH2014** | PK\_SADG\_TSD | SA\_DATA\_GROUP\_TSD |  | 50 |
| **DWH2014** | PK\_SAHT\_TSD | SA\_HANG\_TCB\_TSD |  | 17 |
| **DWH2014** | PK\_SALT\_TSD | SA\_LHCONGVIEC\_TCB\_TSD |  | 8 |
| **DWH2014** | PK\_SANT\_TSD | SA\_NOICUTRU\_TCB\_TSD |  | 4 |
| **DWH2014** | PK\_SAPHT\_TSD | SA\_PHUONGTIEN\_TCB\_TSD |  | 4 |
| **DWH2014** | PK\_SAPT\_TSD | SA\_PTTHONGTIN\_TCB\_TSD |  | 2 |
| **DWH2014** | PK\_SAQT\_TSD | SA\_QHETCB1\_TCB\_TSD |  | 2 |
| **DWH2014** | PK\_SAR\_TSD | SA\_RATIOS\_TSD |  | 38 |
| **DWH2014** | PK\_SASD\_TSD | SA\_SCORE\_DATA\_TSD |  | 17 |
| **DWH2014** | PK\_SASL\_TSD | SA\_SCORE\_LIMIT\_TSD |  | 0 |
| **DWH2014** | PK\_SASP\_TSD | SA\_SCORE\_PARAMETER\_TS  D |  | 0 |
| **DWH2014** | PK\_SATD\_TSD | SA\_TDHOCVAN\_TCB\_TSD |  | 5 |
| **DWH2014** | PK\_SATT\_TSD | SA\_TTHONNHAN\_TCB\_TSD |  | 3 |
| **DWH2014** | PK\_SAUT\_TSD | SA\_UYTINGD\_TCB\_TSD |  | 4 |
| **DWH2014** | PK\_SAVT\_TSD | SA\_VTCONGTAC\_TCB\_TSD |  | 4 |
| **DWH2014** | IDX\_FACT\_SC\_POS\_ASSET\_  SV | SC\_POS\_ASSET\_SV |  | 0 |
| **DWH2014** | PK\_SCPASV | SC\_POS\_ASSET\_SV |  | 0 |
| **DWH2014** | IDX\_FACT\_SEC\_POS | SECURITY\_POSITION |  | 566 |
| **DWH2014** | PK\_SECP | SECURITY\_POSITION |  | 128,997 |
| **DWH2014** | PK\_SAM\_TSD | SEC\_ACC\_MASTER\_TSD |  | 100,047 |
| **DWH2014** | IDX\_STMT\_ENTRY\_BD\_ACC | STMT\_ENTRY |  | 62,127,993 |
| **DWH2014** | IDX\_STMT\_ENTRY\_BD\_CUS | STMT\_ENTRY |  | 48,336,087 |
| **DWH2014** | PK\_IDX\_STMT\_ENTRY\_ID | STMT\_ENTRY |  | 317,184,513 |
| **DWH2014** | STMT\_ENTRY\_BOOKING\_D  ATE | STMT\_ENTRY |  | 297 |
| **DWH2014** | PK\_TRA\_TSD | TRANSACTION\_CODE\_TSD |  | 742 |
| **DWH2014** | IDX\_TXN\_LOG\_TCB\_SV\_ID | TXN\_LOG\_TCB\_SV |  | 533,716 |
| **DWH2014** | IDX\_TXN\_LOG\_TCB\_SV\_WD | TXN\_LOG\_TCB\_SV |  | 297 |
| **DWH2014** | PK\_USE\_TSD | USERTBL\_TSD |  | 845,084 |
| **DWH\_QUERY** | IDX\_PMS\_DATA\_DIMENSIO  N | TBL\_PMS\_DATA\_DIMENSIO  N |  | 0 |
| **EDW\_ADM** | IDX\_PMS\_DATA\_DIMENSIO  N | TBL\_PMS\_DATA\_DIMENSIO  N |  | 0 |
| **EDW\_DMT** | IDX\_AR\_BHVR\_FCT\_CDR\_D  T | AR\_BHVR\_ANL\_FCT |  |  |
| **EDW\_DMT** | IDX\_BSH\_FCT\_ITM\_DIM | BSH\_ANL\_FCT\_160606 |  | 337 |
| **EDW\_DMT** | IDX\_PFT\_FCT\_CDR\_DT | PFT\_ANL\_FCT |  | 110 |
| **EDW\_DMT** | IDX\_SALE\_PERF\_FCT\_CDR\_  DT | SALE\_PERF\_ANL\_FCT |  | 120 |
| **EDW\_SOR** | UK\_AR\_AVY\_SMY | AR\_AVY\_SMY |  | 2,737,862 |
| **EDW\_SOR** | UK\_AR\_INT\_SMY | AR\_INT\_SMY |  | 4,103,240 |
| **EDW\_SOR** | UK\_AR\_TVR\_SMY | AR\_TVR\_SMY |  | 25,855,343 |
| **EDW\_SOR** | UK\_AU\_BAL | AU\_BAL |  | 31,282,607 |
| **EDW\_SOR** | IDX\_AU\_SMY\_01 | AU\_SMY |  | 42 |
| **EDW\_SOR** | UK\_PST\_ENTR | PST\_ENTR |  | 14,073,420 |
| **T24REP** | FBNK\_STMT\_ENTRY\_PARTI  TION\_PK | FBNK\_STMT\_ENTRY |  | 0 |
| **T24REP** | PK\_OGG\_CATEG\_ENTRY | OGG\_CATEG\_ENTRY |  |  |
| **T24REP** | PK\_OGG\_PROTOCOL | OGG\_PROTOCOL |  |  |
| **T24REP** | PK\_OGG\_STMT\_ENTRY\_1 | OGG\_STMT\_ENTRY |  |  |
| **T24REP** | PK\_OGG\_STMT\_ENTRY\_ID | OGG\_STMT\_ENTRY\_BK |  |  |
| **T24REP** | PK\_OGG\_STMT\_ENTRY | OGG\_STMT\_ENTRY\_HIS |  |  |
| **T24REP** | IDX\_TBL\_MV\_STMT\_PRINT  ED | TBL\_MV\_STMT\_PRINTED |  | 0 |
| **T24REP** | PK\_TBL\_MV\_STMT\_PRINTE  D | TBL\_MV\_STMT\_PRINTED |  |  |

**Recommendation**: Recreate index with LOCAL option.

## Index with low distinct keys

Following index has low distinct key which may be ineffective for index scan.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **OWNER** | **TABLE\_NAME** | **INDEX\_NAME** | **NUM**  **ROWS** | **DISTINCT**  **KEYS** | **LAST\_ANALYZED** |
| **EDW\_DMT** | AR\_DIM | IDX\_AR\_DIM\_END\_DT | 8,526,813 | 5 | 08/18/2014 08:36:01 |
| **DWH\_QUERY** | TCB\_LOY\_ACCOU  NT\_KBL\_1 | TCB\_LOY\_ACCOUNT\_  KBL\_1\_IND\_1 | 4,573,617 | 2 | 01/20/2014 10:21:04 |
| **EDW\_DMT** | CST\_DIM | IDX\_CST\_DIM\_ID\_END  \_DT | 3,536,487 | 2 | 07/20/2014 18:40:20 |
| **TCB\_DWH\_VAS** | MCO\_TCB\_NEW\_  DAILY | IDX\_MCO\_NEW\_DAILY  \_YM | 3,272,688 | 1 | 01/15/2014 18:40:42 |
| **DWH\_QUERY** | TBL\_MCO\_2014072  4\_CHITIET | IDX\_MCO\_20140724\_CT  \_YNGAYBC | 3,135,118 | 1 | 07/28/2014 16:15:22 |
| **EDW\_SOR** | ACS\_FCY\_AR | IDX\_ACS\_FCY\_AR\_ID | 2,983,640 | 4 | 08/01/2014 23:58:05 |
| **KRM\_ETL** | SBV\_CONSOL\_KE  Y | SBV\_CONSOL\_KEY\_PR  OC\_DATE\_IDX | 2,890,211 | 1 | 01/02/2013 00:41:18 |
| **KRM\_RPT** | KRM\_SYN\_PORT\_  ALM | PORT\_ALM\_U\_DATA\_  DATE | 2,780,365 | 1 | 01/16/2014 17:17:52 |
| **KRM\_RPT** | KRM\_SYN\_PORT\_  ALM\_0409 | PORT\_ALM\_U\_D\_DATE  \_0409 | 2,776,433 | 1 | 01/16/2014 17:17:55 |
| **TCB\_DWH\_CEB2** | ACCOUNTING\_TR  ANSACTION | IDX\_ACCOUNTING\_ST  ATUS | 2,182,286 | 4 | 01/15/2014 17:16:43 |
| **KRM\_RPT** | KRM\_SYN\_R01\_AL  M | TEMP\_R01\_UDATE | 1,250,862 | 1 | 09/16/2013 22:37:55 |
| **KRM\_APP** | PORT\_TODAY\_TM  P1 | PT\_TMP1\_A01\_IDX | 295,779 | 2 | 09/20/2013 23:08:37 |
| **KRM\_ETL** | SBV\_RE\_STAT\_LIN  E\_CONT | SBV\_RE\_STAT\_PROC\_D  ATE\_IDX | 278,360 | 1 | 01/02/2013 00:36:24 |
| **DWH\_QUERY** | TBL\_MCO\_2014072  4\_NB | IDX\_MCO\_20140724\_NB  \_YNGAYBC | 74,409 | 1 | 07/28/2014 16:13:40 |
| **DWH\_QUERY** | MCO\_20140731\_NB | IDX\_MCO\_20140731\_NB | 71,648 | 1 | 08/06/2014 13:54:11 |
| **KRM\_RPT** | KRM\_SYN\_R01\_AL  M\_FRM\_PORT | PORT\_R01\_UDATE | 61,205 | 1 | 08/18/2013 21:11:58 |
| **KRM\_RPT** | KRM\_SYN\_R01\_AL  M\_FRM\_PORT | PORT\_R01\_YCCY | 61,205 | 1 | 08/18/2013 21:11:58 |
| **TCB\_DWH\_VAS** | R\_TBL\_000101 | R\_TBL\_000101\_IND\_1 | 52,212 | 1 | 01/17/2014 11:43:22 |
| **KRM\_APP** | PORT\_TODAY\_TM  P3 | PT\_TMP3\_A01\_IDX | 30,800 | 3 | 09/20/2013 23:06:11 |
| **TCB\_DWH\_VAS** | R\_TBL\_CIC\_GD\_K3  QHTD\_NGB | IDX\_R\_TBL\_CIC\_GD\_K3  QHTD\_NGB | 25,499 | 4 | 08/05/2015 17:10:25 |
| **KRM\_ETL** | ACC\_CREDIT\_INT | ACI\_CR\_BS\_RATE\_IDX | 19,667 | 1 | 01/02/2013 00:36:37 |
| **KRM\_RPT** | KRM\_SUM\_DMV\_  OUT | DMV\_OUT\_DATE | 8,526 | 1 | 01/16/2014 17:13:41 |
| **KRM\_RPT** | KRM\_SUM\_DMV\_  OUT | DMV\_OUT\_RUN\_ID | 8,526 | 3 | 01/16/2014 17:13:41 |
| **KRM\_APP** | PORT\_FTP | PORT\_FTP\_NUIDX1 | 7,633 | 5 | 09/20/2013 23:19:11 |
| **EDW\_DMT** | MV\_AR\_DIM\_X\_A  DJ\_FNC\_ST | IDX\_MV\_AR\_DIM\_EXC  PN\_IND | 4,104 | 2 | 09/20/2016 13:17:22 |
| **DWH\_QUERY** | TMP\_ANHVT1\_M  V\_AR\_DIM | IDX\_MV\_AR\_DIM\_EXC  PN\_IND | 1,981 | 2 | 01/26/2015 19:18:23 |
| **KRM\_RPT** | KRM\_SYN\_PORT\_  FTP\_ALL | PORT\_FTP\_ALL\_TP\_AD  J5\_ID\_IDX | 1,436 | 1 | 02/25/2014 05:48:22 |
| **TEST\_KRM** | SNP\_TABLE | TABLE\_FK1 | 1,302 | 5 | 08/19/2013 12:09:44 |
| **EDW\_SOR** | IP\_X\_GRP | IDX\_IP\_X\_GRP\_IP\_X\_G  RP\_TP | 1,297 | 8 | 07/09/2014 23:26:48 |
| **EDW\_STG** | T\_DMT\_AR\_3 | IDX\_T\_DM\_AR\_SRC\_ST  M\_ID | 1,267 | 9 | 07/30/2014 00:44:35 |
| **KRM\_APP** | KRMPRCID | KRMPRCID\_NUIDX1 | 1,267 | 6 | 08/18/2013 18:11:53 |
| **EDW\_SOR** | EXG\_RATE\_HIST | IDX\_EXG\_RATE\_HIST\_  EFF\_DT | 1,258 | 5 | 07/30/2014 23:28:19 |
| **EDW\_SOR** | EXG\_RATE\_HIST | IDX\_EXG\_RATE\_HIST\_  END\_DT | 1,258 | 5 | 07/30/2014 23:28:19 |
| **EDW\_DMT** | AR\_DIM | IDX\_AR\_DIM\_SRC\_STM  \_ID | 1,021 | 9 | 08/18/2014 08:36:09 |

**Recommendation**: Consider invisible & drop indexes with low distinct keys.

## Restructure large tables indexes

### DWH.CATEG\_ENTRY

|  |  |
| --- | --- |
| **Table information** |  |
| **Table size** | 57 GB |
| **Partition** | Interval 10 day on BOOKING\_DATE |
| **Number of row (statistic)** | 10,566,799 |
| **Last analyzed** | 1/23/2016 6:45:39 PM |
| **Actual COUNT(\*)** | 128,821,870 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Index name** | **Column** | **Size** | **Partition** |
| **IDX\_FACT\_CATEG\_ENTRY** | BOOKING\_DATE  CUSTOMER\_NO | 5G | NO |
| **PK\_CATEG\_CONST** | SOURCE\_ID | 6.7G | NO |

**Recommendation**: Change partition from 10 days to 1 days, recreate index PK\_CATEG\_CONST as LOCAL. Create index IDX\_FACT\_CATEG\_ENTRY on CUSTOMER\_NO only.

### DWH.CMS\_COLLECTIONCENTRALBANK

|  |  |
| --- | --- |
| **Table information** |  |
| **Table size** | 57 GB |
| **Partition** | Interval by 3 month on PROCESS\_DATE |
| **Number of row (statistic)** | 128,103,870 |
| **Last analyzed** | 2/24/2016 12:46:10 PM |
| **Actual COUNT(\*)** | 177,109,163 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Index name** | **Column** | **Size** | **Partition** |
| **PK\_CMS\_COLLECTIONCENTRALBANK\_C** | CARD\_NUMBER  PRODCODE  CONTRACT\_NO  PROCESS\_DATE | 14GB | NO |

**Recommendation**: Recreate index PK\_CATEG\_CONST as LOCAL.

### CB\_DWH\_VAS.R312\_TAB11F

|  |  |
| --- | --- |
| **Table information** |  |
| **Table size** | 660 GB |
| **Partition** | Interval 1 day on SYSTEM\_DATE |
| **Number of row (statistic)** | 218,848,210 |
| **Last analyzed** | 9/15/2013 7:02:02 PM |
| **Actual COUNT(\*)** | 587,017,422 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Index name** | **Column** | **Size** | **Partition** |
| **IDX\_SYSTEM\_DATE** | SYSTEM\_DATE | 18GB | NO |
| **IDX\_LINE\_NO** | LINE\_NO | 15.5GB | NO |
| **IDX\_R312TAB11F\_MTH** | MTH | 19GB | NO |
| **IDX\_R312\_TAB11F\_002** | MTH  ORDER\_ | 21GB | NO |
| **IDX\_R312\_TAB11F\_003** | YTD | 19GB | NO |
|  | ORDER\_ |  |  |

**Recommendation**: Drop index IDX\_SYSTEM\_DATE as it is not needed (1 distinct value for each partition). Drop index IDX\_R312TAB11F\_MTH as index IDX\_R312\_TAB11F\_002cover MTH column. Consider drop index IDX\_R312\_TAB11F\_003 as number of distinct value is low (YTD: 3, ORDER\_: 5).

### EDW\_SOR.AR\_TVR\_SMY

|  |  |
| --- | --- |
| **Table information** |  |
| **Table size** | 510 GB |
| **Partition** | Interval 3 on MSR\_PRD\_ID |
| **Number of row (statistic)** | N/A |
| **Last analyzed** | Not analyzed |
| **Actual COUNT(\*)** | 2,915,351,282 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Index name** | **Column** | **Size** | **Partition** |
| **UK\_AR\_TVR\_SMY** | MSR\_PRD\_ID  AR\_ID | 108 GB | NO |

**Recommendation**: Change partition by interval 3 to partition by interval 1 & create index

UK\_AR\_TVR\_SMY on AR\_ID only with LOCAL option or unique index with AR\_ID as first column.

### EDW\_DMT.AR\_BHVR\_ANL\_FCT

|  |  |
| --- | --- |
| **Table information** |  |
| **Table size** | 476 GB |
| **Partition** | Interval 3 on CDR\_DT\_DIM\_ID |
| **Number of row (statistic)** | N/A |
| **Last analyzed** | Not analyzed |
| **Actual COUNT(\*)** | 3,900,929,934 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Index name** | **Column** | **Size** | **Partition** |
| **IDX\_AR\_BHVR\_FCT\_CDR\_DT** | CDR\_DT\_DIM\_ID | 108 GB | NO |

**Recommendation**: Change partition by interval 3 to partition by interval 1 & drop index

IDX\_AR\_BHVR\_FCT\_CDR\_DT.

### T24REP.F\_PROTOCOL

|  |  |
| --- | --- |
| **Table information** |  |
| **Table size** | 388 GB |
| **Partition** | NO |
| **Number of row (statistic)** | N/A |
| **Last analyzed** | Not analyzed |
| **Actual COUNT(\*)** | 415,818,141 |

Create table script

CREATE TABLE T24REP.F\_PROTOCOL

(

RECID VARCHAR2 (255 BYTE) NOT NULL,

XMLRECORD SYS.XMLTYPE

)

XMLTYPE XMLRECORD

STORE AS CLOB

(TABLESPACE DWH\_TBS ENABLE STORAGE IN ROW CHUNK 8192) <...>

**Recommendation**: Partition table by hash 256 on RECID & use SecureFile to store LOB.

### T24REP.FBNK\_STMT\_ENTRY

|  |  |
| --- | --- |
| **Table information** |  |
| **Table size** | 377 GB |
| **Partition** | Partition by range on RECID |
| **Number of row (statistic)** | N/A |
| **Last analyzed** | Not analyzed |
| **Actual COUNT(\*)** | 600233470 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Index name** | **Column** | **Size** | **Partition** |
| **FBNK\_STMT\_ENTRY\_PARTITION\_PK** | REC\_ID | 47 GB | NO |

**Recommendation**: Recreate FBNK\_STMT\_ENTRY\_PARTITION\_PK as LOCAL.

### DWH.ESB\_MESSAGES\_OSBV1\_QUERY

|  |  |
| --- | --- |
| **Table information** |  |
| **Table size** | 263 GB |
| **Partition** | Interval 3 days on PROCESSTIME |
| **Number of row (statistic)** | N/A |
| **Last analyzed** | Not analyzed |
| **Actual COUNT(\*)** | 206,780,442 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Index name** | **Column** | **Size** | **Partition** |
| **IDX\_MSG\_OSBV1\_QUERY\_OP** | OPERATION | 9.3G | NO |
| **IDX\_MSG\_OSBV1\_QUERY\_REQ** | REQUESTID | 9.5G | NO |
| **IDX\_MSG\_OSBV1\_QUERY\_SID** | SERVICEID | 7.5G | NO |

**Recommendation**: Recreate 3 indexes above as LOCAL.

### TCB\_DWH\_VAS.R310\_TAB\_2

|  |  |
| --- | --- |
| **Table information** |  |
| **Table size** | 260 GB |
| **Partition** | Partition by interval 1 on PROCESS\_DATE |
| **Number of row (statistic)** | N/A |
| **Last analyzed** | Not analyzed |
| **Actual COUNT(\*)** | 189,296,865 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Index name** | **Column** | **Size** | **Partition** |
| **IDX\_R310TAB2\_PDATE** | PROCESS\_DATE | 5.6GB | NO |

**Recommendation**: Drop index IDX\_R310TAB2\_PDATE.

### EDW\_SOR.AU\_SMY

|  |  |
| --- | --- |
| **Table information** |  |
| **Table size** | 236 GB |
| **Partition** | Partition by interval 3 on MSR\_PRD\_ID |
| **Number of row (statistic)** | N/A |
| **Last analyzed** | Not analyzed |
| **Actual COUNT(\*)** | 2,739,288,703 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Index name** | **Column** | **Size** | **Partition** |
| **IDX\_AU\_SMY\_01** | MSR\_PRD\_ID  SRC\_STM\_ID | 146GB | NO |

**Recommendation**: Change partition by interval 3 to partition by interval 1 & recreate index IDX\_AU\_SMY\_01 on column SRC\_STM\_ID with LOCAL option.

### DWH.STMT\_ENTRY

|  |  |
| --- | --- |
| **Table information** |  |
| **Table size** | 177 GB |
| **Partition** | Partition by interval 5 day on BOOKING\_DATE |
| **Number of row (statistic)** | 162,033,055 |
| **Last analyzed** | 6/7/2016 7:15:39 PM |
| **Actual COUNT(\*)** | 276,815,404 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Index name** | **Column** | **Size** | **Partition** |
| **IDX\_STMT\_ENTRY\_BD\_ACC** | BOOKING\_DATE  ACCOUNT\_NUMBER | 11 GB | NO |
| **IDX\_STMT\_ENTRY\_BD\_CUS** | BOOKING\_DATE  CUSTOMER\_ID | 16 GB | NO |
| **PK\_STMT\_ENTRY\_ID\_CONST** | STMT\_ENTRY\_ID | 15GB | NO |

**Recommendation**: Change partition by interval 5 days to partition by interval 1 day & drop index recreate index IDX\_STMT\_ENTRY\_BD\_ACC on column ACCOUNT\_NUMBER with LOCAL option, IDX\_STMT\_ENTRY\_BD\_CUS on column CUSTOMER\_ID with LOCAL option. Recreate PK\_STMT\_ENTRY\_ID\_CONST with LOCAL option.

## Resource Intensive SQL

Any effort of improving performance must involve reviewing the actual SQL code that is submitted in transactions to determine if it can be optimized. The largest performance improvements usually come from tuning the actual code, not from adjusting database parameters. It is important to periodically extract the most resource intensive SQL and examine it for improvement opportunities.

Following SQL statements should be tuned to gain maximum benefits.

### SQL ID bur7zzjmnth3j – Module ODI:1382949750338/7/8487007

INSERT INTO DWH.ACCOUNT\_IPL

(BANK\_ID, ACCOUNT\_NUMBER, CUSTOMER, PRODCAT, ACCOUNT\_TITLE\_1, ACCOUNT\_TITLE\_2,

SHORT\_TITLE, MNEMONIC, POSITION\_TYPE, CURRENCY, CURRENCY\_MARKET, LIMIT\_REF,

ACCOUNT\_OFFICER, OTHER\_OFFICER, POSTING\_RESTRICT, RECONCILE\_ACCT,

INTEREST\_LIQU\_ACCT, INTEREST\_COMP\_ACCT, INT\_NO\_BOOKING, REFERAL\_CODE,

WAIVE\_LEDGER\_FEE, LOCAL\_REF, CONDITION\_GROUP, INACTIV\_MARKER,

OPEN\_ACTUAL\_BAL, OPEN\_CLEARED\_BAL, ONLINE\_ACTUAL\_BAL, ONLINE\_CLEARED\_BAL,

WORKING\_BALANCE, DATE\_LAST\_CR\_CUST, AMNT\_LAST\_CR\_CUST, TRAN\_LAST\_CR\_CUST,

DATE\_LAST\_CR\_AUTO, AMNT\_LAST\_CR\_AUTO, TRAN\_LAST\_CR\_AUTO, DATE\_LAST\_CR\_BANK,

AMNT\_LAST\_CR\_BANK, TRAN\_LAST\_CR\_BANK, DATE\_LAST\_DR\_CUST, AMNT\_LAST\_DR\_CUST,

TRAN\_LAST\_DR\_CUST, DATE\_LAST\_DR\_AUTO, AMNT\_LAST\_DR\_AUTO, TRAN\_LAST\_DR\_AUTO,

DATE\_LAST\_DR\_BANK, AMNT\_LAST\_DR\_BANK, TRAN\_LAST\_DR\_BANK, CAP\_DATE\_CHARGE,

CAP\_DATE\_CR\_INT, CAP\_DATE\_C2\_INT, CAP\_DATE\_DR\_INT, CAP\_DATE\_D2\_INT,

CAP\_BACK\_VALUE, ACCR\_CHG\_CATEG, ACCR\_CHG\_TRANS, ACCR\_CHG\_AMOUNT,

ACCR\_CHG\_SUSP, ACCR\_CR\_CATEG, ACCR\_CR\_TRANS, ACCR\_CR\_AMOUNT, ACCR\_CR\_SUSP,

ACCR\_CR2\_CATEG, ACCR\_CR2\_TRANS, ACCR\_CR2\_AMOUNT, ACCR\_CR2\_SUSP,

ACCR\_DR\_CATEG, ACCR\_DR\_TRANS, ACCR\_DR\_AMOUNT, ACCR\_DR\_SUSP, ACCR\_DR2\_CATEG,

ACCR\_DR2\_TRANS, ACCR\_DR2\_AMOUNT, ACCR\_DR2\_SUSP, CONSOL\_KEY, INT\_LIQU\_TYPE,

INT\_LIQU\_ACCT, INT\_LIQ\_CCY, PASSBOOK, START\_YEAR\_BAL, OPENING\_DATE,

VALUE\_DATE, CREDIT\_MOVEMENT, DEBIT\_MOVEMENT, VALUE\_DATED\_BAL,

CONTINGENT\_BAL\_CR, CONTINGENT\_BAL\_DR, OPEN\_CATEGORY, OPEN\_VAL\_DATED\_BAL,

ACCT\_CREDIT\_INT, ACCT\_DEBIT\_INT, LINK\_TO\_LIMIT, CLOSURE\_DATE,

LOCKED\_WITH\_LIMIT, CHARGE\_ACCOUNT, CHARGE\_CCY, CHARGE\_MKT, INTEREST\_CCY,

INTEREST\_MKT, CON\_CHARGE\_ACCR, CON\_INTEREST\_ACCR, ALT\_ACCT\_TYPE,

ALT\_ACCT\_ID, PREMIUM\_TYPE, CAP\_DATE\_PRM, PREMIUM\_FREQ, APR, JOINT\_HOLDER,

RELATION\_CODE, JOINT\_NOTES, ALLOW\_NETTING, LEDG\_RECO\_WITH, STMT\_RECO\_WITH,

OUR\_EXT\_ACCT\_NO, RECO\_TOLERANCE, PENDING\_ID, TOTAL\_PENDING,

STOCK\_CONTROL\_TYPE, SERIAL\_NO\_FORMAT, AUTO\_PAY\_ACCT, ORIG\_CCY\_PAYMENT,

AUTO\_REC\_CCY, ORIGINAL\_ACCT, FROM\_DATE, LOCKED\_AMOUNT, DISPO\_OFFICER,

DISPO\_EXEMPT, TAX\_SUSPEND, TAX\_AT\_SETTLE, ICA\_MAIN\_ACCOUNT,

ICA\_DISTRIB\_RATIO, ICA\_MAIN\_ACCT\_IND, ICA\_DISTRIB\_TYPE, ICA\_POST\_INTEREST,

ICA\_MAIN\_RATIO, ICA\_NEW\_MAIN\_ACC, ICA\_START\_DATE, ICA\_ADD\_REMOVE,

ICA\_BACK\_VALUE, ICA\_MAIN\_ACCT, ICA\_MAIN\_DATE, LIQUIDATION\_MODE,

OVERDUE\_STATUS, HVT\_FLAG, SINGLE\_LIMIT, CONTINGENT\_INT, ALL\_IN\_ONE\_PRODUCT,

ER\_VALUE\_DATE, ER\_BALANCE, EP\_BALANCE, SB\_GROUP\_ID, OPEN\_AVAILABLE\_BAL,

AVAILABLE\_DATE, AV\_AUTH\_DB\_MVMT, AV\_NAU\_DB\_MVMT, AV\_AUTH\_CR\_MVMT,

AV\_NAU\_CR\_MVMT, AVAILABLE\_BAL, FORWARD\_MVMTS, CREDIT\_CHECK,

AVAILABLE\_BAL\_UPD, CONSOLIDATE\_ENT, MAX\_SUB\_ACCOUNT, MASTER\_ACCOUNT,

LOCK\_INC\_THIS\_MVMT, CLOSED\_ONLINE, NEXT\_AF\_DATE, NEXT\_ACCT\_CAP,

NEXT\_EXP\_DATE, DATE\_LAST\_UPDATE, NEXT\_STMT\_DATE, EXPOSURE\_DATES,

PORTFOLIO\_NO, SHADOW\_ACCOUNT, FWD\_ENTRY\_HOLD, FIRST\_AF\_DATE,

CASH\_POOL\_GROUP, OPEN\_ASSET\_TYPE, LAST\_COM\_CHG\_DATE, IC\_CHARGE\_ID,

IC\_NEXT\_CAP\_DATE, IC\_PRODUCT, IC\_LST\_PROD\_CAP, ARRANGEMENT\_ID,

ACC\_DEB\_LIMIT, MANDATE\_APPL, MANDATE\_REG, MANDATE\_RECORD, DR\_ADJ\_AMOUNT,

DR2\_ADJ\_AMOUNT, CR\_ADJ\_AMOUNT, CR2\_ADJ\_AMOUNT, EVENT, FIELD, OPERAND,

VALUE, MV\_ALERT\_RES6, MV\_ALERT\_RES5, MV\_ALERT\_RES4, MV\_ALERT\_RES3,

MV\_ALERT\_RES2, MV\_ALERT\_RES1, REQUEST\_ID, OVERRIDE, RECORD\_STATUS, CURR\_NO,

INPUTTER, DATE\_TIME, AUTHORISER, CO\_CODE, DEPT\_CODE, AUDITOR\_CODE, AUDIT\_DATE\_TIME, PROCESS\_DATE)

VALUES

(:B1, :B2, :B3, :B4, :B5, :B6, :B7, :B8, :B9, :B10, :B11, :B12, :B13, :B14, :B15,

:B16, :B17, :B18, :B19, :B20, :B21, :B22, :B23, :B24, :B25, :B26, :B27,

:B28, :B29, :B30, :B31, :B32, :B33, :B34, :B35, :B36, :B37, :B38, :B39,

:B40, :B41, :B42, :B43, :B44, :B45, :B46, :B47, :B48, :B49, :B50, :B51,

:B52, :B53, :B54, :B55, :B56, :B57, :B58, :B59, :B60, :B61, :B62, :B63,

:B64, :B65, :B66, :B67, :B68, :B69, :B70, :B71, :B72, :B73, :B74, :B75,

:B76, :B77, :B78, :B79, :B80, :B81, :B82, :B83, :B84, :B85, :B86, :B87,

:B88, :B89, :B90, :B91, :B92, :B93, :B94, :B95, :B96, :B97, :B98, :B99,

:B100, :B101, :B102, :B103, :B104, :B105, :B106, :B107, :B108, :B109,

:B110, :B111, :B112, :B113, :B114, :B115, :B116, :B117, :B118, :B119,

:B120, :B121, :B122, :B123, :B124, :B125, :B126, :B127, :B128, :B129,

:B130, :B131, :B132, :B133, :B134, :B135, :B136, :B137, :B138, :B139,

:B140, :B141, :B142, :B143, :B144, :B145, :B146, :B147, :B148, :B149,

:B150, :B151, :B152, :B153, :B154, :B155, :B156, :B157, :B158, :B159,

:B160, :B161, :B162, :B163, :B164, :B165, :B166, :B167, :B168, :B169,

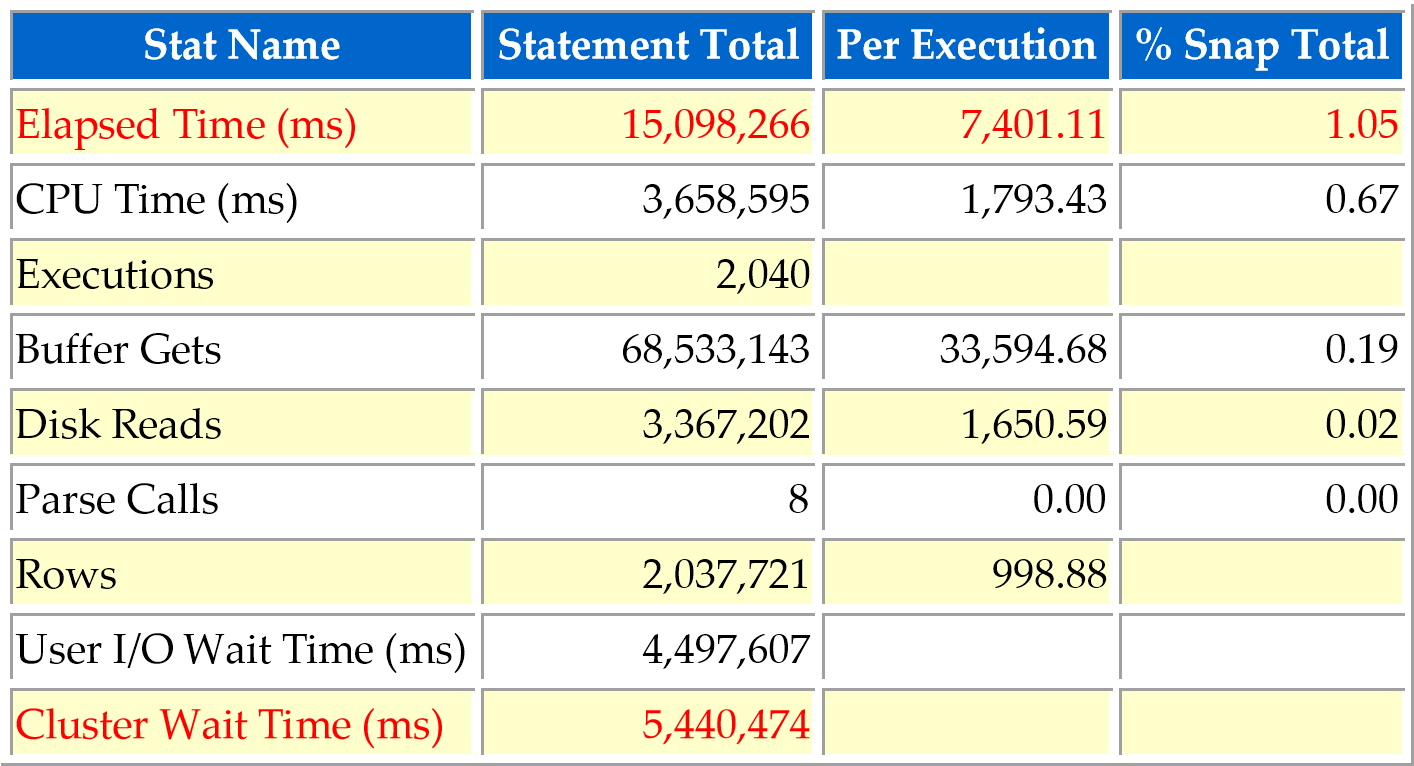
:B170, :B171, :B172, :B173, :B174, :B175, :B176, :B177, :B178, :B179,

:B180, :B181, :B182, :B183, :B184, :B185, :B186, :B187, :B188, :B189,

:B190, :B191, :B192, :B193, :B194, :B195, :B196, :B197, :B198, :B199,

:B200, :B201, :B202, :B203, :B204, :B205, :B206, :B207, :B208, :B209, :B210, :B211, :B212, :B213)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| EXECUTIONS | ELAPSED  TIME PER  EXEC (S) | %TOTAL | SQL ID | SQL MODULE | SQL TEXT |
| 2,040 | 7.40 | 5.49 | bur7zzjmnth3j | ODI:1382949750338/7/8487007 | INSERT INTO DWH.ACCOUNT\_IPL( B... |
| 0 |  | 3.93 | 0j26p05h38btv | ODI:1382949750338/7/7458007 | insert /\*+ append \*/ into DWH\_... |
| 0 |  | 3.35 | bfznkpy3atxm1 | ODI:1382949750338/7/7346007 | SELECT /\*+DRIVING\_SITE(v24)\*/ ... |
| 0 |  | 3.25 | 0k66jnv1ymupu | ODI:1382949750338/7/2155002 | update DWH.ECM\_MONEYTRANSFER T... |
| 1 | 8,695.30 | 3.16 | fty8ttr7ahz7p | ODI:1382949750338/7/2161002 | update DWH.ECM\_SWIFTTRANSACTIO... |



Cluster wait takes large portion of wait time. This is because different session/node insert to the same block which causes waits to modify same block.

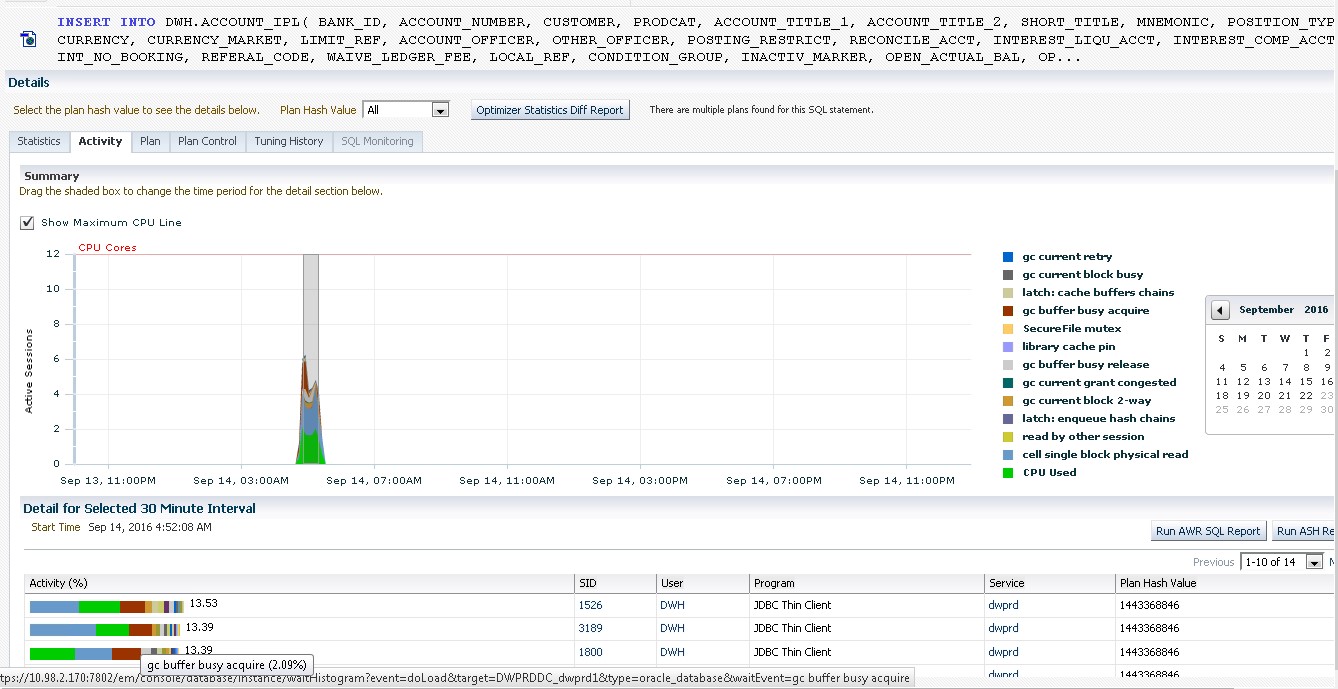


Table DWH.ACCOUNT\_IPL: size 20.8 GB, 4,105,838 rows, non-partition.

Table also use COMPRESS FOR QUERY HIGH which affects DML performance. Compression is useful for table/partition with small changes only.

**Recommendation**: Partition table by HASH on column that can divide table effectively. Do not use COMPRESS on table/partition with high DML activity.

### SQL ID fty8ttr7ahz7p - Module ODI:1382949750338/7/2161002

UPDATE DWH.ECM\_SWIFTTRANSACTION T

SET T.CURRENT\_RECORD = 0, T.END\_DATE = TO\_DATE ('20160913', 'YYYYMMDD') WHERE ( (T.CASEID) IN (SELECT X.CASEID

FROM DWH\_STAGING.I$\_ECM\_SWIFTTRANSACTION X

WHERE X.IND\_UPDATE = 'U')

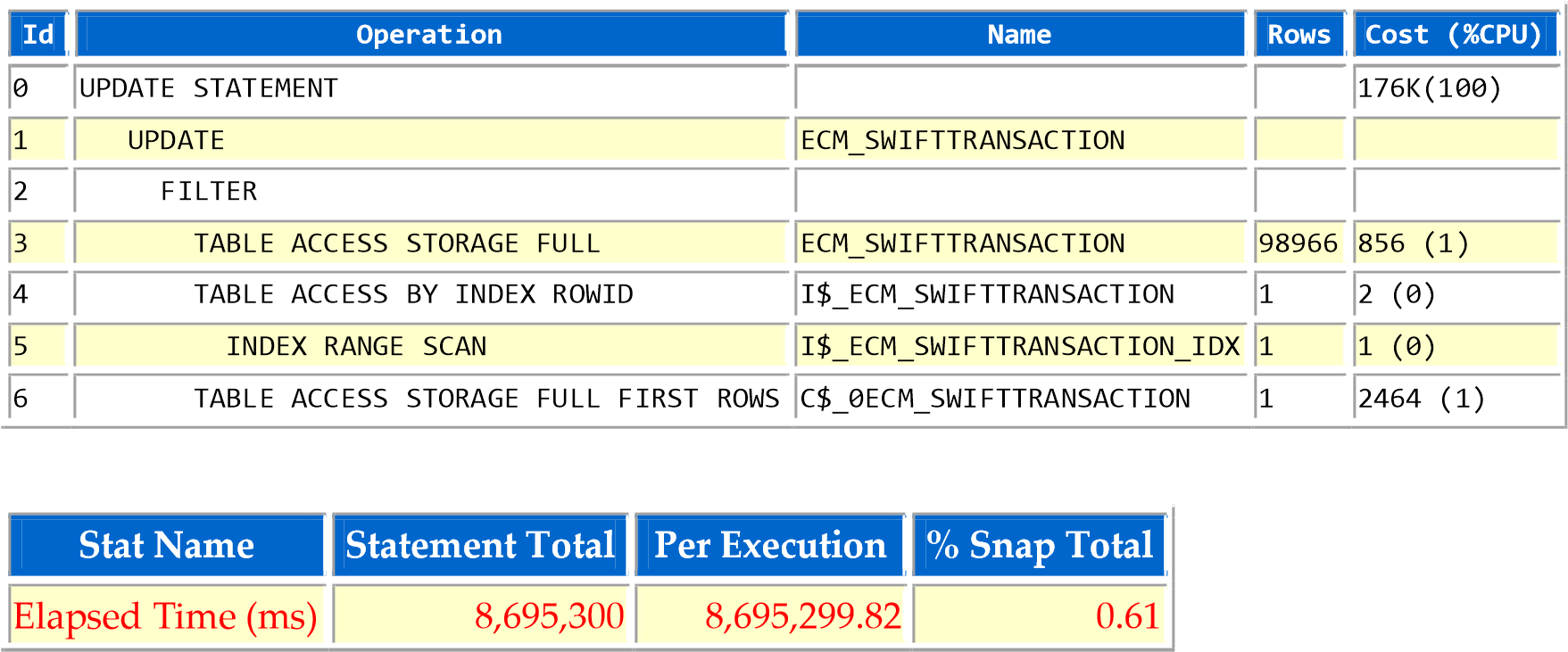
OR (T.CASEID) NOT IN (SELECT C1\_CASEID CASEID

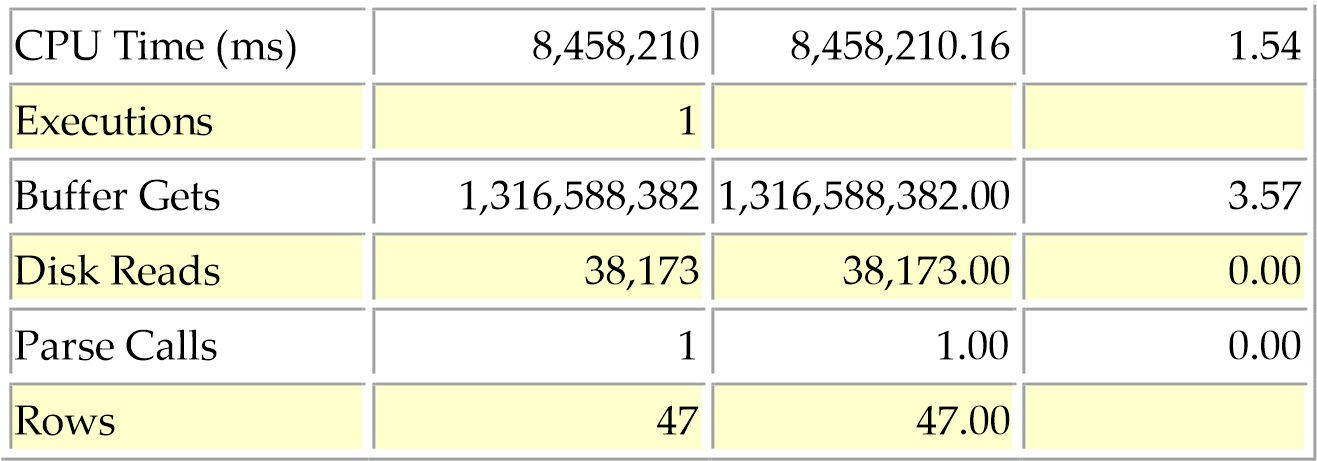
FROM DWH\_STAGING.C$\_0ECM\_SWIFTTRANSACTION

WHERE (1 = 1)))

AND T.CURRENT\_RECORD = 1

AND END\_DATE = TO\_DATE ('01-01-2400', 'mm-dd-yyyy')





Each execution takes 144 minutes, process 9.8 TB.

Table DWH.ECM\_SWIFTTRANSACTION size: 88MB, 100.169 rows, last analyze 2014/07/16, actual row count 303.626.

Table I$\_ECM\_SWIFTTRANSACTION is not found at data collection time.

**Recommendation**: Use hint to force FULL SCAN on I$\_ECM\_SWIFTTRANSACTION to reduce Buffer Gets.

### SQL ID 3f2t30tn75u8f - Module ODI:1382949750338/7/3751007

INSERT INTO DWH\_STAGING.T\_QUANLYTHE

(IDSEQ, BANK\_ID, CARD\_KEY, CUSTOMER\_XL, ACCOUNT\_XL, NAME\_XL, LOAI\_THE\_XL,

LOAI\_YEU\_CAU, SO\_THE\_XL, NGUOI\_XU\_LY, NGAY\_UPDATE, NGAY\_XAC\_NHAN,

NGAY\_TRA\_LAI\_CN, NGAN\_HANG\_TRA, TEN\_NH\_TRA, DIA\_CHI\_ATM, NH\_QLY\_ATM,

LIMIT\_CU, LIMIT\_MOI, DESCRIPTION, COMPANY\_WRITE, NGAY\_YEU\_CAU\_XL,

SO\_DIEN\_THOAI, NGAY\_XU\_LY, GIO\_XU\_LY, TRANG\_THAI\_XL, ID\_INFO\_CARD,

CN\_XU\_LY, SO\_MAY\_ATM, LOAI\_HINH\_GD, AMOUNT\_GD, SO\_TIEN\_GD, REMARK,

NGAY\_GIAO\_DICH, BALANCE\_GD, SEQUENCE\_XULY, BUOC\_XU\_LY, SO\_TRACE,

TTHAI\_JOUNAL, KT\_XAC\_NHAN, DIEN\_GIAI, KE\_TOAN\_XN, VAN\_HANH\_XN,

KE\_TOAN\_HTRA, INPUT\_NAME, AUTH\_NAME, CURRENCY, SO\_LAN\_TRA\_SOAT,

KT\_CHU\_KY\_MAU, DIA\_CHI\_NHAN\_SK, EMAIL, ACCOUNT\_TT, DEBIT\_AMOUNT, FREE\_TXT,

NG\_NHAN\_KHOA\_THE, RESERVED\_12, RESERVED\_13, RESERVED\_14, RESERVED\_15,

RESERVED\_16, RESERVED\_17, RESERVED\_18, RESERVED\_19, RESERVED\_20,

TRANSACTION\_TYPE, TRANSACTION\_AMOUNT, RESERVED\_23, RESERVED\_24,

RESERVED\_25, OVERRIDE, STMT\_NOS, DELIVERY\_REF, RECORD\_STATUS, CURR\_NO,

INPUTTER, DATE\_TIME, AUTHORISER, CO\_CODE, DEPT\_CODE, AUDITOR\_CODE, AUDIT\_DATE\_TIME)

SELECT SRC.IDSEQ IDSEQ, SRC.BANK\_ID BANK\_ID, SRC.CARD\_KEY CARD\_KEY,

SRC.CUSTOMER\_XL CUSTOMER\_XL, SRC.ACCOUNT\_XL ACCOUNT\_XL, SRC.NAME\_XL NAME\_XL,

SRC.LOAI\_THE\_XL LOAI\_THE\_XL, SRC.LOAI\_YEU\_CAU LOAI\_YEU\_CAU,

SRC.SO\_THE\_XL SO\_THE\_XL, SRC.NGUOI\_XU\_LY NGUOI\_XU\_LY,

SRC.NGAY\_UPDATE NGAY\_UPDATE, SRC.NGAY\_XAC\_NHAN NGAY\_XAC\_NHAN,

SRC.NGAY\_TRA\_LAI\_CN NGAY\_TRA\_LAI\_CN, SRC.NGAN\_HANG\_TRA NGAN\_HANG\_TRA,

SRC.TEN\_NH\_TRA TEN\_NH\_TRA, SRC.DIA\_CHI\_ATM DIA\_CHI\_ATM,

SRC.NH\_QLY\_ATM NH\_QLY\_ATM, SRC.LIMIT\_CU LIMIT\_CU, SRC.LIMIT\_MOI LIMIT\_MOI,

SRC.DESCRIPTION DESCRIPTION, SRC.COMPANY\_WRITE COMPANY\_WRITE,

SRC.NGAY\_YEU\_CAU\_XL NGAY\_YEU\_CAU\_XL, SRC.SO\_DIEN\_THOAI SO\_DIEN\_THOAI,

SRC.NGAY\_XU\_LY NGAY\_XU\_LY, SRC.GIO\_XU\_LY GIO\_XU\_LY,

SRC.TRANG\_THAI\_XL TRANG\_THAI\_XL, SRC.ID\_INFO\_CARD ID\_INFO\_CARD,

SRC.CN\_XU\_LY CN\_XU\_LY, SRC.SO\_MAY\_ATM SO\_MAY\_ATM,

SRC.LOAI\_HINH\_GD LOAI\_HINH\_GD, SRC.AMOUNT\_GD AMOUNT\_GD,

SRC.SO\_TIEN\_GD SO\_TIEN\_GD, SRC.REMARK REMARK,

SRC.NGAY\_GIAO\_DICH NGAY\_GIAO\_DICH, SRC.BALANCE\_GD BALANCE\_GD,

SRC.SEQUENCE\_XULY SEQUENCE\_XULY, SRC.BUOC\_XU\_LY BUOC\_XU\_LY,

SRC.SO\_TRACE SO\_TRACE, SRC.TTHAI\_JOUNAL TTHAI\_JOUNAL,

SRC.KT\_XAC\_NHAN KT\_XAC\_NHAN, SRC.DIEN\_GIAI DIEN\_GIAI,

SRC.KE\_TOAN\_XN KE\_TOAN\_XN, SRC.VAN\_HANH\_XN VAN\_HANH\_XN,

SRC.KE\_TOAN\_HTRA KE\_TOAN\_HTRA, SRC.INPUT\_NAME INPUT\_NAME,

SRC.AUTH\_NAME AUTH\_NAME, SRC.CURRENCY CURRENCY,

SRC.SO\_LAN\_TRA\_SOAT SO\_LAN\_TRA\_SOAT, SRC.KT\_CHU\_KY\_MAU KT\_CHU\_KY\_MAU,

SRC.DIA\_CHI\_NHAN\_SK DIA\_CHI\_NHAN\_SK, SRC.EMAIL EMAIL,

SRC.ACCOUNT\_TT ACCOUNT\_TT, SRC.DEBIT\_AMOUNT DEBIT\_AMOUNT,

SRC.FREE\_TXT FREE\_TXT, SRC.NG\_NHAN\_KHOA\_THE NG\_NHAN\_KHOA\_THE,

SRC.RESERVED\_12 RESERVED\_12, SRC.RESERVED\_13 RESERVED\_13,

SRC.RESERVED\_14 RESERVED\_14, SRC.RESERVED\_15 RESERVED\_15,

SRC.RESERVED\_16 RESERVED\_16, SRC.RESERVED\_17 RESERVED\_17,

SRC.RESERVED\_18 RESERVED\_18, SRC.RESERVED\_19 RESERVED\_19,

SRC.RESERVED\_20 RESERVED\_20, SRC.TRANSACTION\_TYPE TRANSACTION\_TYPE,

SRC.TRANSACTION\_AMOUNT TRANSACTION\_AMOUNT, SRC.RESERVED\_23 RESERVED\_23,

SRC.RESERVED\_24 RESERVED\_24, SRC.RESERVED\_25 RESERVED\_25,

SRC.OVERRIDE OVERRIDE, SRC.STMT\_NOS STMT\_NOS, SRC.DELIVERY\_REF DELIVERY\_REF,

SRC.RECORD\_STATUS RECORD\_STATUS, SRC.CURR\_NO CURR\_NO, SRC.INPUTTER INPUTTER,

SRC.DATE\_TIME DATE\_TIME, SRC.AUTHORISER AUTHORISER, SRC.CO\_CODE CO\_CODE,

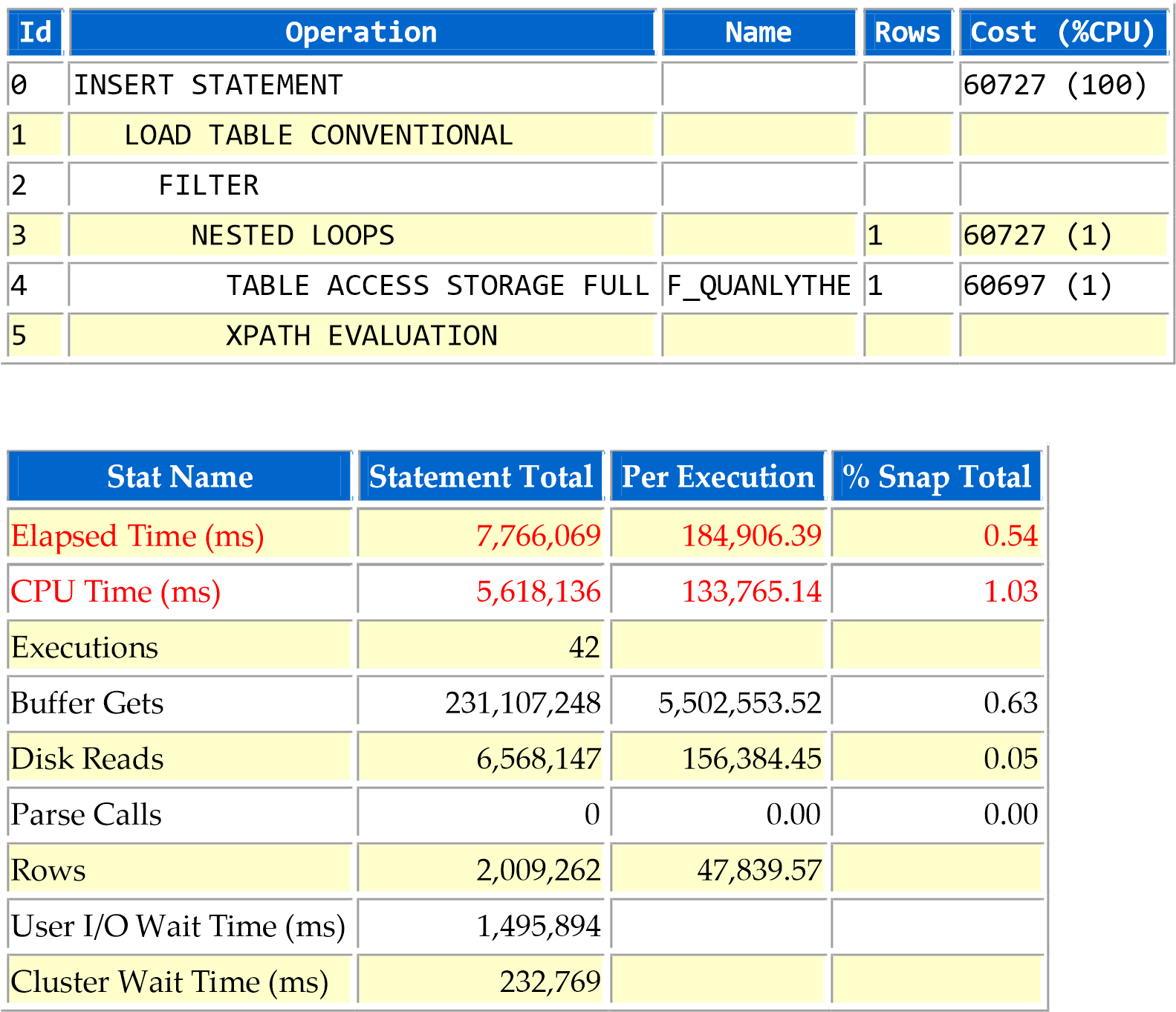
SRC.DEPT\_CODE DEPT\_CODE, SRC.AUDITOR\_CODE AUDITOR\_CODE,

SRC.AUDIT\_DATE\_TIME AUDIT\_DATE\_TIME

FROM DWH.V\_T24QUANLYTHE SRC

WHERE

IDSEQ BETWEEN :B2 AND :B1 LOG ERRORS REJECT LIMIT UNLIMITED



CPU takes 72% of execution time. This is mostly because XPATH EVALUATION step. To reduce CPU usage, we will limit rows to process by use index on IDSEQ column.

Table DWH\_BK.F\_QUANLYTHE: 2.23 GB, 3171879 rows, no statistics.

Create index on IDSEG:

CREATE UNIQUE INDEX DWH\_BK.F\_QUANLYTHE\_IDSEQ\_I

ON DWH\_BK.F\_QUANLYTHE (IDSEQ)

TABLESPACE DWH\_BK ONLINE;

New execution plan:

Plan hash value: 4228470407

------------------------------------------------------------------------------------------------------

| Id | Operation | Name | Rows | Bytes | Cost (%CPU)| Time |

------------------------------------------------------------------------------------------------------

| 0 | INSERT STATEMENT | | 4284K| 9405M| 290K (1)| 00:00:08 |

| 1 | LOAD TABLE CONVENTIONAL | T\_QUANLYTHE | | | | |

|\* 2 | FILTER | | | | | |

| 3 | NESTED LOOPS | | 4284K| 9405M| 290K (1)| 00:00:08 |

| 4 | TABLE ACCESS BY INDEX ROWID| F\_QUANLYTHE | 10490 | 21M| 4716 (1)| 00:00:01 |

|\* 5 | INDEX RANGE SCAN | F\_QUANLYTHE\_IDSEQ\_I | 18882 | | 36 (0)| 00:00:01 |

|\* 6 | XPATH EVALUATION | | | | | | ------------------------------------------------------------------------------------------------------

Predicate Information (identified by operation id):

---------------------------------------------------

2 - filter(TO\_NUMBER(:B1)>=TO\_NUMBER(:B2))

5 - access("X"."IDSEQ">=TO\_NUMBER(:B2) AND "X"."IDSEQ"<=TO\_NUMBER(:B1)) 6 - filter("P"."C\_01$" IS NOT NULL)

Less rows will process with XPATH EVALUATION & CPU usage will be lower.

**Recommendation**: Create unique index on F\_QUANLYTHE (IDSEQ).

### SQL ID bfznkpy3atxm1 - Module ODI:1382949750338/7/7346007

SELECT */\*+DRIVING\_SITE(v24)\*/*

SEQ,

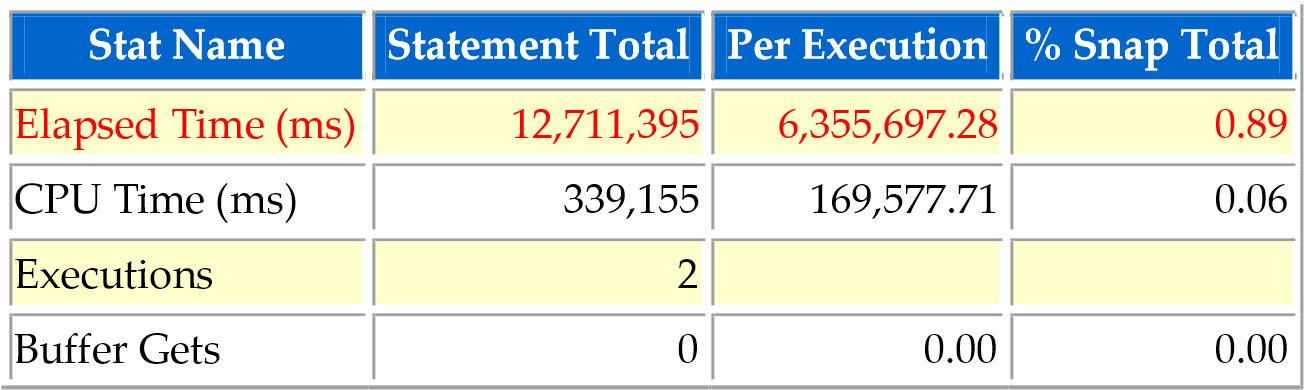
RECID,

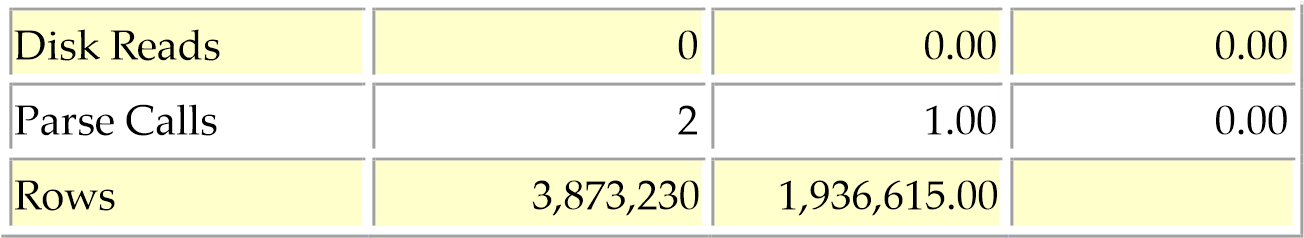
XMLRECORD,

TO\_DATE ('20160913', 'YYYYMMDD')

FROM V24\_QUANLY\_INFO\_UPDATE\_LKGD@T24DWH V24

WHERE SEQ BETWEEN :B2 AND :B1





Each execution takes 100 minutes.

The query actually runs on T24DWH database link which is COBR14DR instance.

Execution plan at remote site:

-------------------------------------------------------------------------------------------------------------

| Id | Operation | Name | Rows | Bytes | Cost (%CPU)| Time |

-------------------------------------------------------------------------------------------------------------

| 0 | SELECT STATEMENT | | 23750 | 15M| 16070 (3)| 00:03:13 |

|\* 1 | FILTER | | | | | |

| 2 | NESTED LOOPS | | 23750 | 15M| 16070 (3)| 00:03:13 |

| 3 | NESTED LOOPS | | 23750 | 15M| 16070 (3)| 00:03:13 |

|\* 4 | TABLE ACCESS FULL | F24\_QUANLY\_INFO\_UPDATE\_LKGD | 23750 | 3293K| 15833 (3)| 00:03:10 |

|\* 5 | INDEX UNIQUE SCAN | PK\_FBNK\_QUAN014 | 1 | | 1 (0)| 00:00:01 |

| 6 | TABLE ACCESS BY INDEX ROWID| FBNK\_QUAN014 | 1 | 547 | 1 (0)| 00:00:01 | -------------------------------------------------------------------------------------------------------------

Predicate Information (identified by operation id):

---------------------------------------------------

1 - filter(TO\_NUMBER(:B1)>=TO\_NUMBER(:B2))

4 - filter("B"."SEQ">=TO\_NUMBER(:B2) AND "B"."SEQ"<=TO\_NUMBER(:B1)) 5 - access("A"."RECID"="B"."RECID")

Table T24\_LIVE\_DWH.F24\_QUANLY\_INFO\_UPDATE\_LKGD: no statistic, 448MB, 9.773.049 rows. Min SEQ: 1, Max SEQ: 9.773.049.

If :B2 and :B1 is a small range compare to above range, consider create index on F24\_QUANLY\_INFO\_UPDATE\_LKGD(SEQ) in COBR14DR to filter rows.

**Recommendation**: Consider create index on FF24\_QUANLY\_INFO\_UPDATE\_LKGD(SEQ). Similar SQL with high execution time:

SELECT */\*+DRIVING\_SITE(v24)\*/*

SEQ,

RECID,

XMLRECORD,

TO\_DATE ('20160912', 'YYYYMMDD')

FROM V24\_PD\_BALANCES@T24DWH V24

WHERE SEQ BETWEEN :B2 AND :B1

### SQL ID ca0vc3cbhjn0t - Module ODI:1382949750338/7/7425007

INSERT INTO DWH\_STAGING.T\_IC\_HOME\_BANKING\_TCB

(IDSEQ, RECID, TERM, CHARGE\_AMOUNT, DEBIT\_ACCOUNT, PROCESSING\_DATE, STMT\_NO,

CHARGE\_CODE, RESERVED\_2, RESERVED\_3, RESERVED\_4, NOMINATED\_ACCT, STATUS,

RESERVED\_6, RESERVED\_7, RESERVED\_8, RESERVED\_9, RESERVED\_10, PENDING,

OVERRIDE, RECORD\_STATUS, CURR\_NO, INPUTTER, DATE\_TIME, AUTHORISER, CO\_CODE,

DEPT\_CODE, AUDITOR\_CODE, AUDIT\_DATE\_TIME)

SELECT SRC.IDSEQ IDSEQ, SRC.RECID RECID, SRC.TERM TERM,

SRC.CHARGE\_AMOUNT CHARGE\_AMOUNT, SRC.DEBIT\_ACCOUNT DEBIT\_ACCOUNT,

SRC.PROCESSING\_DATE PROCESSING\_DATE, SRC.STMT\_NO STMT\_NO,

SRC.CHARGE\_CODE CHARGE\_CODE, SRC.RESERVED\_2 RESERVED\_2, SRC.RESERVED\_3 RESERVED\_3, SRC.RESERVED\_4 RESERVED\_4,

SRC.NOMINATED\_ACCT NOMINATED\_ACCT, SRC.STATUS STATUS,

SRC.RESERVED\_6 RESERVED\_6, SRC.RESERVED\_7 RESERVED\_7,

SRC.RESERVED\_8 RESERVED\_8, SRC.RESERVED\_9 RESERVED\_9,

SRC.RESERVED\_10 RESERVED\_10, SRC.PENDING PENDING, SRC.OVERRIDE OVERRIDE,

SRC.RECORD\_STATUS RECORD\_STATUS, SRC.CURR\_NO CURR\_NO, SRC.INPUTTER INPUTTER,

SRC.DATE\_TIME DATE\_TIME, SRC.AUTHORISER AUTHORISER, SRC.CO\_CODE CO\_CODE,

SRC.DEPT\_CODE DEPT\_CODE, SRC.AUDITOR\_CODE AUDITOR\_CODE,

SRC.AUDIT\_DATE\_TIME AUDIT\_DATE\_TIME

FROM DWH.V\_T24IC\_HOME\_BANKING\_TCB SRC

WHERE

IDSEQ BETWEEN :B2 AND :B1 LOG ERRORS REJECT LIMIT UNLIMITED

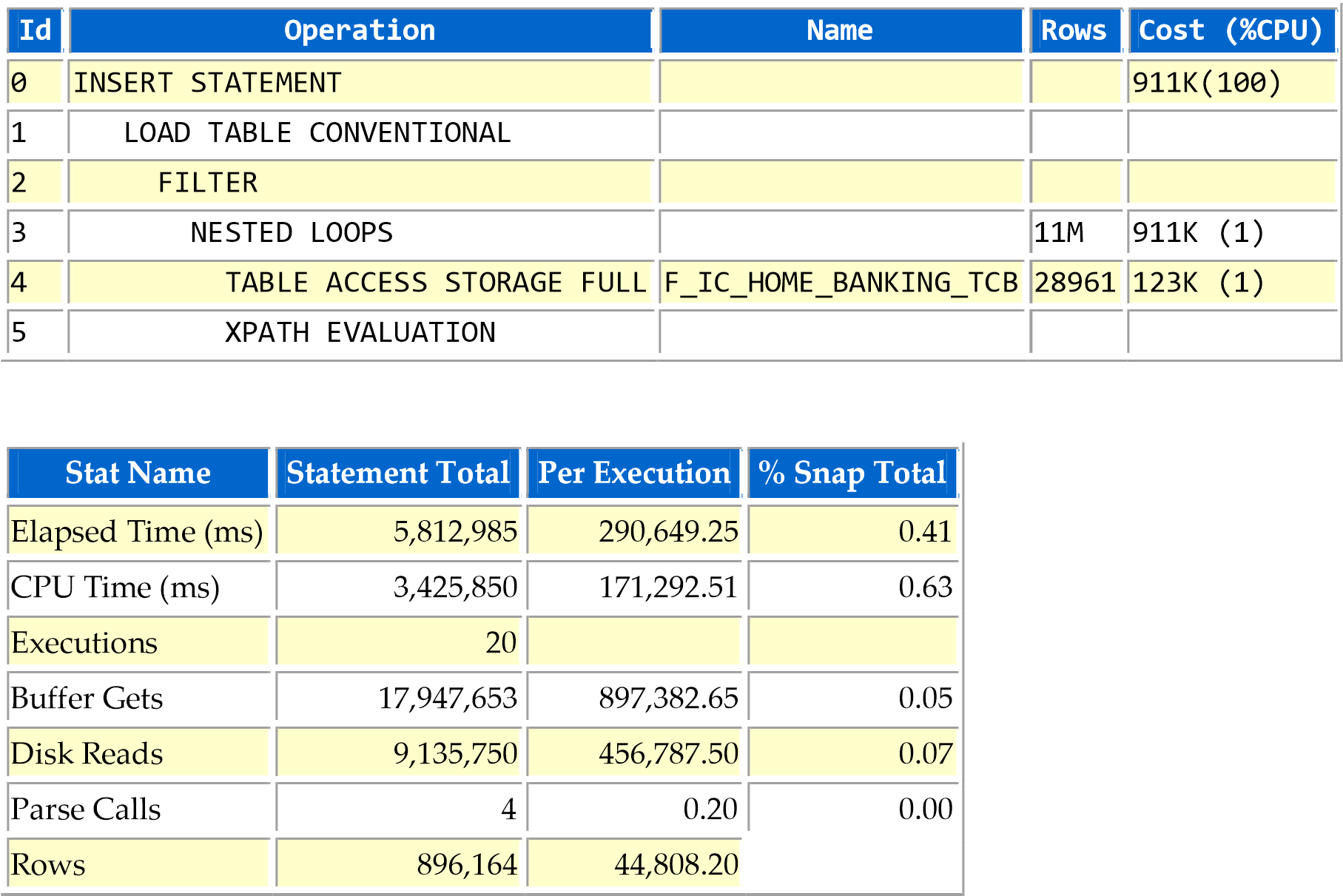


TABLE DWH\_BK.F\_IC\_HOME\_BANKING\_TCB: Size 4.24 GB, 2240413 rows, no statistics.

**Recommendation**: Create index on F\_IC\_HOME\_BANKING\_TCB(IDSEQ).

### SQL ID 105jxp6m8chwv - Module ODI:1382949750338/7/3776007

INSERT INTO DWH\_STAGING.T\_STMT\_ENTRY

(IDSEQ, STMT\_ENTRY\_ID, ACCOUNT\_NUMBER, COMPANY\_CODE, AMT\_LCY, TRANSACTION\_CODE,

THEIR\_REFERENCE, NARRATIVE, PL\_CATEGORY, CUSTOMER\_ID, ACCOUNT\_OFFICER,

PRODUCT\_CATEGORY, VALUE\_DATE, CURRENCY, AMOUNT\_FCY, EXCHANGE\_RATE,

NEGOTIATED\_REF\_NUM, POSITION\_TYPE, OUR\_REFERENCE, REVERSAL\_MARKER,

EXPOSURE\_DATE, CURRENCY\_MARKET, LOCAL\_REF, DEPARTMENT\_CODE,

TRANS\_REFERENCE, SYSTEM\_ID, BOOKING\_DATE, STMT\_NO, OVERRIDE, RECORD\_STATUS,

CURR\_NO, ADJ, ADJ\_DATE, INPUTTER, DATE\_TIME, AUTHORISER, SUSPENSE\_CATEGORY,

SUSPNSE\_VALUE\_DATE, SUPPRESS\_POSITION, CRF\_TYPE, CRF\_TXN\_CODE,

CRF\_CURRENCY, CONSOL\_KEY, CRF\_MAT\_DATE, CRF\_PROD\_CAT, PM\_TYPE, DEALER\_DESK,

COUNTERPARTY, LIQUIDATION\_MODE, REPAYMENT\_DATE, REPAYMENT\_TYPE,

REPAYMENT\_AMT, OUTSTANDING\_BAL, CONTRACT\_INT\_RATE, CONTRACT\_INT\_KEY,

CYCLE\_FORWARD, ORIG\_LOCAL\_EQUIV, ORIGINAL\_AMOUNT, ORIGINAL\_CCY,

ORIGINAL\_ACCT, ORIGINAL\_EXCH\_RATE, EXP\_SPLIT\_DATE, EXP\_SPLIT\_AMT,

ORIG\_AMOUNT\_LCY, BANK\_SORT\_CDE, CHEQUE\_NUMBER, CHQ\_COLL\_ID, DRAWN\_ACCOUNT,

ACCOUNTING\_DATE, PC\_PERIOD\_END, PC\_APPLIED, PROCESS\_FORWARD,

AA\_SUSPENSE\_REF, POS\_EXP\_DATE, RC\_DETAIL\_ID, TAX\_DATA, CUS\_PL\_ACCOUNT,

RESERVED\_9, RESERVED\_10, AMOUNT\_DEAL\_CCY, DEAL\_CCY, DEAL\_EXCH\_RATE,

MASK\_PRINT, MASK\_NARRATIVE, STMT1\_DATE, STMT2\_DATE, CHQ\_TYPE,

TAX\_EXCH\_RATE, NET\_PARAM, MASTER\_ACCOUNT, ADDL\_TRANS\_REF, INTEREST\_RATE,

DD\_MANDATE\_REF, DD\_ITEM\_REF, DD\_MANDATE\_DATE, CONTRACT\_BAL\_ID, TRADE\_DATE,

PROCESSING\_DATE, BALANCE\_TYPE, AA\_ITEM\_REF, ACCRUAL\_DATA, ORIG\_CCY\_MARKET,

CARD\_NUMBER, CARD\_TXN\_DETAIL, DRAFT\_PAYEE\_NAME, BANK\_ID)

SELECT SRC.IDSEQ IDSEQ, SRC.STMT\_ENTRY\_ID STMT\_ENTRY\_ID,

NVL (SRC.ACCOUNT\_NUMBER, '\*\*\*') ACCOUNT\_NUMBER,

NVL (SRC.COMPANY\_CODE, '\*\*\*') COMPANY\_CODE, SRC.AMT\_LCY AMT\_LCY,

NVL (SRC.TRANSACTION\_CODE, -1) TRANSACTION\_CODE,

SRC.THEIR\_REFERENCE THEIR\_REFERENCE, SRC.NARRATIVE NARRATIVE,

SRC.PL\_CATEGORY PL\_CATEGORY, NVL (SRC.CUSTOMER\_ID, -1) CUSTOMER\_ID,

NVL (SRC.ACCOUNT\_OFFICER, -1) ACCOUNT\_OFFICER,

NVL (SRC.PRODUCT\_CATEGORY, -1) PRODUCT\_CATEGORY, SRC.VALUE\_DATE VALUE\_DATE,

NVL (SRC.CURRENCY, '\*\*\*') CURRENCY, SRC.AMOUNT\_FCY AMOUNT\_FCY,

SRC.EXCHANGE\_RATE EXCHANGE\_RATE, SRC.NEGOTIATED\_REF\_NUM NEGOTIATED\_REF\_NUM,

SRC.POSITION\_TYPE POSITION\_TYPE, SRC.OUR\_REFERENCE OUR\_REFERENCE,

SRC.REVERSAL\_MARKER REVERSAL\_MARKER, SRC.EXPOSURE\_DATE EXPOSURE\_DATE,

SRC.CURRENCY\_MARKET CURRENCY\_MARKET, SRC.LOCAL\_REF LOCAL\_REF,

NVL (SRC.DEPARTMENT\_CODE, -1) DEPARTMENT\_CODE,

NVL (SRC.TRANS\_REFERENCE, '\*\*\*') TRANS\_REFERENCE, SRC.SYSTEM\_ID SYSTEM\_ID,

SRC.BOOKING\_DATE BOOKING\_DATE, SRC.STMT\_NO STMT\_NO, SRC.OVERRIDE OVERRIDE,

SRC.RECORD\_STATUS RECORD\_STATUS, SRC.CURR\_NO CURR\_NO, 'S' ADJ,

NULL ADJ\_DATE, SRC.INPUTTER INPUTTER, SRC.DATE\_TIME DATE\_TIME,

SRC.AUTHORISER AUTHORISER, SRC.SUSPENSE\_CATEGORY SUSPENSE\_CATEGORY,

SRC.SUSPNSE\_VALUE\_DATE SUSPNSE\_VALUE\_DATE,

SRC.SUPPRESS\_POSITION SUPPRESS\_POSITION, SRC.CRF\_TYPE CRF\_TYPE,

SRC.CRF\_TXN\_CODE CRF\_TXN\_CODE, SRC.CRF\_CURRENCY CRF\_CURRENCY,

SRC.CONSOL\_KEY CONSOL\_KEY, SRC.CRF\_MAT\_DATE CRF\_MAT\_DATE,

SRC.CRF\_PROD\_CAT CRF\_PROD\_CAT, SRC.PM\_TYPE PM\_TYPE,

SRC.DEALER\_DESK DEALER\_DESK, SRC.COUNTERPARTY COUNTERPARTY,

SRC.LIQUIDATION\_MODE LIQUIDATION\_MODE, SRC.REPAYMENT\_DATE REPAYMENT\_DATE,

SRC.REPAYMENT\_TYPE REPAYMENT\_TYPE, SRC.REPAYMENT\_AMT REPAYMENT\_AMT,

SRC.OUTSTANDING\_BAL OUTSTANDING\_BAL,

SRC.CONTRACT\_INT\_RATE CONTRACT\_INT\_RATE,

SRC.CONTRACT\_INT\_KEY CONTRACT\_INT\_KEY, SRC.CYCLE\_FORWARD CYCLE\_FORWARD,

SRC.ORIG\_LOCAL\_EQUIV ORIG\_LOCAL\_EQUIV, SRC.ORIGINAL\_AMOUNT ORIGINAL\_AMOUNT,

SRC.ORIGINAL\_CCY ORIGINAL\_CCY, SRC.ORIGINAL\_ACCT ORIGINAL\_ACCT,

SRC.ORIGINAL\_EXCH\_RATE ORIGINAL\_EXCH\_RATE,

SRC.EXP\_SPLIT\_DATE EXP\_SPLIT\_DATE, SRC.EXP\_SPLIT\_AMT EXP\_SPLIT\_AMT,

SRC.ORIG\_AMOUNT\_LCY ORIG\_AMOUNT\_LCY, SRC.BANK\_SORT\_CDE BANK\_SORT\_CDE, SRC.CHEQUE\_NUMBER CHEQUE\_NUMBER, SRC.CHQ\_COLL\_ID CHQ\_COLL\_ID,

SRC.DRAWN\_ACCOUNT DRAWN\_ACCOUNT, SRC.ACCOUNTING\_DATE ACCOUNTING\_DATE,

SRC.PC\_PERIOD\_END PC\_PERIOD\_END, SRC.PC\_APPLIED PC\_APPLIED,

SRC.PROCESS\_FORWARD PROCESS\_FORWARD, SRC.AA\_SUSPENSE\_REF AA\_SUSPENSE\_REF,

SRC.POS\_EXP\_DATE POS\_EXP\_DATE, SRC.RC\_DETAIL\_ID RC\_DETAIL\_ID,

SRC.TAX\_DATA TAX\_DATA, SRC.CUS\_PL\_ACCOUNT CUS\_PL\_ACCOUNT,

SRC.RESERVED\_9 RESERVED\_9, SRC.RESERVED\_10 RESERVED\_10,

SRC.AMOUNT\_DEAL\_CCY AMOUNT\_DEAL\_CCY, SRC.DEAL\_CCY DEAL\_CCY,

SRC.DEAL\_EXCH\_RATE DEAL\_EXCH\_RATE, SRC.MASK\_PRINT MASK\_PRINT,

SRC.MASK\_NARRATIVE MASK\_NARRATIVE, SRC.STMT1\_DATE STMT1\_DATE,

SRC.STMT2\_DATE STMT2\_DATE, SRC.CHQ\_TYPE CHQ\_TYPE,

SRC.TAX\_EXCH\_RATE TAX\_EXCH\_RATE, SRC.NET\_PARAM NET\_PARAM,

SRC.MASTER\_ACCOUNT MASTER\_ACCOUNT, SRC.ADDL\_TRANS\_REF ADDL\_TRANS\_REF,

SRC.INTEREST\_RATE INTEREST\_RATE, SRC.DD\_MANDATE\_REF DD\_MANDATE\_REF,

SRC.DD\_ITEM\_REF DD\_ITEM\_REF, SRC.DD\_MANDATE\_DATE DD\_MANDATE\_DATE,

SRC.CONTRACT\_BAL\_ID CONTRACT\_BAL\_ID, SRC.TRADE\_DATE TRADE\_DATE,

SRC.PROCESSING\_DATE PROCESSING\_DATE, SRC.BALANCE\_TYPE BALANCE\_TYPE,

SRC.AA\_ITEM\_REF AA\_ITEM\_REF, SRC.ACCRUAL\_DATA ACCRUAL\_DATA, SRC.ORIG\_CCY\_MARKET ORIG\_CCY\_MARKET, SRC.CARD\_NUMBER CARD\_NUMBER,

SRC.CARD\_TXN\_DETAIL CARD\_TXN\_DETAIL, SRC.DRAFT\_PAYEE\_NAME DRAFT\_PAYEE\_NAME,

SRC.BANK\_ID BANK\_ID

FROM DWH.V\_T24STMT\_ENTRY SRC

WHERE

IDSEQ BETWEEN :B2 AND :B1 LOG ERRORS REJECT LIMIT UNLIMITED

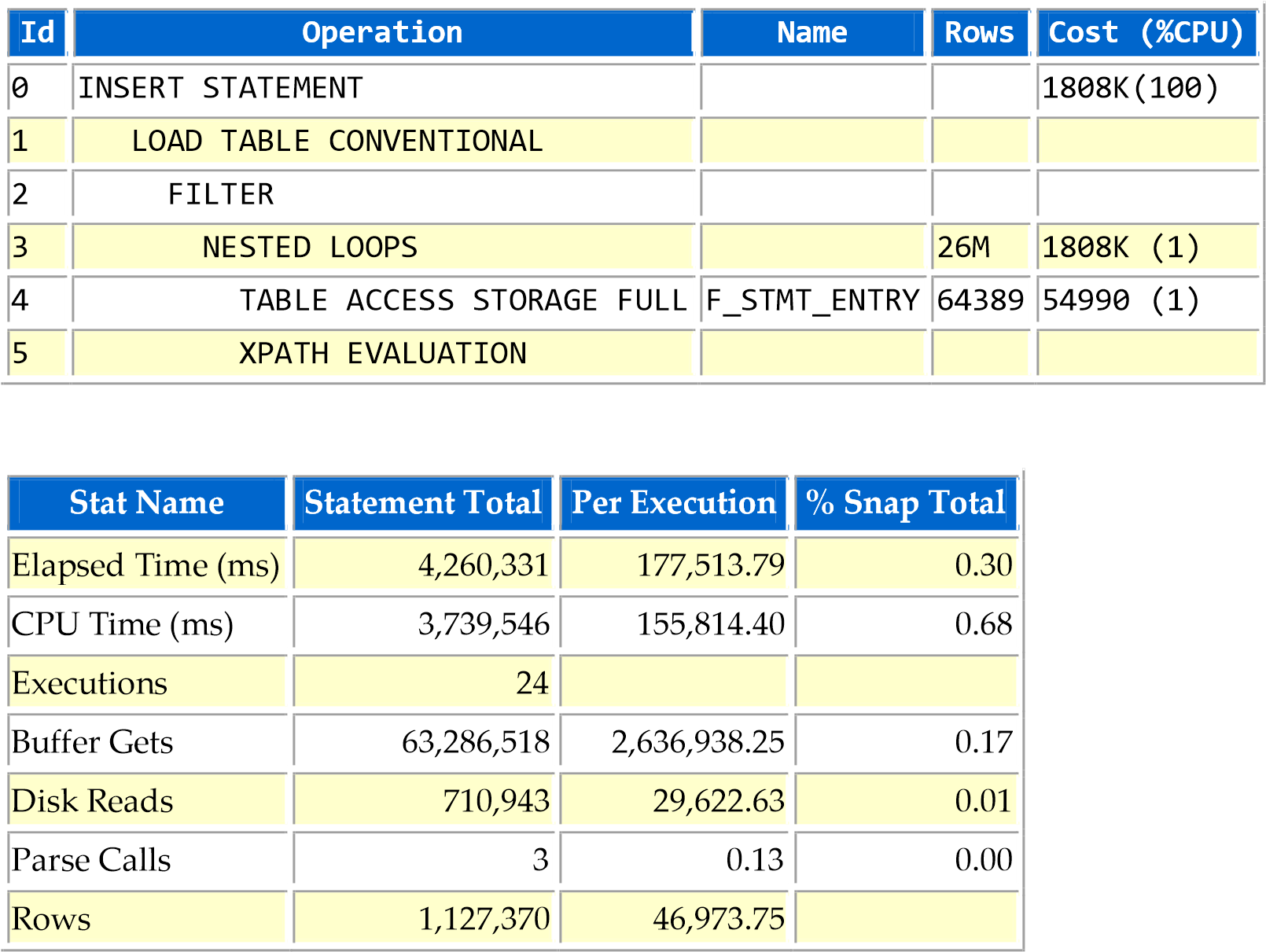


TABLE DWH\_BK.F\_STMT\_ENTRY: Size 839 MB, 1.110.225 rows, no statistics.

**Recommendation**: Create index on F\_STMT\_ENTRY(IDSEQ).

### SQL ID 3s69um4a8x1ap - Module ODI:1382949750338/7/2777007

INSERT INTO DWH\_STAGING.T\_VISA\_OFFUS\_TCB(IDSEQ, REF\_NO, CARD\_NO, MERCHANT\_ID, CURRENCY,

AMOUNT\_LCY, AMOUNT\_FCY, DEBIT\_ACCT\_NO, DEBIT\_CURRENCY, CREDIT\_ACCT\_NO, CREDIT\_CURRENCY,

TRANS\_VALUE\_DATE, POSTING\_DATE, RESERVED\_1, USE\_VND, TRANS\_CANCEL, NOTES, MGS\_IN,

CREATE\_DATE, MSG\_DESCRIPTION, EXCHANGE\_RATE, APP\_CODE, USER\_, COMPANY\_CREDIT, CATEG\_CR,

DEPT\_OFFICER\_CR, HACH\_TOAN, MERCHANT\_AMT, PL\_AMT, VAT\_AMT, TRANS\_REF, TCB\_MERCHANT, STMT\_NO,

REVERSAL\_MARKER, REFERENCE, LOCAL\_REF, OVERRIDE, RECORD\_STATUS, CURR\_NO, INPUTTER,

DATE\_TIME, AUTHORISER, CO\_CODE, DEPT\_CODE, AUDITOR\_CODE, AUDIT\_DATE\_TIME)

SELECT SRC.IDSEQ IDSEQ, SRC.REF\_NO REF\_NO, SRC.CARD\_NO CARD\_NO,

SRC.MERCHANT\_ID MERCHANT\_ID, SRC.CURRENCY CURRENCY,

SRC.AMOUNT\_LCY AMOUNT\_LCY, SRC.AMOUNT\_FCY AMOUNT\_FCY,

SRC.DEBIT\_ACCT\_NO DEBIT\_ACCT\_NO, SRC.DEBIT\_CURRENCY DEBIT\_CURRENCY,

SRC.CREDIT\_ACCT\_NO CREDIT\_ACCT\_NO, SRC.CREDIT\_CURRENCY CREDIT\_CURRENCY,

SRC.TRANS\_VALUE\_DATE TRANS\_VALUE\_DATE, SRC.POSTING\_DATE POSTING\_DATE,

SRC.RESERVED\_1 RESERVED\_1, SRC.USE\_VND USE\_VND,

SRC.TRANS\_CANCEL TRANS\_CANCEL, SRC.NOTES NOTES, SRC.MGS\_IN MGS\_IN,

SRC.CREATE\_DATE CREATE\_DATE, SRC.MSG\_DESCRIPTION MSG\_DESCRIPTION,

SRC.EXCHANGE\_RATE EXCHANGE\_RATE, SRC.APP\_CODE APP\_CODE, SRC.USER\_ USER\_,

SRC.COMPANY\_CREDIT COMPANY\_CREDIT, SRC.CATEG\_CR CATEG\_CR,

SRC.DEPT\_OFFICER\_CR DEPT\_OFFICER\_CR, SRC.HACH\_TOAN HACH\_TOAN,

SRC.MERCHANT\_AMT MERCHANT\_AMT, SRC.PL\_AMT PL\_AMT, SRC.VAT\_AMT VAT\_AMT,

SRC.TRANS\_REF TRANS\_REF, SRC.TCB\_MERCHANT TCB\_MERCHANT, SRC.STMT\_NO STMT\_NO,

SRC.REVERSAL\_MARKER REVERSAL\_MARKER, SRC.REFERENCE REFERENCE,

SRC.LOCAL\_REF LOCAL\_REF, SRC.OVERRIDE OVERRIDE,

SRC.RECORD\_STATUS RECORD\_STATUS, SRC.CURR\_NO CURR\_NO, SRC.INPUTTER INPUTTER,

SRC.DATE\_TIME DATE\_TIME, SRC.AUTHORISER AUTHORISER, SRC.CO\_CODE CO\_CODE,

SRC.DEPT\_CODE DEPT\_CODE, SRC.AUDITOR\_CODE AUDITOR\_CODE,

SRC.AUDIT\_DATE\_TIME AUDIT\_DATE\_TIME

FROM DWH.V\_T24VISA\_OFFUS\_TCB SRC

WHERE

IDSEQ BETWEEN :B2 AND :B1 LOG ERRORS REJECT LIMIT UNLIMITED

#### Id Operation Name Rows Cost (%CPU)

1. INSERT STATEMENT 1039K(100)
2. LOAD TABLE CONVENTIONAL
3. FILTER
4. NESTED LOOPS 14M 1039K (1)
5. TABLE ACCESS STORAGE FULL F\_VISA\_OFFUS\_TCB 35930 61368 (1)
6. XPATH EVALUATION

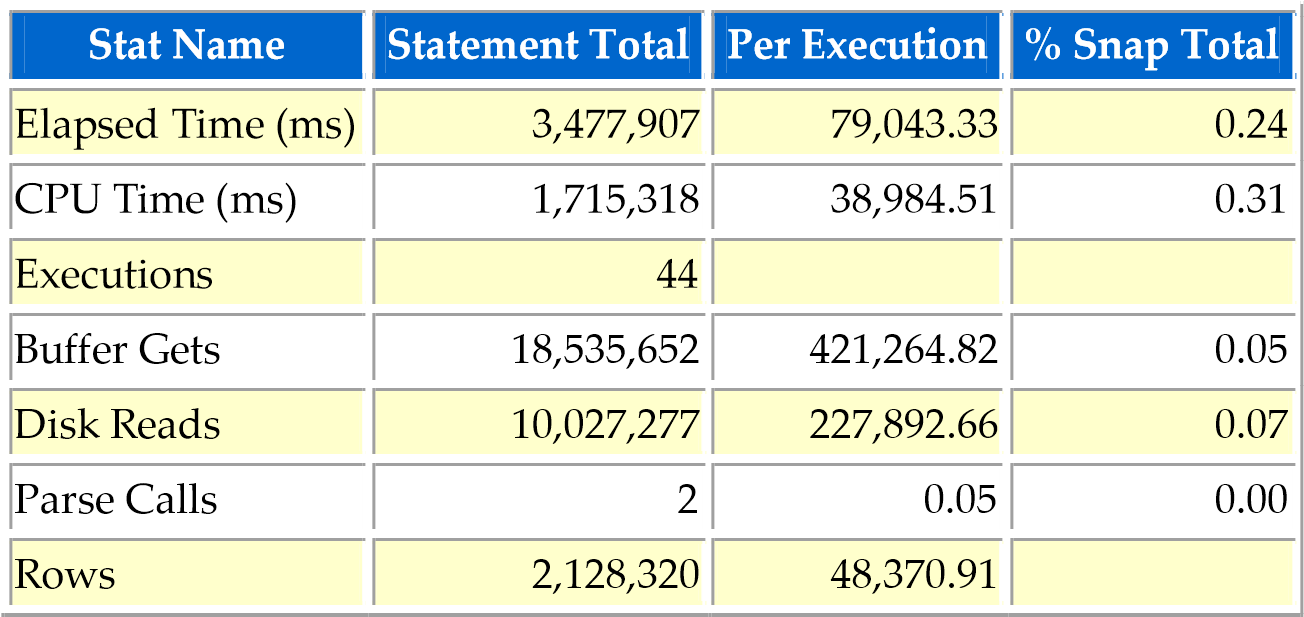


TABLE DWH\_BK.F\_VISA\_OFFUS\_TCB: Size 2.58 GB, 3.210.251 rows, no statistics.

**Recommendation**: Create index on F\_VISA\_OFFUS\_TCB(IDSEQ).

### SQL ID dntcqtwbvpvv4 - Module ODI:1382949750338/7/7347007

INSERT INTO DWH\_STAGING.T\_VISA\_OFFUS\_TCB(IDSEQ, REF\_NO, CARD\_NO, MERCHANT\_ID, CURRENCY,

AMOUNT\_LCY, AMOUNT\_FCY, DEBIT\_ACCT\_NO, DEBIT\_CURRENCY, CREDIT\_ACCT\_NO, CREDIT\_CURRENCY,

TRANS\_VALUE\_DATE, POSTING\_DATE, RESERVED\_1, USE\_VND, TRANS\_CANCEL, NOTES, MGS\_IN,

CREATE\_DATE, MSG\_DESCRIPTION, EXCHANGE\_RATE, APP\_CODE, USER\_, COMPANY\_CREDIT, CATEG\_CR,

DEPT\_OFFICER\_CR, HACH\_TOAN, MERCHANT\_AMT, PL\_AMT, VAT\_AMT, TRANS\_REF, TCB\_MERCHANT, STMT\_NO,

REVERSAL\_MARKER, REFERENCE, LOCAL\_REF, OVERRIDE, RECORD\_STATUS, CURR\_NO, INPUTTER,

DATE\_TIME, AUTHORISER, CO\_CODE, DEPT\_CODE, AUDITOR\_CODE, AUDIT\_DATE\_TIME)

SELECT SRC.IDSEQ IDSEQ, SRC.REF\_NO REF\_NO, SRC.CARD\_NO CARD\_NO,

SRC.MERCHANT\_ID MERCHANT\_ID, SRC.CURRENCY CURRENCY,

SRC.AMOUNT\_LCY AMOUNT\_LCY, SRC.AMOUNT\_FCY AMOUNT\_FCY,

SRC.DEBIT\_ACCT\_NO DEBIT\_ACCT\_NO, SRC.DEBIT\_CURRENCY DEBIT\_CURRENCY,

SRC.CREDIT\_ACCT\_NO CREDIT\_ACCT\_NO, SRC.CREDIT\_CURRENCY CREDIT\_CURRENCY,

SRC.TRANS\_VALUE\_DATE TRANS\_VALUE\_DATE, SRC.POSTING\_DATE POSTING\_DATE,

SRC.RESERVED\_1 RESERVED\_1, SRC.USE\_VND USE\_VND,

SRC.TRANS\_CANCEL TRANS\_CANCEL, SRC.NOTES NOTES, SRC.MGS\_IN MGS\_IN,

SRC.CREATE\_DATE CREATE\_DATE, SRC.MSG\_DESCRIPTION MSG\_DESCRIPTION,

SRC.EXCHANGE\_RATE EXCHANGE\_RATE, SRC.APP\_CODE APP\_CODE, SRC.USER\_ USER\_,

SRC.COMPANY\_CREDIT COMPANY\_CREDIT, SRC.CATEG\_CR CATEG\_CR,

SRC.DEPT\_OFFICER\_CR DEPT\_OFFICER\_CR, SRC.HACH\_TOAN HACH\_TOAN,

SRC.MERCHANT\_AMT MERCHANT\_AMT, SRC.PL\_AMT PL\_AMT, SRC.VAT\_AMT VAT\_AMT,

SRC.TRANS\_REF TRANS\_REF, SRC.TCB\_MERCHANT TCB\_MERCHANT, SRC.STMT\_NO STMT\_NO,

SRC.REVERSAL\_MARKER REVERSAL\_MARKER, SRC.REFERENCE REFERENCE,

SRC.LOCAL\_REF LOCAL\_REF, SRC.OVERRIDE OVERRIDE,

SRC.RECORD\_STATUS RECORD\_STATUS, SRC.CURR\_NO CURR\_NO, SRC.INPUTTER INPUTTER,

SRC.DATE\_TIME DATE\_TIME, SRC.AUTHORISER AUTHORISER, SRC.CO\_CODE CO\_CODE,

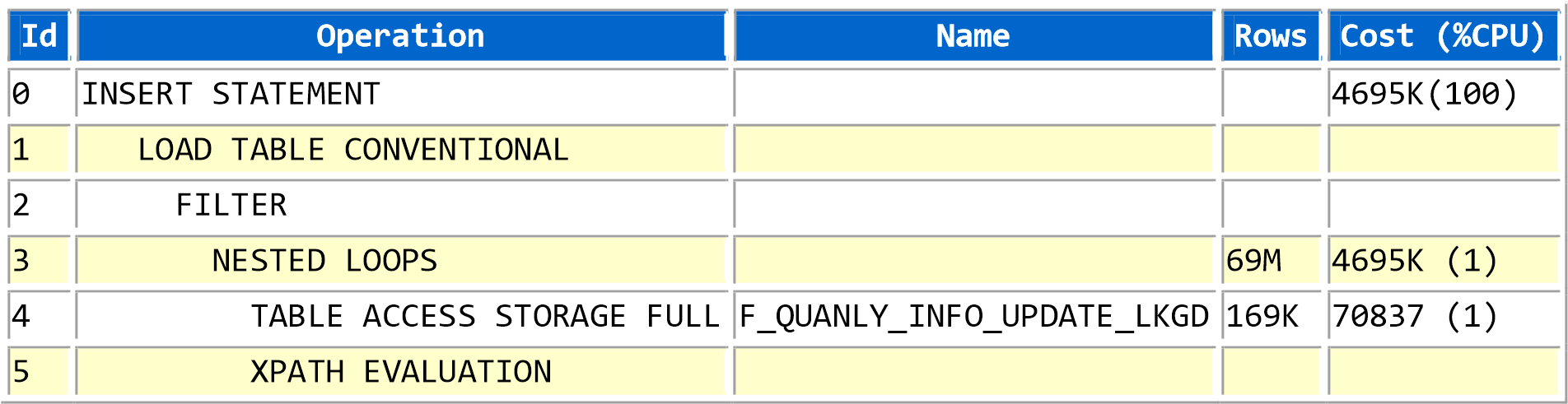
SRC.DEPT\_CODE DEPT\_CODE, SRC.AUDITOR\_CODE AUDITOR\_CODE,

SRC.AUDIT\_DATE\_TIME AUDIT\_DATE\_TIME

FROM DWH.V\_T24VISA\_OFFUS\_TCB SRC

WHERE

IDSEQ BETWEEN :B2 AND :B1 LOG ERRORS REJECT LIMIT UNLIMITED



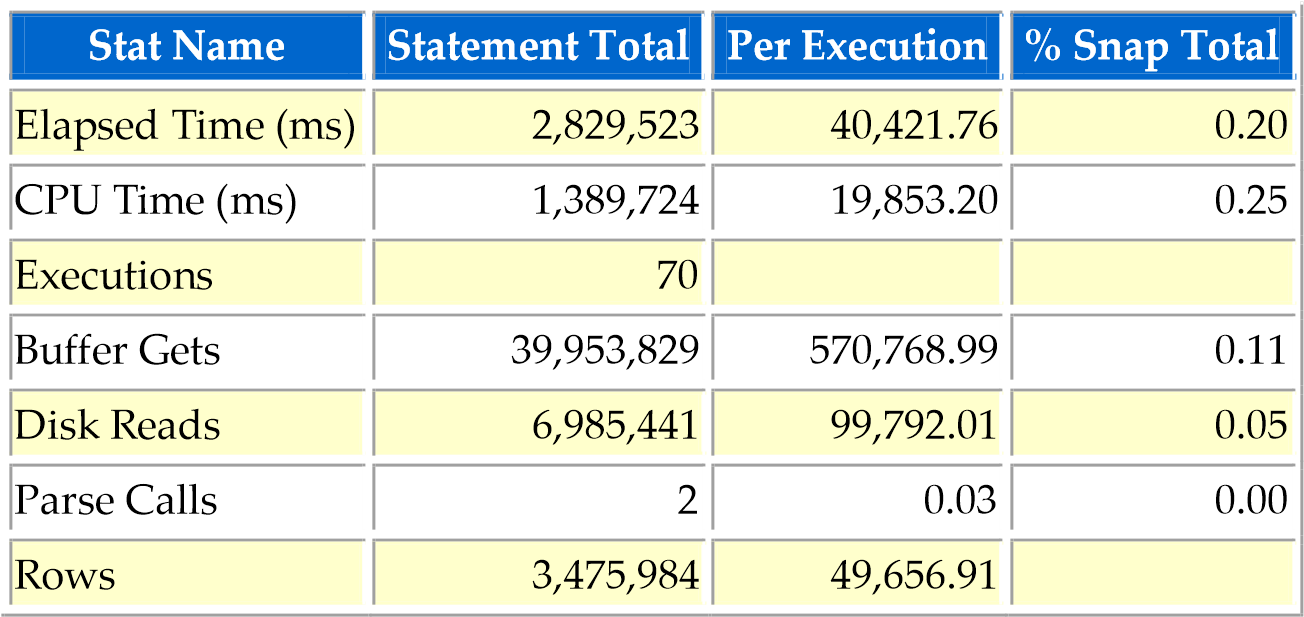


TABLE DWH\_BK.F\_QUANLY\_INFO\_UPDATE\_LKGD: Size 2.64GB, 9.761.544 rows, no

statistics.

**Recommendation**: Create index on F\_QUANLY\_INFO\_UPDATE\_LKGD(IDSEQ).

### SQL ID 4qjdnsbrp7xs2 - Module ODI:1382949750338/7/7373007

INSERT INTO DWH\_STAGING.T\_PD\_BALANCES\_HIST

(IDSEQ, BANK\_ID, KEY, RECORD\_START\_DATE, CURRENCY, PAYMENT\_STATUS,

PREVIOUS\_STATUS, NO\_DAYS\_OVERDUE, BASE\_EFF\_DATE, BASE\_AMOUNT,

RATE\_EFF\_DATE, RATE, POST\_START\_DATE, POST\_END\_DATE, BASE2\_EFF\_DATE,

BASE2\_AMOUNT, RATE2\_EFF\_DATE, RATE2, POST2\_START\_DATE, POST2\_END\_DATE,

PEN\_CALC\_DATE, PEN\_INT\_CALC\_AMT, PEN\_INT\_ACCR\_AMT, PEN\_INT\_NAB\_AMT,

PEN\_INT2\_CALC\_AMT, PEN\_INT2\_ACCR\_AMT, PEN\_INT2\_NAB\_AMT, FROM\_DATE\_1,

TO\_DATE\_1, NO\_DAYS\_1, BASE\_AMT\_1, RATE\_1, ACCR\_AMT\_1, ACCR\_ACT\_AMT\_1,

POSTED\_IND\_1, FROM\_DATE\_2, TO\_DATE\_2, NO\_DAYS\_2, BASE\_AMT\_2, RATE\_2,

ACCR\_AMT\_2, ACCR\_ACT\_AMT\_2, POSTED\_IND\_2, AMT\_TYPE, ORIGINAL\_AMT,

CURR\_OS\_AMT, CURR\_OS\_TAX, CURR\_OS\_ACCR, CURR\_OS\_NAB, REPAY\_DATE, REPAY\_AMT,

ADJ\_AMT, INT\_REPAY\_DATE, INT\_REPAY\_AMT, INT2\_REPAY\_DATE, INT2\_REPAY\_AMT,

CALC\_START\_DATE, RESERVED\_6, RESERVED\_5, RESERVED\_4, RESERVED\_3,

RESERVED\_2, RESERVED\_1)

SELECT SRC.IDSEQ IDSEQ, SRC.BANK\_ID BANK\_ID, SRC.KEY KEY,

SRC.RECORD\_START\_DATE RECORD\_START\_DATE, SRC.CURRENCY CURRENCY,

SRC.PAYMENT\_STATUS PAYMENT\_STATUS, SRC.PREVIOUS\_STATUS PREVIOUS\_STATUS,

SRC.NO\_DAYS\_OVERDUE NO\_DAYS\_OVERDUE, SRC.BASE\_EFF\_DATE BASE\_EFF\_DATE,

SRC.BASE\_AMOUNT BASE\_AMOUNT, SRC.RATE\_EFF\_DATE RATE\_EFF\_DATE, SRC.RATE RATE,

SRC.POST\_START\_DATE POST\_START\_DATE, SRC.POST\_END\_DATE POST\_END\_DATE,

SRC.BASE2\_EFF\_DATE BASE2\_EFF\_DATE, SRC.BASE2\_AMOUNT BASE2\_AMOUNT,

SRC.RATE2\_EFF\_DATE RATE2\_EFF\_DATE, SRC.RATE2 RATE2,

SRC.POST2\_START\_DATE POST2\_START\_DATE, SRC.POST2\_END\_DATE POST2\_END\_DATE,

SRC.PEN\_CALC\_DATE PEN\_CALC\_DATE, SRC.PEN\_INT\_CALC\_AMT PEN\_INT\_CALC\_AMT,

SRC.PEN\_INT\_ACCR\_AMT PEN\_INT\_ACCR\_AMT, SRC.PEN\_INT\_NAB\_AMT PEN\_INT\_NAB\_AMT,

SRC.PEN\_INT2\_CALC\_AMT PEN\_INT2\_CALC\_AMT,

SRC.PEN\_INT2\_ACCR\_AMT PEN\_INT2\_ACCR\_AMT,

SRC.PEN\_INT2\_NAB\_AMT PEN\_INT2\_NAB\_AMT, SRC.FROM\_DATE\_1 FROM\_DATE\_1,

SRC.TO\_DATE\_1 TO\_DATE\_1, SRC.NO\_DAYS\_1 NO\_DAYS\_1, SRC.BASE\_AMT\_1 BASE\_AMT\_1,

SRC.RATE\_1 RATE\_1, SRC.ACCR\_AMT\_1 ACCR\_AMT\_1,

SRC.ACCR\_ACT\_AMT\_1 ACCR\_ACT\_AMT\_1, SRC.POSTED\_IND\_1 POSTED\_IND\_1,

SRC.FROM\_DATE\_2 FROM\_DATE\_2, SRC.TO\_DATE\_2 TO\_DATE\_2,

SRC.NO\_DAYS\_2 NO\_DAYS\_2, SRC.BASE\_AMT\_2 BASE\_AMT\_2, SRC.RATE\_2 RATE\_2,

SRC.ACCR\_AMT\_2 ACCR\_AMT\_2, SRC.ACCR\_ACT\_AMT\_2 ACCR\_ACT\_AMT\_2,

SRC.POSTED\_IND\_2 POSTED\_IND\_2, SRC.AMT\_TYPE AMT\_TYPE,

SRC.ORIGINAL\_AMT ORIGINAL\_AMT, SRC.CURR\_OS\_AMT CURR\_OS\_AMT,

SRC.CURR\_OS\_TAX CURR\_OS\_TAX, SRC.CURR\_OS\_ACCR CURR\_OS\_ACCR,

SRC.CURR\_OS\_NAB CURR\_OS\_NAB, SRC.REPAY\_DATE REPAY\_DATE,

SRC.REPAY\_AMT REPAY\_AMT, SRC.ADJ\_AMT ADJ\_AMT,

SRC.INT\_REPAY\_DATE INT\_REPAY\_DATE, SRC.INT\_REPAY\_AMT INT\_REPAY\_AMT,

SRC.INT2\_REPAY\_DATE INT2\_REPAY\_DATE, SRC.INT2\_REPAY\_AMT INT2\_REPAY\_AMT,

SRC.CALC\_START\_DATE CALC\_START\_DATE, SRC.RESERVED\_6 RESERVED\_6,

SRC.RESERVED\_5 RESERVED\_5, SRC.RESERVED\_4 RESERVED\_4,

SRC.RESERVED\_3 RESERVED\_3, SRC.RESERVED\_2 RESERVED\_2,

SRC.RESERVED\_1 RESERVED\_1

FROM DWH.V\_T24PD\_BALANCES\_HIST SRC

WHERE

IDSEQ BETWEEN :B2 AND :B1 LOG ERRORS REJECT LIMIT UNLIMITED

**Id**

**Operation**

**Name**

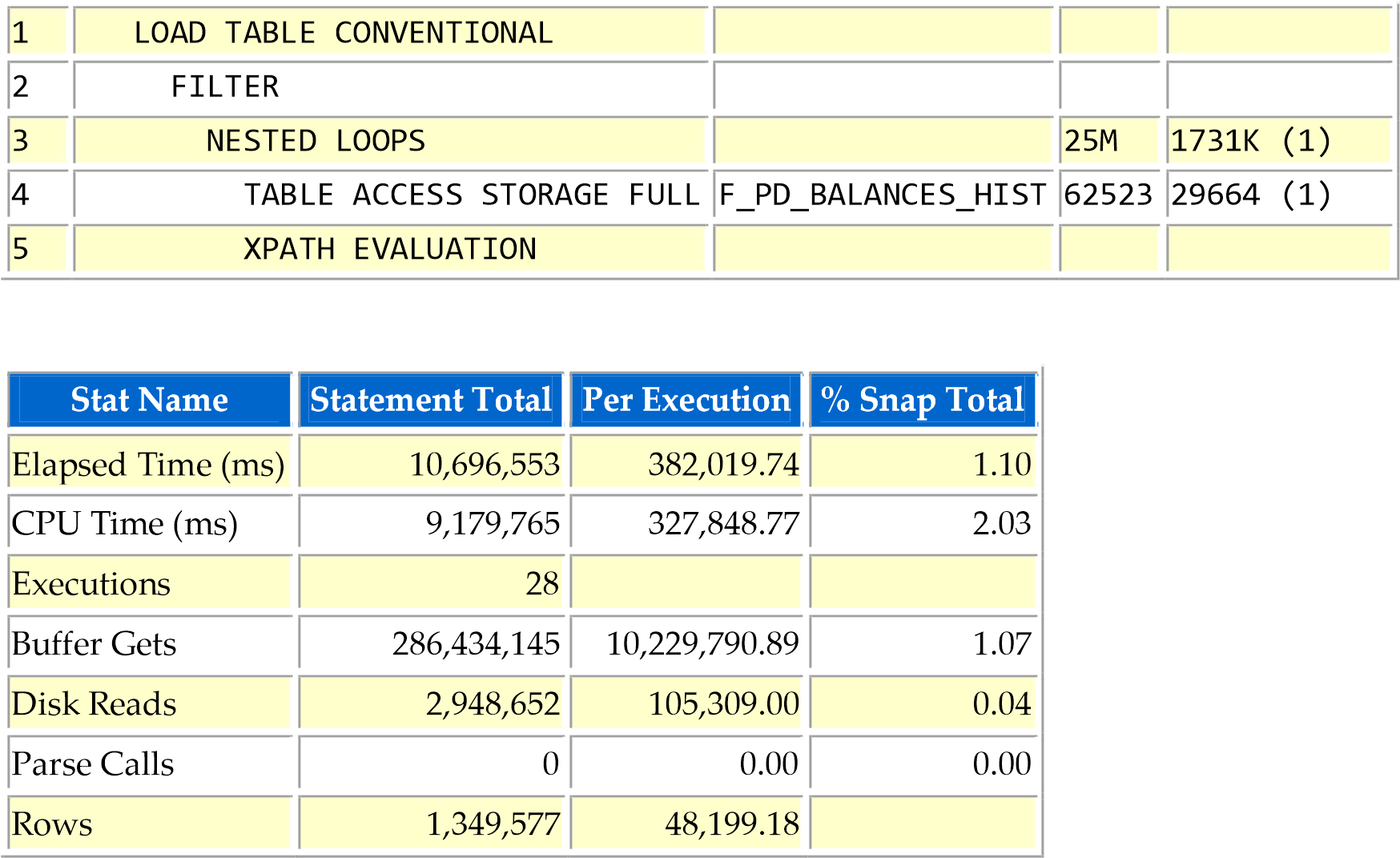
**Rows**

**Cost (%CPU)**

0

INSERT STATEMENT

1731K(100)



**Recommendation**: Create index on F\_PD\_BALANCES\_HIST(IDSEQ).

### SQL ID d5dadbhtugtfq - Module ODI:1382949750338/7/8488007

INSERT INTO DWH.ACCOUNT

(BANK\_ID, ACCOUNT\_NUMBER, CUSTOMER, PRODCAT, ACCOUNT\_TITLE\_1, ACCOUNT\_TITLE\_2,

SHORT\_TITLE, MNEMONIC, POSITION\_TYPE, CURRENCY, CURRENCY\_MARKET, LIMIT\_REF,

ACCOUNT\_OFFICER, OTHER\_OFFICER, POSTING\_RESTRICT, RECONCILE\_ACCT,

INTEREST\_LIQU\_ACCT, INTEREST\_COMP\_ACCT, INT\_NO\_BOOKING, REFERAL\_CODE,

WAIVE\_LEDGER\_FEE, LOCAL\_REF, CONDITION\_GROUP, INACTIV\_MARKER,

OPEN\_ACTUAL\_BAL, OPEN\_CLEARED\_BAL, ONLINE\_ACTUAL\_BAL, ONLINE\_CLEARED\_BAL,

WORKING\_BALANCE, DATE\_LAST\_CR\_CUST, AMNT\_LAST\_CR\_CUST, TRAN\_LAST\_CR\_CUST,

DATE\_LAST\_CR\_AUTO, AMNT\_LAST\_CR\_AUTO, TRAN\_LAST\_CR\_AUTO, DATE\_LAST\_CR\_BANK,

AMNT\_LAST\_CR\_BANK, TRAN\_LAST\_CR\_BANK, DATE\_LAST\_DR\_CUST, AMNT\_LAST\_DR\_CUST,

TRAN\_LAST\_DR\_CUST, DATE\_LAST\_DR\_AUTO, AMNT\_LAST\_DR\_AUTO, TRAN\_LAST\_DR\_AUTO,

DATE\_LAST\_DR\_BANK, AMNT\_LAST\_DR\_BANK, TRAN\_LAST\_DR\_BANK, CAP\_DATE\_CHARGE,

CAP\_DATE\_CR\_INT, CAP\_DATE\_C2\_INT, CAP\_DATE\_DR\_INT, CAP\_DATE\_D2\_INT,

CAP\_BACK\_VALUE, ACCR\_CHG\_CATEG, ACCR\_CHG\_TRANS, ACCR\_CHG\_AMOUNT,

ACCR\_CHG\_SUSP, ACCR\_CR\_CATEG, ACCR\_CR\_TRANS, ACCR\_CR\_AMOUNT, ACCR\_CR\_SUSP,

ACCR\_CR2\_CATEG, ACCR\_CR2\_TRANS, ACCR\_CR2\_AMOUNT, ACCR\_CR2\_SUSP,

ACCR\_DR\_CATEG, ACCR\_DR\_TRANS, ACCR\_DR\_AMOUNT, ACCR\_DR\_SUSP, ACCR\_DR2\_CATEG,

ACCR\_DR2\_TRANS, ACCR\_DR2\_AMOUNT, ACCR\_DR2\_SUSP, CONSOL\_KEY, INT\_LIQU\_TYPE,

INT\_LIQU\_ACCT, INT\_LIQ\_CCY, PASSBOOK, START\_YEAR\_BAL, OPENING\_DATE,

VALUE\_DATE, CREDIT\_MOVEMENT, DEBIT\_MOVEMENT, VALUE\_DATED\_BAL,

CONTINGENT\_BAL\_CR, CONTINGENT\_BAL\_DR, OPEN\_CATEGORY, OPEN\_VAL\_DATED\_BAL,

ACCT\_CREDIT\_INT, ACCT\_DEBIT\_INT, LINK\_TO\_LIMIT, CLOSURE\_DATE,

LOCKED\_WITH\_LIMIT, CHARGE\_ACCOUNT, CHARGE\_CCY, CHARGE\_MKT, INTEREST\_CCY,

INTEREST\_MKT, CON\_CHARGE\_ACCR, CON\_INTEREST\_ACCR, ALT\_ACCT\_TYPE,

ALT\_ACCT\_ID, PREMIUM\_TYPE, CAP\_DATE\_PRM, PREMIUM\_FREQ, APR, JOINT\_HOLDER,

RELATION\_CODE, JOINT\_NOTES, ALLOW\_NETTING, LEDG\_RECO\_WITH, STMT\_RECO\_WITH,

OUR\_EXT\_ACCT\_NO, RECO\_TOLERANCE, PENDING\_ID, TOTAL\_PENDING,

STOCK\_CONTROL\_TYPE, SERIAL\_NO\_FORMAT, AUTO\_PAY\_ACCT, ORIG\_CCY\_PAYMENT,

AUTO\_REC\_CCY, ORIGINAL\_ACCT, FROM\_DATE, LOCKED\_AMOUNT, DISPO\_OFFICER,

DISPO\_EXEMPT, TAX\_SUSPEND, TAX\_AT\_SETTLE, ICA\_MAIN\_ACCOUNT,

ICA\_DISTRIB\_RATIO, ICA\_MAIN\_ACCT\_IND, ICA\_DISTRIB\_TYPE, ICA\_POST\_INTEREST,

ICA\_MAIN\_RATIO, ICA\_NEW\_MAIN\_ACC, ICA\_START\_DATE, ICA\_ADD\_REMOVE,

ICA\_BACK\_VALUE, ICA\_MAIN\_ACCT, ICA\_MAIN\_DATE, LIQUIDATION\_MODE,

OVERDUE\_STATUS, HVT\_FLAG, SINGLE\_LIMIT, CONTINGENT\_INT, ALL\_IN\_ONE\_PRODUCT,

ER\_VALUE\_DATE, ER\_BALANCE, EP\_BALANCE, SB\_GROUP\_ID, OPEN\_AVAILABLE\_BAL,

AVAILABLE\_DATE, AV\_AUTH\_DB\_MVMT, AV\_NAU\_DB\_MVMT, AV\_AUTH\_CR\_MVMT,

AV\_NAU\_CR\_MVMT, AVAILABLE\_BAL, FORWARD\_MVMTS, CREDIT\_CHECK,

AVAILABLE\_BAL\_UPD, CONSOLIDATE\_ENT, MAX\_SUB\_ACCOUNT, MASTER\_ACCOUNT,

LOCK\_INC\_THIS\_MVMT, CLOSED\_ONLINE, NEXT\_AF\_DATE, NEXT\_ACCT\_CAP,

NEXT\_EXP\_DATE, DATE\_LAST\_UPDATE, NEXT\_STMT\_DATE, EXPOSURE\_DATES,

PORTFOLIO\_NO, SHADOW\_ACCOUNT, FWD\_ENTRY\_HOLD, FIRST\_AF\_DATE,

CASH\_POOL\_GROUP, OPEN\_ASSET\_TYPE, LAST\_COM\_CHG\_DATE, IC\_CHARGE\_ID,

IC\_NEXT\_CAP\_DATE, IC\_PRODUCT, IC\_LST\_PROD\_CAP, ARRANGEMENT\_ID,

ACC\_DEB\_LIMIT, MANDATE\_APPL, MANDATE\_REG, MANDATE\_RECORD, DR\_ADJ\_AMOUNT,

DR2\_ADJ\_AMOUNT, CR\_ADJ\_AMOUNT, CR2\_ADJ\_AMOUNT, EVENT, FIELD, OPERAND,

VALUE, MV\_ALERT\_RES6, MV\_ALERT\_RES5, MV\_ALERT\_RES4, MV\_ALERT\_RES3,

MV\_ALERT\_RES2, MV\_ALERT\_RES1, REQUEST\_ID, OVERRIDE, RECORD\_STATUS, CURR\_NO,

INPUTTER, DATE\_TIME, AUTHORISER, CO\_CODE, DEPT\_CODE, AUDITOR\_CODE, AUDIT\_DATE\_TIME, PROCESS\_DATE)

VALUES

(:B1, :B2, :B3, :B4, :B5, :B6, :B7, :B8, :B9, :B10, :B11, :B12, :B13, :B14, :B15,

:B16, :B17, :B18, :B19, :B20, :B21, :B22, :B23, :B24, :B25, :B26, :B27,

:B28, :B29, :B30, :B31, :B32, :B33, :B34, :B35, :B36, :B37, :B38, :B39,

:B40, :B41, :B42, :B43, :B44, :B45, :B46, :B47, :B48, :B49, :B50, :B51,

:B52, :B53, :B54, :B55, :B56, :B57, :B58, :B59, :B60, :B61, :B62, :B63,

:B64, :B65, :B66, :B67, :B68, :B69, :B70, :B71, :B72, :B73, :B74, :B75,

:B76, :B77, :B78, :B79, :B80, :B81, :B82, :B83, :B84, :B85, :B86, :B87,

:B88, :B89, :B90, :B91, :B92, :B93, :B94, :B95, :B96, :B97, :B98, :B99,

:B100, :B101, :B102, :B103, :B104, :B105, :B106, :B107, :B108, :B109,

:B110, :B111, :B112, :B113, :B114, :B115, :B116, :B117, :B118, :B119,

:B120, :B121, :B122, :B123, :B124, :B125, :B126, :B127, :B128, :B129,

:B130, :B131, :B132, :B133, :B134, :B135, :B136, :B137, :B138, :B139,

:B140, :B141, :B142, :B143, :B144, :B145, :B146, :B147, :B148, :B149,

:B150, :B151, :B152, :B153, :B154, :B155, :B156, :B157, :B158, :B159,

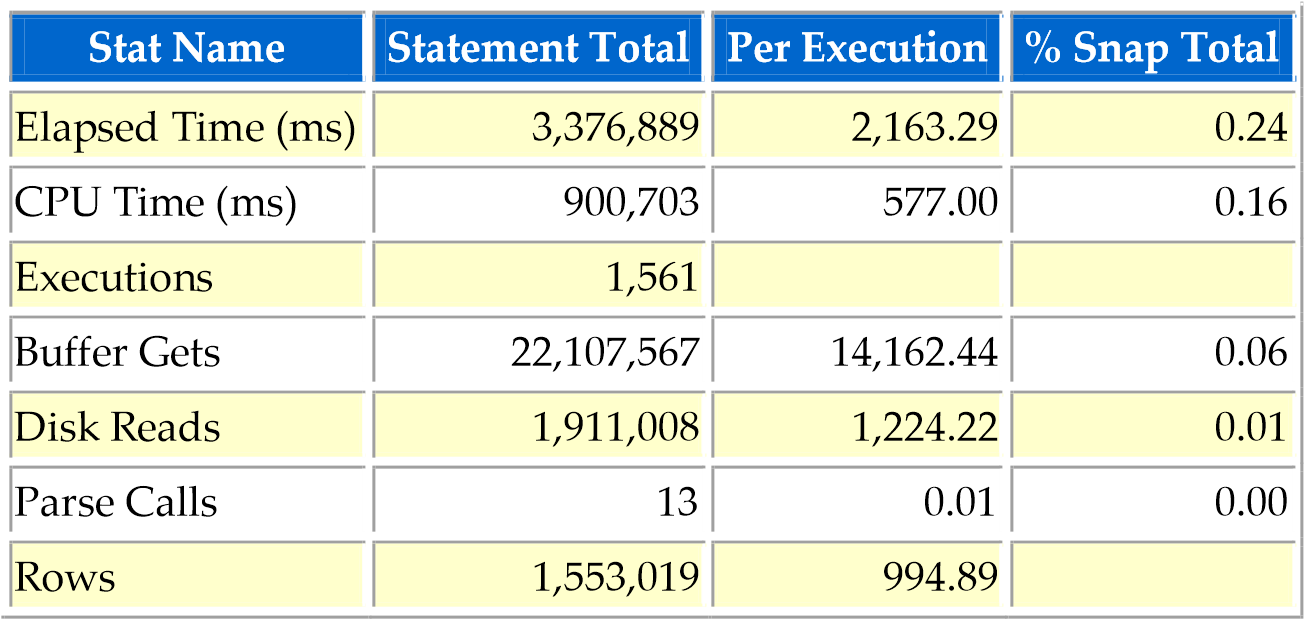
:B160, :B161, :B162, :B163, :B164, :B165, :B166, :B167, :B168, :B169,

:B170, :B171, :B172, :B173, :B174, :B175, :B176, :B177, :B178, :B179,

:B180, :B181, :B182, :B183, :B184, :B185, :B186, :B187, :B188, :B189,

:B190, :B191, :B192, :B193, :B194, :B195, :B196, :B197, :B198, :B199,

:B200, :B201, :B202, :B203, :B204, :B205, :B206, :B207, :B208, :B209, :B210, :B211, :B212, :B213)



It takes 2 second for an INSERT which is quite slow.

TABLE DWH.ACCOUNT: Size 321 GB, 733.011.491 rows, partition by interval 1 day on PROCESS\_DATE. Table use COMPRESS FOR QUERY HIGH for all partition that will affect DML performance.

**Recommendation**: Do not COMPRESS partition with high number of DML activity

### SQL ID 6a2ay1m4fzkzu - Module ODI:1382949750338/7/2483007

INSERT */\*+append nologging \*/*

INTO R\_TBL\_AC\_0009

SELECT ACC.ACCOUNT\_NUMBER ACCOUNT\_NUMBER, ACC.ACCOUNT\_TITLE\_1 ACCOUNT\_TITLE,

(SELECT COM.MNEMONIC

FROM DWH.COMPANY COM

WHERE

COM.COMPANY\_CODE = ACC.CO\_CODE) COMPANY\_MNE,

(SELECT DWH.SPLIT\_COL (COM.COMPANY\_NAME, 1)

FROM DWH.COMPANY COM

WHERE

COM.COMPANY\_CODE = ACC.CO\_CODE) COMPANY\_NAME, ACC.MNEMONIC,

ACC.CUSTOMER, DWH.SPLIT\_COL (ACC.ALT\_ACCT\_ID, 1) ALT\_ACCT\_ID,

DWH.SPLIT\_COL (CUS.NAME\_1, 1) CUS\_NAME, ACC.CURRENCY, ACC.PRODCAT CATEGORY,

CONCAT (CONCAT (ACC.CUSTOMER, '.0000'), ACC.LIMIT\_REF) LIMIT\_ID,

LIM.ONLINE\_LIMIT\_DATE, LIM.EXPIRY\_DATE,

NVL (DWH.SPLIT\_COL (LIM.ONLINE\_LIMIT, 1), 0) ONLINE\_LIMIT,

ACC.WORKING\_BALANCE, ACC.ONLINE\_ACTUAL\_BAL, ACC.OPEN\_ACTUAL\_BAL,

(CASE

WHEN (SPLIT\_COL (ACC.POSTING\_RESTRICT) <> '80') THEN TO\_CHAR ( NVL

(TCB\_DWH\_VAS.FNC\_GET\_MAX (ACC.LOCKED\_AMOUNT), 0))

ELSE 'TOAN BO SO DU'

END) AS SO\_TIEN\_PHONG\_TOA,

(CASE

WHEN (ACC.FROM\_DATE LIKE '%99990909%') THEN TO\_NUMBER ( DWH.SPLIT\_COL (

ACC.LOCKED\_AMOUNT, TCB\_DWH\_VAS.GET\_POS\_MV (ACC.FROM\_DATE, '99990909')))

WHEN (ACC.FROM\_DATE LIKE '%10000101%') THEN TO\_NUMBER ( DWH.SPLIT\_COL ( ACC.LOCKED\_AMOUNT, TCB\_DWH\_VAS.GET\_POS\_MV (ACC.FROM\_DATE, '10000101')))

ELSE 0

END) AS PHONG\_TOA\_THE,

CASE

WHEN (NVL (DWH.SPLIT\_COL (LIM.ONLINE\_LIMIT, 1), 0) = 0) THEN 0

ELSE (

CASE

WHEN (NVL (ACC.WORKING\_BALANCE, 0) >= 0) THEN TO\_NUMBER ( NVL (DWH.SPLIT\_COL (LIM.ONLINE\_LIMIT, 1), 0))

ELSE TO\_NUMBER ( NVL (DWH.SPLIT\_COL (LIM.ONLINE\_LIMIT, 1), 0)) + NVL

(ACC.WORKING\_BALANCE, 0)

END)

END AS HM\_CON\_LAI, CUS.SECTOR SECTOR,

(SELECT DWH.SPLIT\_COL (SEC.LOCAL\_REF, 1)

FROM DWH.SECTOR SEC

WHERE

SEC.SECTOR\_CODE = CUS.SECTOR) BIZLINE,

DWH.SPLIT\_COL (CUS.LOCAL\_REF, 20) CITY\_REGID,

DWH.SPLIT\_COL (CUS.LOCAL\_REF, 34) DKKD, ACC.ACCOUNT\_OFFICER,

DWH.SPLIT\_COL (ACC.LOCAL\_REF, 14) TCB\_DEPARTMENT, ACC.CONSOL\_KEY,

DWH.SPLIT\_COL (ACC.LOCAL\_REF, 26) LAI\_SUAT\_KH,

(SELECT DWH.SPLIT\_COL (IND.DESCRIPTION, 1)

FROM DWH.INDUSTRY IND

WHERE

IND.INDUSTRY\_CODE = CUS.INDUSTRY) INDUSTRY,

DWH.SPLIT\_COL (ACC.LOCAL\_REF, 23) ATM,

DWH.SPLIT\_COL (ACC.LOCAL\_REF, 48) ID\_CONG\_TY,

(SELECT DWH.SPLIT\_COL (CUS.SHORT\_NAME, 2)

FROM DWH.CUSTOMER CUS

WHERE

DWH.SPLIT\_COL (ACC.LOCAL\_REF, 48) = CUS.CUSTOMER\_CODE) TEN\_CONG\_TY,

DWH.SPLIT\_COL (ACC.LOCAL\_REF, 44) TK\_SALE,

DWH.SPLIT\_COL (ACC.LOCAL\_REF, 41) TCB\_PRODUCT, ACC.DATE\_LAST\_DR\_CUST,

ACC.DATE\_LAST\_CR\_CUST, ACC.CONDITION\_GROUP,

DWH.SPLIT\_COL (ACC.LOCAL\_REF, 2) TERM\_START\_DATE,

DWH.SPLIT\_COL (ACC.JOINT\_HOLDER, 1) JOINT\_HOLDER,

REPLACE (CONVERT\_MV\_CLOB (FROM\_DATE), '|', ', ') FROM\_DATE, ACC.CO\_CODE FROM DWH.ACCOUNT ACC, DWH.CUSTOMER CUS, DWH.LIMIT LIM

WHERE

ACC.PROCESS\_DATE = :B1

AND ACC.PRODCAT <> 1006

AND ACC.CUSTOMER = CUS.CUSTOMER\_CODE(+)

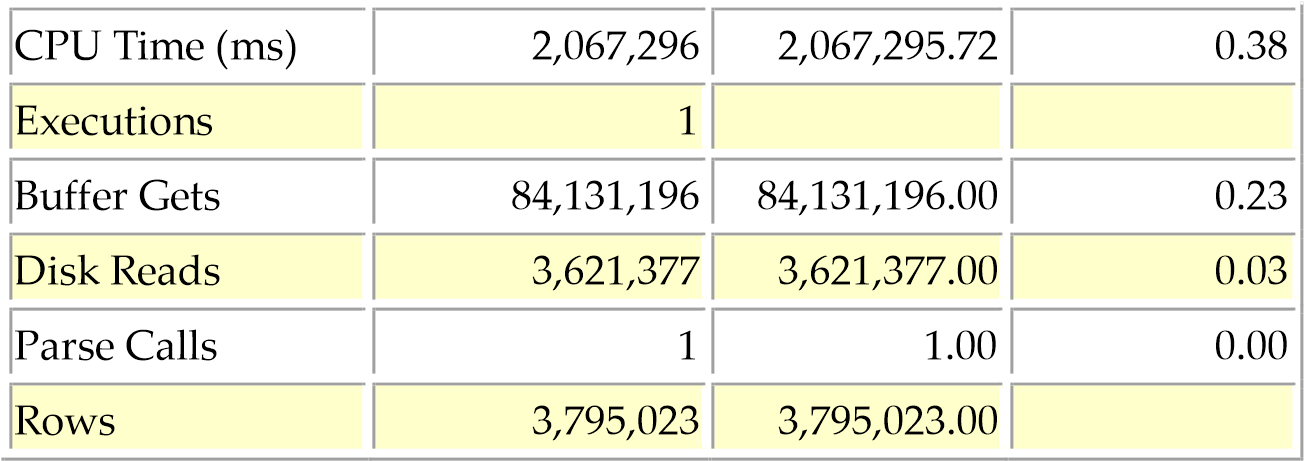
AND CONCAT (CONCAT (ACC.CUSTOMER, '.0000'), ACC.LIMIT\_REF) = LIM.LIMIT\_ID(+)

#### Id Operation Name Rows Cost (%CPU)

1. INSERT STATEMENT 734K(100)
2. LOAD AS SELECT
3. TABLE ACCESS BY INDEX ROWID COMPANY 1 2 (0)
4. INDEX UNIQUE SCAN PK\_COMPANY 1 1 (0)
5. TABLE ACCESS BY INDEX ROWID COMPANY 1 2 (0)
6. INDEX UNIQUE SCAN PK\_COMPANY 1 1 (0)
7. TABLE ACCESS BY INDEX ROWID SECTOR 1 2 (0)
8. INDEX UNIQUE SCAN PK\_SECTOR 1 1 (0)
9. TABLE ACCESS BY INDEX ROWID INDUSTRY 1 2 (0)
10. INDEX UNIQUE SCAN PK\_IND 1 1 (0)
11. TABLE ACCESS BY INDEX ROWID CUSTOMER 1 3 (0)
12. INDEX UNIQUE SCAN PK\_CUSTOMER\_CONST 1 2 (0)
13. HASH JOIN OUTER 1453K 734K (1)
14. HASH JOIN OUTER 1453K 573K (1)
15. PARTITION RANGE SINGLE 1453K 466K (1)
16. TABLE ACCESS STORAGE FULL ACCOUNT 1453K 466K (1)
17. TABLE ACCESS STORAGE FULL CUSTOMER 4351K 25063 (3)
18. TABLE ACCESS STORAGE FULL LIMIT 1036K 9951 (1)

**Stat Name Statement Total Per Execution % Snap Total**

Elapsed Time (ms) 2,991,443 2,991,443.07 0.21



The SQL takes 50 minutes to finish.

We can use parallel feature to decrease execution time with hint as below:

INSERT */\*+ append nologging \*/* INTO R\_TBL\_AC\_0009

SELECT */\*+ PARALLEL(32) \*/* ACC.ACCOUNT\_NUMBER ACCOUNT\_NUMBER, ACC.ACCOUNT\_TITLE\_1 ACCOUNT\_TITLE,

(SELECT COM.MNEMONIC

FROM DWH.COMPANY COM

WHERE COM.COMPANY\_CODE = ACC.CO\_CODE) COMPANY\_MNE,

**Recommendation**: Test SQL with PARALLEL hint & apply to source code.

# Appendix 1 – Other Documentation

**MTS and Large Pool:**

[Note:62140.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=62140.1)  Fundamentals of the Large Pool

[Note:268581.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=268581.1)  Obsolete / Deprecated Initialization Parameters in 10G

**Checkpoints:**

[Note:265831.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=265831.1)  Automatic Checkpoint Tuning in 10g

[Note:274264.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=274264.1)  REDO LOGS SIZING ADVISORY in 10g

**Statistics:**

[Note: 266040.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=266040.1)  Automatic statistics Gathering in oracle 10G

[Note: 252597.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=252597.1)  Relation between Table Monitoring and STATISTICS\_LEVEL parameter in 10g

[Note:281790.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=281790.1)  Oracle Database 10g DBMS\_STATS Package FORCE argument

[Note: 283890.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=283890.1)  Oracle Database 10g Locking Statistics

Locally Managed Tablespaces:

|  |  |
| --- | --- |
| [Note:93771.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=93771.1) | Introduction to Locally-Managed Tablespaces |
| [Note:262472.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=262472.1) | 10g: BIGFILE Type Tablespaces Versus SMALLFILE Type |
|  |  |

Tuning CPU Resources

|  |  |
| --- | --- |
| [Note: 33824.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=33824.1) | Statistic - recursive cpu usage |
| [Note: 164768.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=164768.1) | Diagnosing High CPU Utilization |
| [Note: 33828.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=33828.1) | Statistic - cpu used by this session (Reference Note) |
| [Note: 33854.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=33854.1) | Statistic - parse time elapsed (Reference Note) |
| [Note: 33853.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=33853.1) | Statistic - parse time cpu (Reference Note) |
| [Note: 33828.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=33828.1) | Statistic - cpu used by this session (Reference Note) |
| [Note: 276103.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=276103.1) | PERFORMANCE TUNING USING 10g ADVISORS AND MANAGEABILITY FEATURES |

**MTS and Large Pool:**

Tuning I/O

[Note: 30286.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=30286.1)  I/O Tuning with Different RAID Configurations

[Note: 1037322.6](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=1037322.6)  WHAT IS THE DB\_FILE\_MULTIBLOCK\_READ\_COUNT PARAMETER

[Note: 148342.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=148342.1)  Avoiding I/O Disk Contention

[Note: 245055.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=245055.1)  Oracle Database 10g Enhanced wait model

[Note: 272360.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=272360.1)  Tablespace Groups for SQL Operations in 10g

[Note: 242090.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=242090.1)  10g NEW FEATURE on SEGMENT SHRINK

Optimizing SQL Statements

|  |  |
| --- | --- |
| [Note: 10585.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=10585.1) | Query and Application Tuning using Explain and TKProf |
| [Note: 163563.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=163563.1) | START POINT: My Query runs slowly |
| [Note: 33089.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=33089.1) | TROUBLESHOOTING GUIDE: SQL Tuning |
| [Note: 67522.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=67522.1) | Why is my index not used? |
| [Note: 69992.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=69992.1) | Why is my hint ignored? |
| [Note: 34558.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=34558.1) | Waitevent - db file scattered read (Reference Note) |
| [Note: 34396.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=34396.1) | Waitevent - SQL\*Net message from dblink (Reference Note) |
| [Note: 34559.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=34559.1) | Waitevent - db file sequential read (Reference Note) |
| [Note 259188.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=259188.1) | Oracle10g: Using SQLAccess Advisor (DBMS\_ADVISOR) with the Automatic Workload Repository |
| [Note: 262687.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=262687.1) | How to use the Sql Tuning Advisor |
| [Note:244192.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=244192.1) | 10g NEW FEATURE Automatic Database Diagnostic Monitor (ADDM) |
| [Note:250655.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=250655.1) | How to use the Automatic Database Diagnostic Monitor |
| [Note: 290027.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=290027.1) | Computationally intensive PL/SQL programs run fast on 10G as compared to 9i |
|  |  |

Tuning Network Resources

[Note: 44694.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=44694.1)  SQL\*Net Packet Sizes (SDU and TDU Parameters)

[Note: 1005123.6](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=1005123.6)  Tuning SQL\*Net for better performance

**MTS and Large Pool:**

Tuning Memory

[Note: 257643.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=257643.1)  Oracle Database 10g Automated SGA Memory Tuning

[Note: 295626.1](https://support.oracle.com/oip/faces/secure/km/DocumentDisplay.jspx?id=295626.1)  How To Use Automatic Shared Memory Management (ASMM) In Oracle10g

# Appendix 2 - Methodology

A number of tools and methods were involved in examining and reviewing the systems, and providing the recommendations:

**Statspack**

Statspack is an Oracle provided utility that collects information and stores the performance statistics data permanently in Oracle tables, which can later be used for reporting and analysis. The data collected can be analyzed using the report provided, which includes an "instance health and load" summary page, high resource SQL statements, as well as the traditional wait events and initialization parameters.

**High-Water Mark Viewer**

This Excel spreadsheet connects to a local Oracle database via OO4O and extracts high-water mark information on all tables. It then generates an Excel chart that depicts the impact on full table scans.

**Oracle Trender**

This Excel spreadsheet connects to a local Oracle database via OO4O and extracts information about wait events, statistics etc. Several Excel charts are automatically generated that depict the impact of these events on the overall system.

**KM Repository on Oracle Support**

KM Repository on Oracle Support is Oracle’s electronic delivery of support information. A premier service for all Oracle-supported customers, it has a wealth of white papers, technical bulletins, user forums, Oracle documentation, and is used to open and work Technical Assistance Requests, verify supported configurations, etc. [http://support.oracle.com](http://support.oracle.com/)

**SAR**

SAR is a performance data collection program found on most Unix platforms. It is configurable for interval and duration, and can capture critical CPU and disk performance data.

**Remote Diagnostic Agent**

The Remote Diagnostic Agent is an Oracle-developed tool that is designed to collect significant amounts of configuration information from both hosts and databases. Primarily used to diagnose problem issues, the information can also be used proactively.

# Appendix 3 - Caveats

There are several potential issues with a health check of this nature.

* The data held internally in SYS or SYSTEM tables and views can be tainted by issues that are now rectified. For example, a database has been running for 4 weeks with a frequently executed query resulting in an expensive full table scan against a 1 million block table. Just prior to the health check a unique index was added to this table resulting in all queries using a unique index lookup. V$SYSTEM\_EVENT would probably still show that too many db file scattered read’ waits had occurred, and the original queries against that table are likely in the top x queries ordered by buffer gets/physical reads, yet the issue has now been rectified.

* Several of the findings in this document are based on ratios. These are not always a solid basis for analyzing a particular component’s performance. Using the frequently quoted buffer cache example, a database can have 5 sql statements that constitute 90% of the load. These queries result in full table scans of a relatively large table and are executed frequently so that each full table scan results in mostly logical rather than physical I/Os. The outcome of this scenario might be that the Buffer Cache Hit Ratio is a very nice 99.99%. Say changing the statements to use indexes and altering the application to execute the sql less often resulted in an 80% drop in overall I/Os. Likely the Buffer Cache Hit Ratio has now dropped but the database is much healthier as a result!

* Most importantly, the Performance Review is based on the difference between two snapshots of how the database has been performing at particular points in time, based on its load and sql at those times. Reducing the load on the database, for example by reducing logical and physical I/O, or reducing parsing, may negate the need to implement some of the recommendations outlined below. To give an example, the Shared Pool Advisor may be indicating that the shared pool size needs to be increased. However, changing the code to use bind variables instead of literals may increase cursor shareability and therefore free space in the shared pool. Result, shared pool no longer needs resizing so the recommendation now becomes redundant.

* In some cases the 'av rd (ms)' columns in a statspack report can show unusually high numbers - in some cases this can be converted to much more time than there is between snapshots. If this is the case in your existing statspack snapshots, you may need to apply patch 4942939.

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