ORACLE SUPPORT

*Advanced Customer Services*

# Report of Findings For

# DWPRD

## Prepared For

TECHCOMBANK

**Prepared by Advanced Customer Services**

| | |
|---|---|
| Author: | Do Duc Thinh |
| Creation Date: | 21 Sep 2016 |
| Version: | 1.0 |
| Data Collection: | From 12-SEP-16 01:00 to 14-SEP-16 23:00 |

ORACLE

# 1. Contents

## 2. 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.<br>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.

# 3. System Reviewed

The following system was reviewed during this engagement:

## 3.1. 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 2.6.39-400.264.6.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 | |

## 3.2. 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<br>Tempfiles: 780 GB |
| Archiving Enabled? | Yes |

# 4. Overview

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

## 4.1. 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.

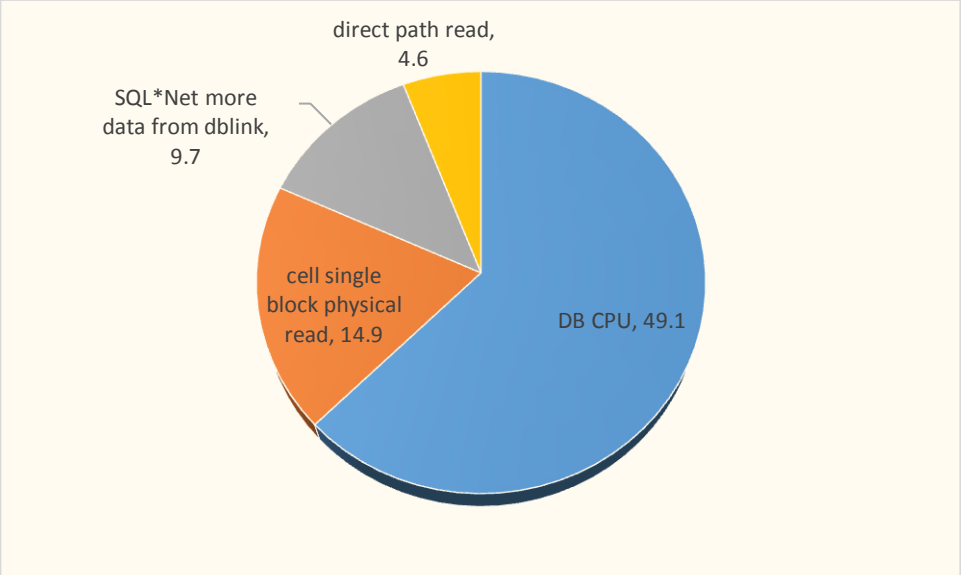


**Figure 1: Top Foreground Waits for DWPRD1**

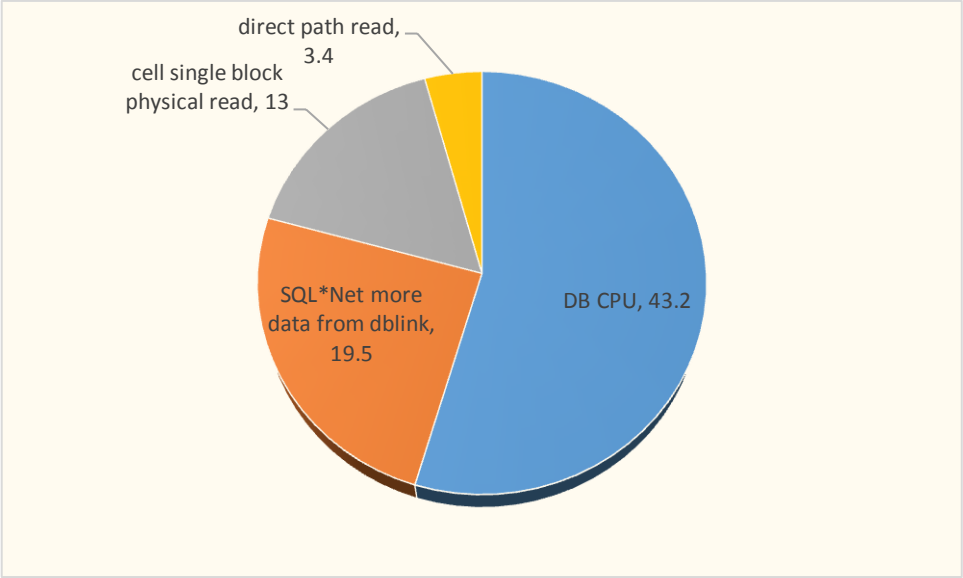


**Figure 2: Top Foreground Waits for DWPRD2**

## 4.2. 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.

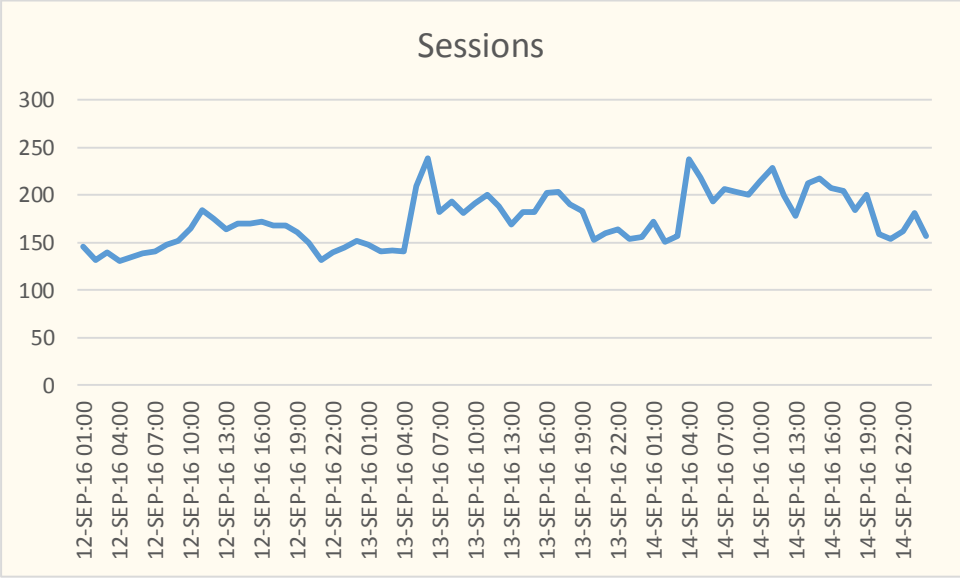


**Figure 3: Average Database Sessions for DWPRD1**

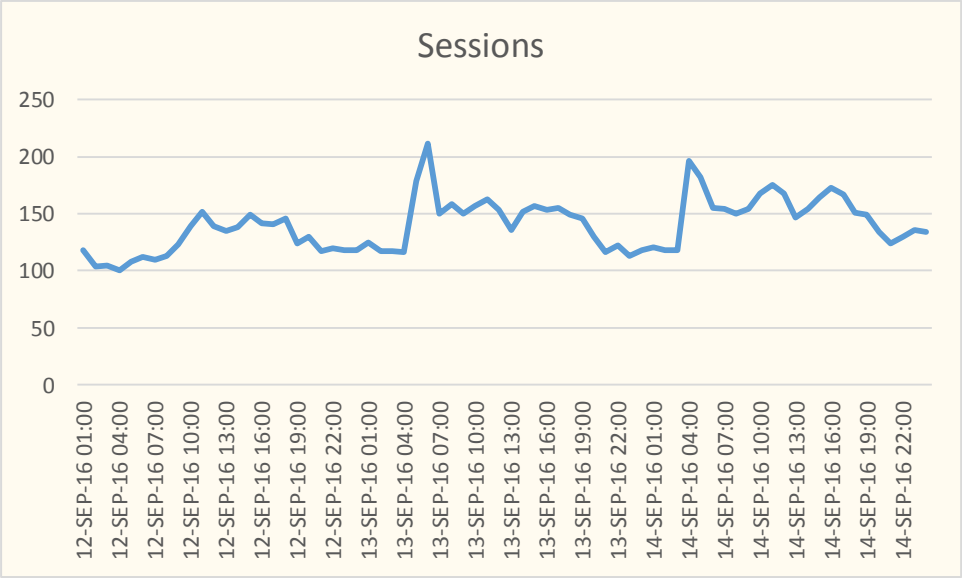


**Figure 4: Average Database Sessions for DWPRD2**

**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.

### 4.3. 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.

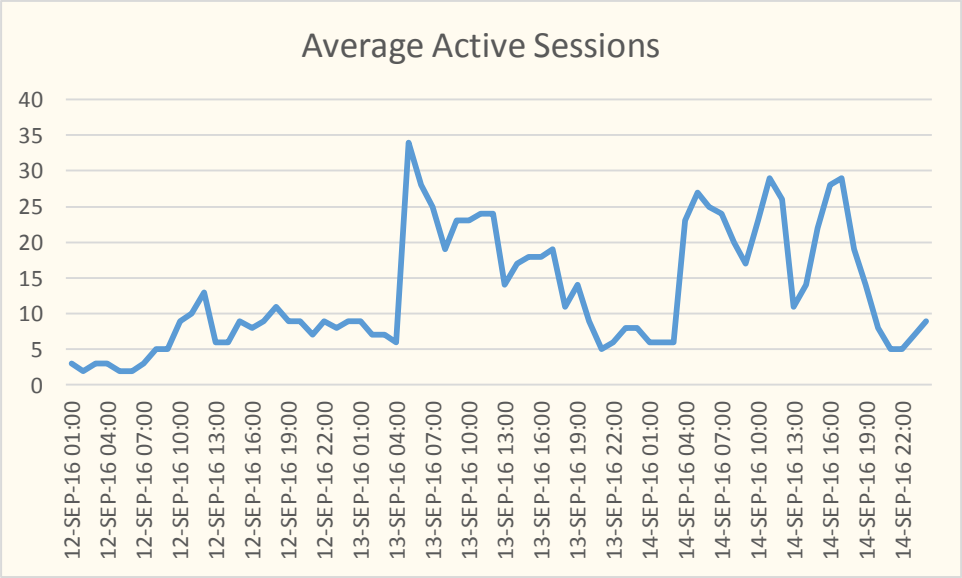


**Figure 5: Average Active Sessions for DWPRD1**

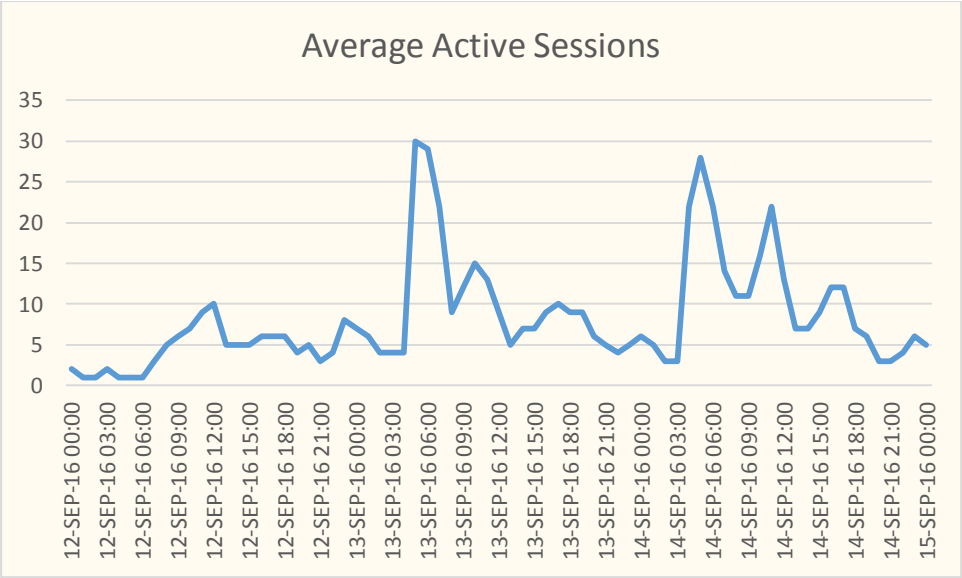


**Figure 6: Average Active Sessions for DWPRD2**

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

## 4.4. 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.

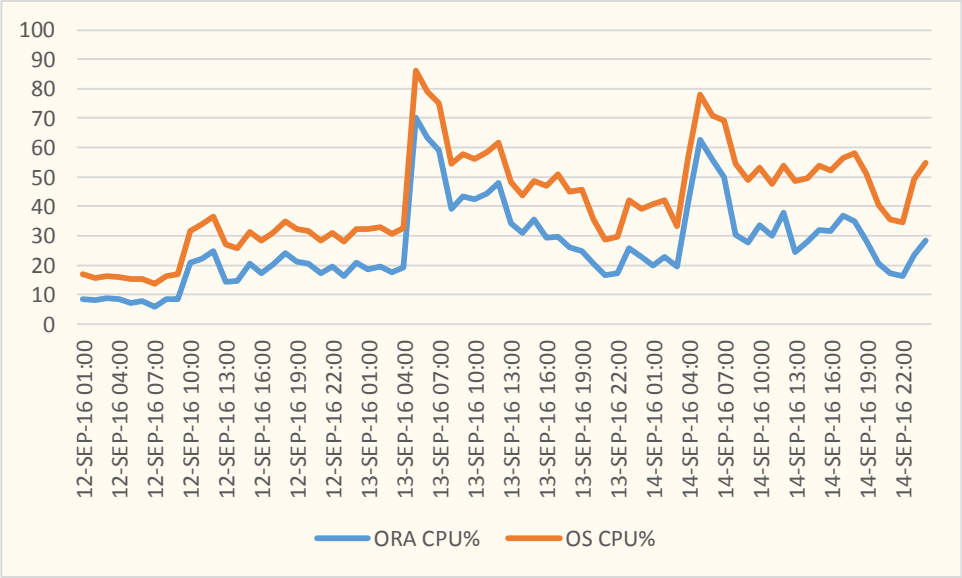


**Figure 7: CPU Break Down for DWPRD1**

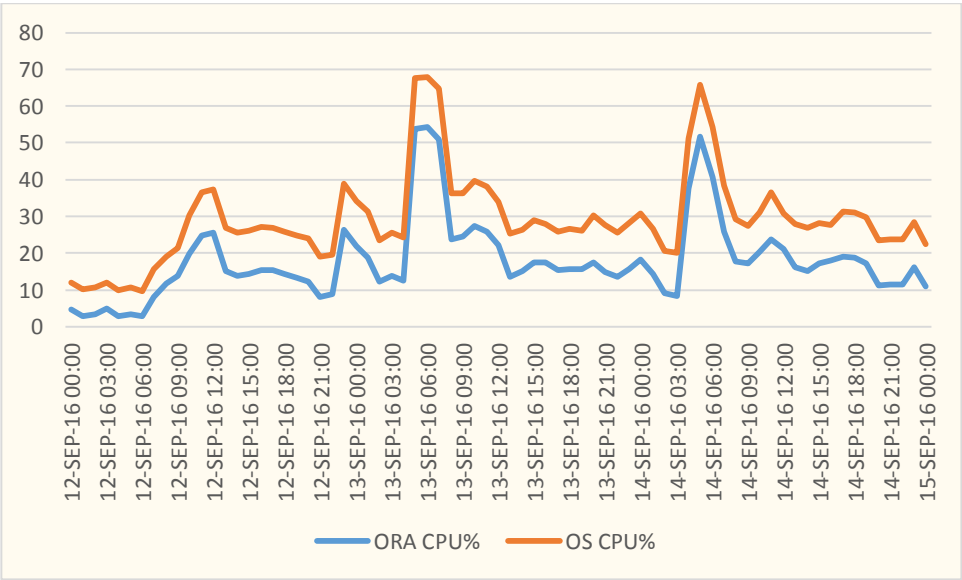


**Figure 8: CPU Break Down for DWPRD2**

**Observation**:

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

## 4.5. 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.

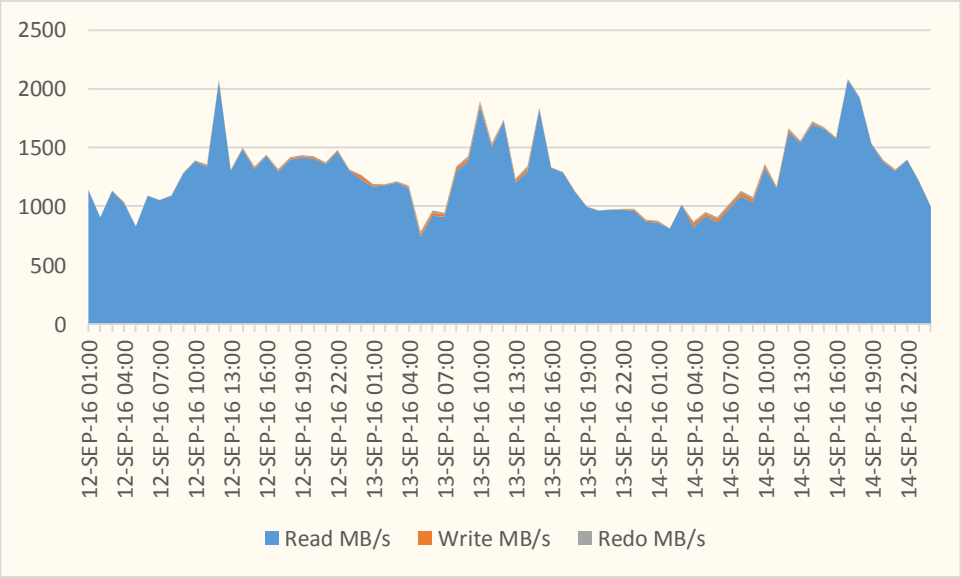


**Figure 9: Disk IO for DWPRD1**

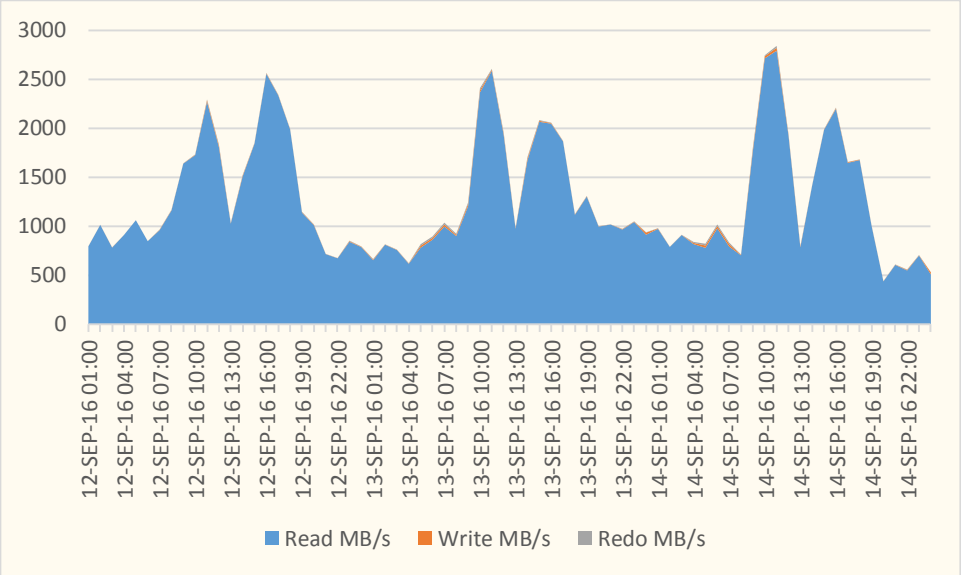


**Figure 10: Disk IO for DWPRD2**

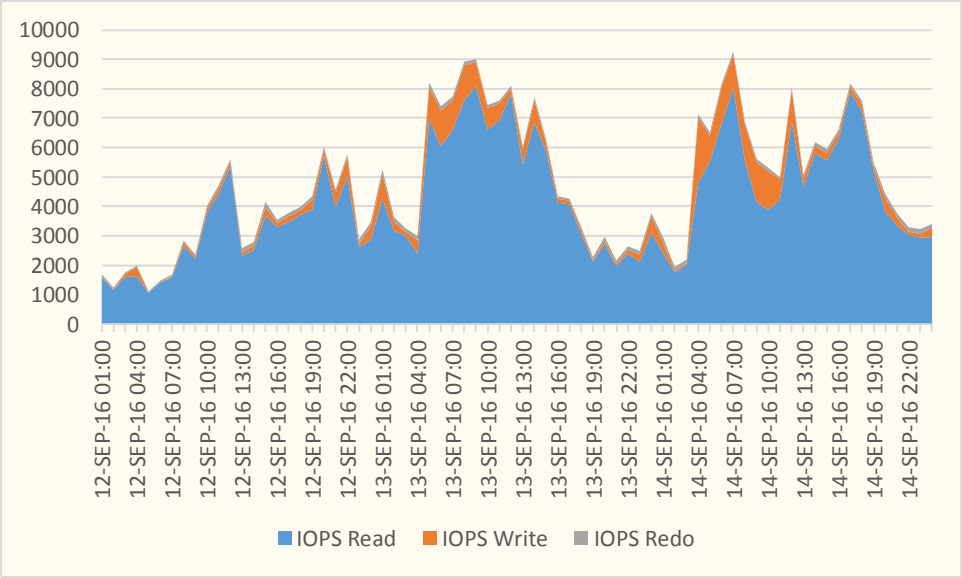


**Figure 11: Read , Write Operations per Second (IOPS) for DWPRD1**

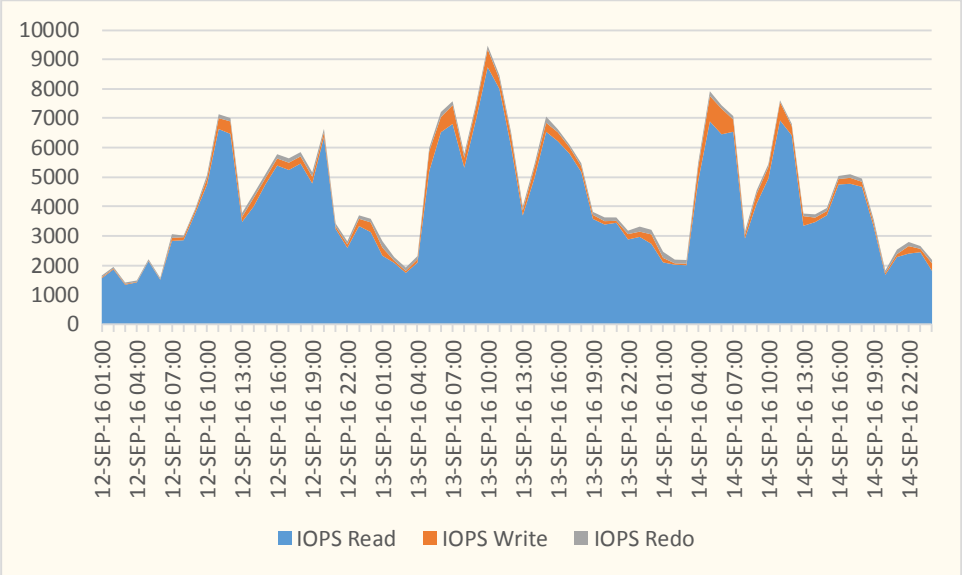


**Figure 12: Read , Write Operations per Second (IOPS) for DWPRD2**

## 4.6. 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.

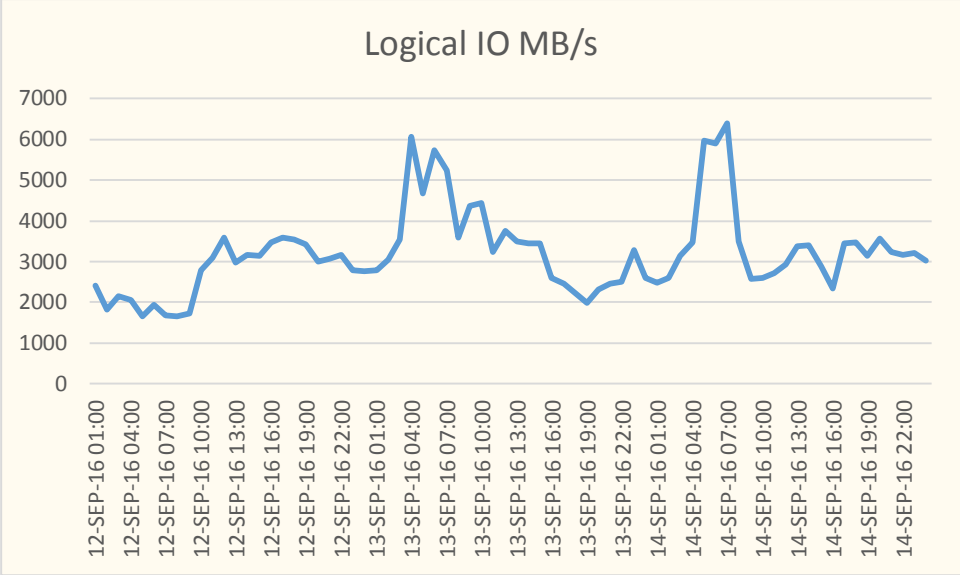


**Figure 13: Logical IO for DWPRD1**

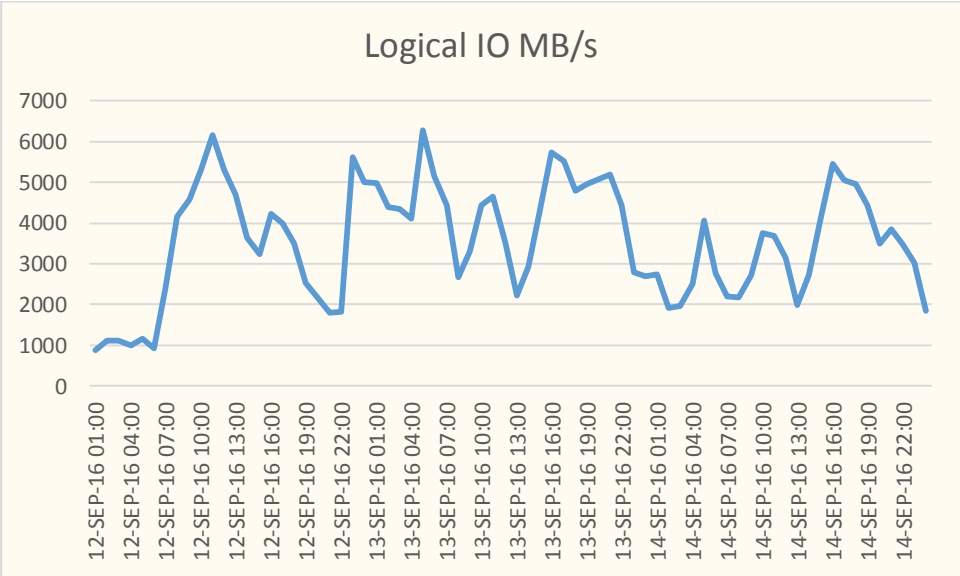


**Figure 14: Logical IO for DWPRD2**

## 4.7. 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.

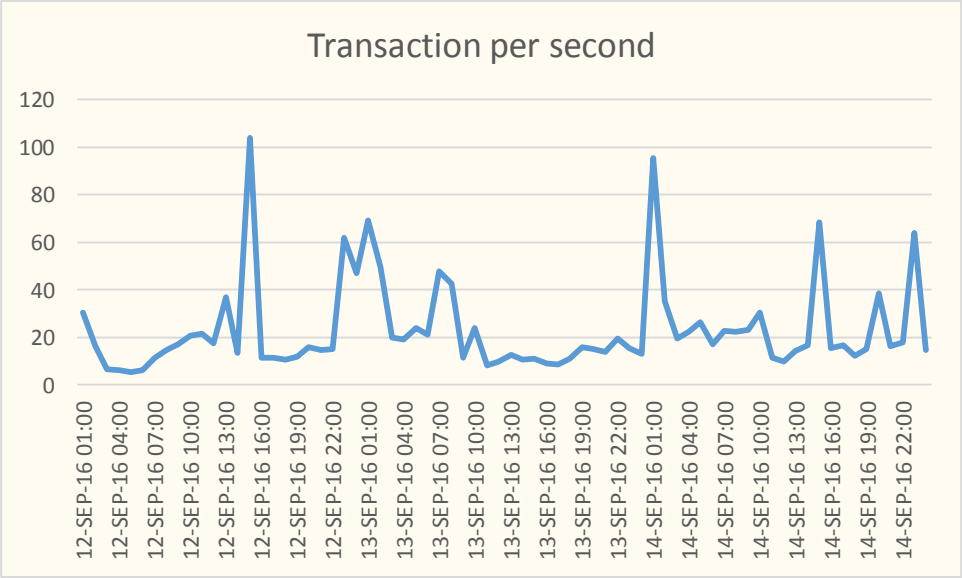


**Figure 15: Transactions per Second for DWPRD1**

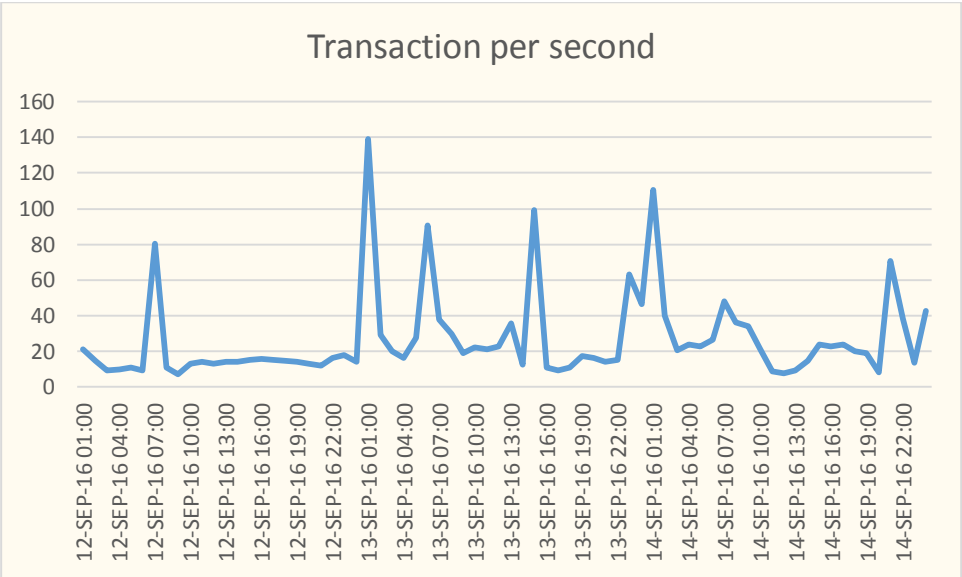


**Figure 16: Transactions per Second for DWPRD2**

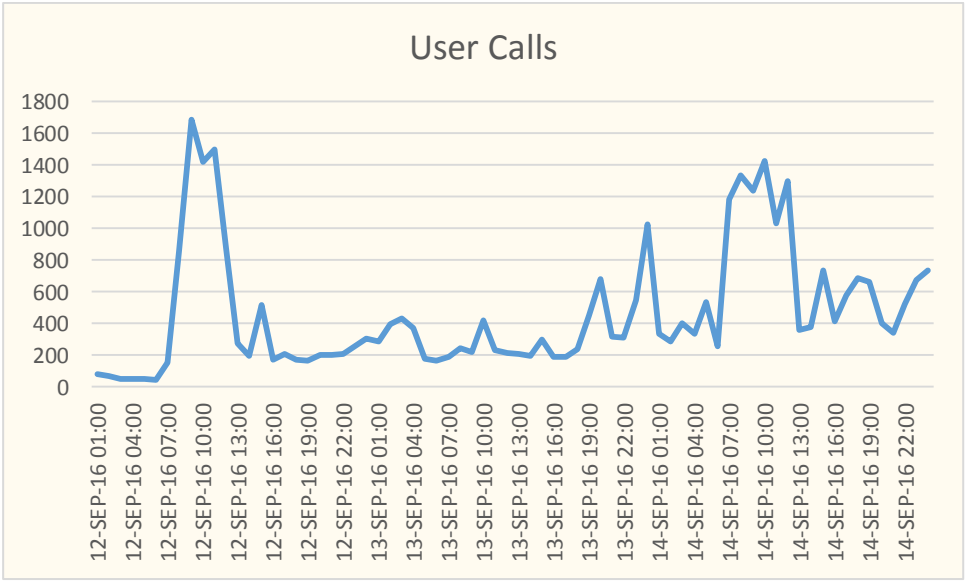


**Figure 17: User call per seconds for DWPRD1**

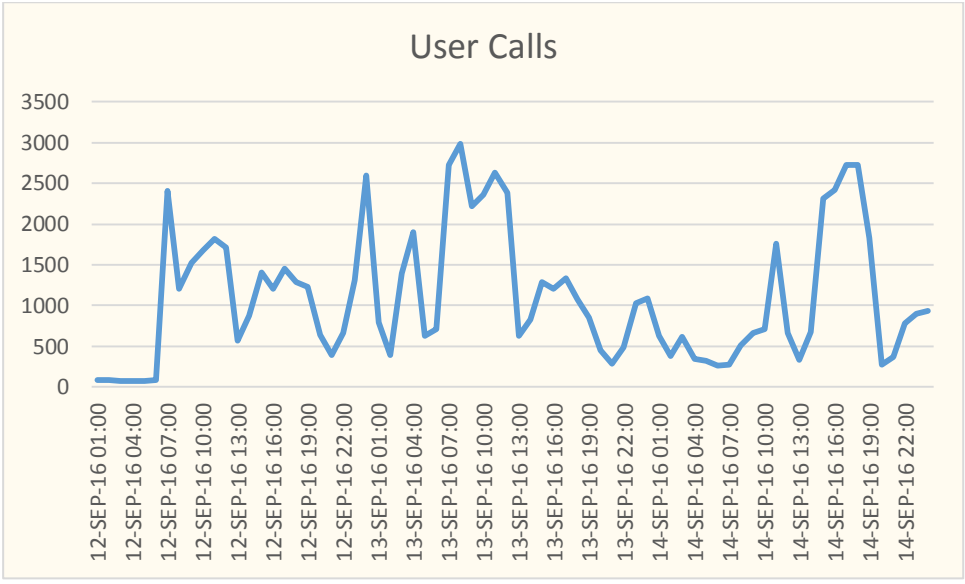


**Figure 18: User call per seconds for DWPRD2**

## 4.8. 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 one-pass 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.

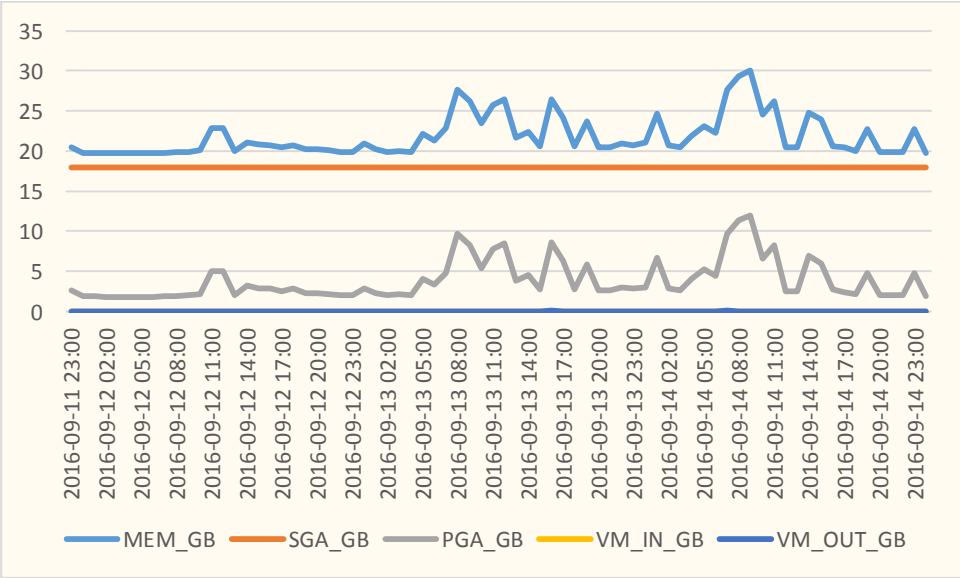

**Figure 19: Memory allocated for DWPRD1**

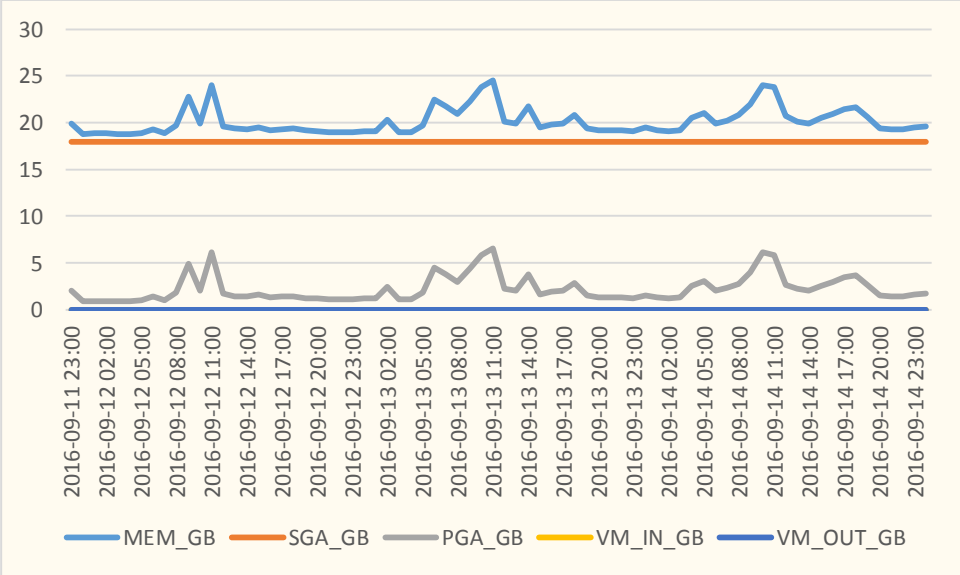


**Figure 20: Memory allocated for DWPRD2**

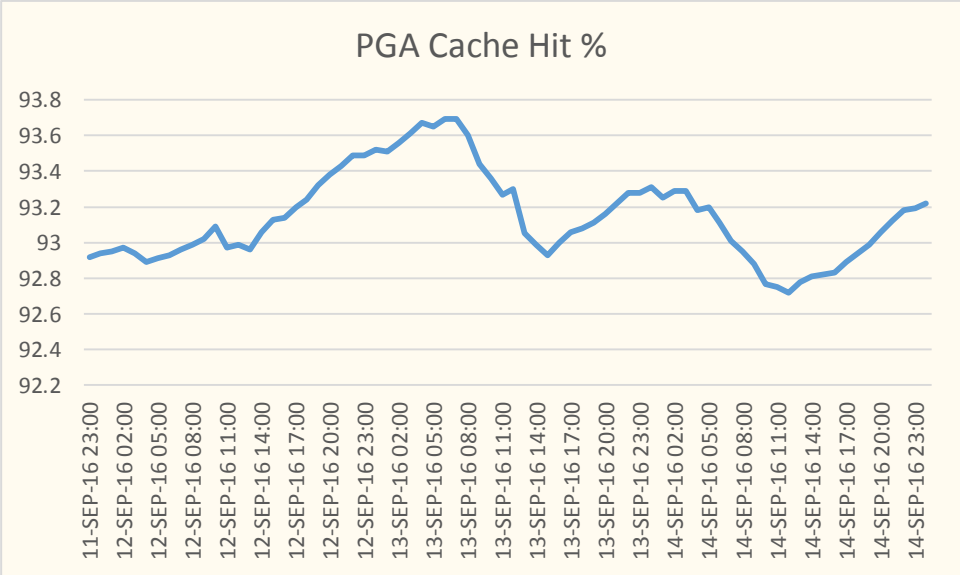


**Figure 21: PGA cache hit % for DWPRD1**

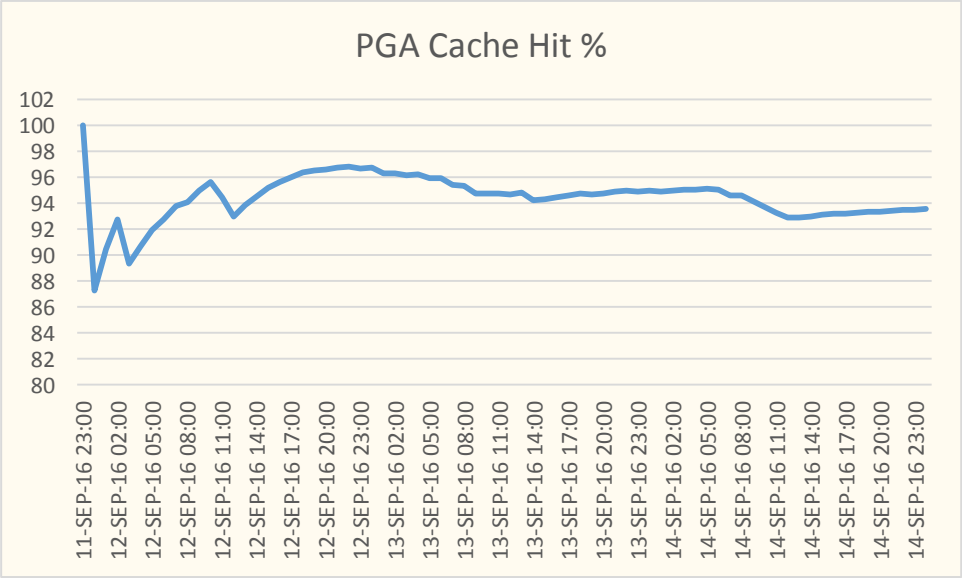


**Figure 22: PGA cache hit % for DWPRD2**

**Observation**:

No changes requires for PGA size.

## 4.9. 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 |


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

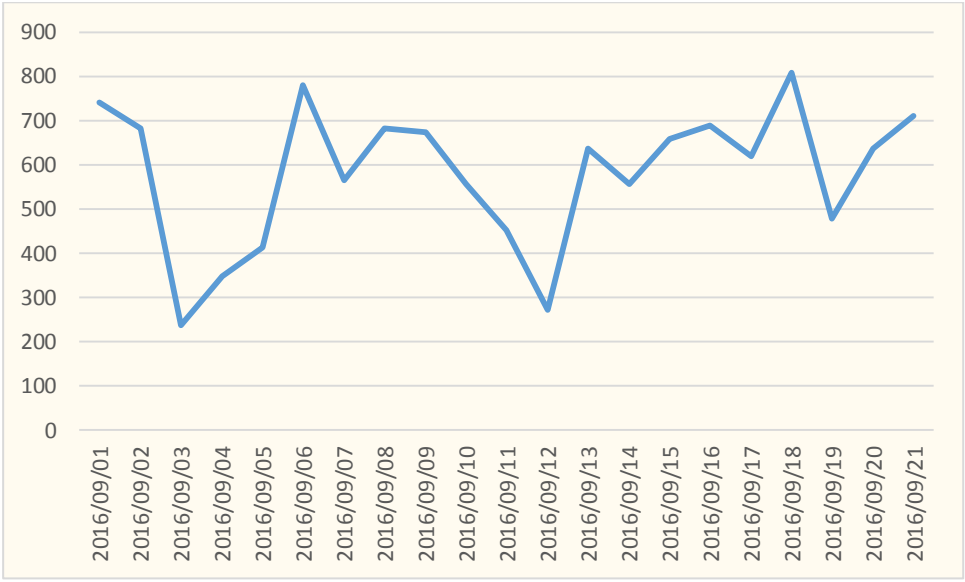


**Figure 24: Redo log per day (GB) for DWPRD2**

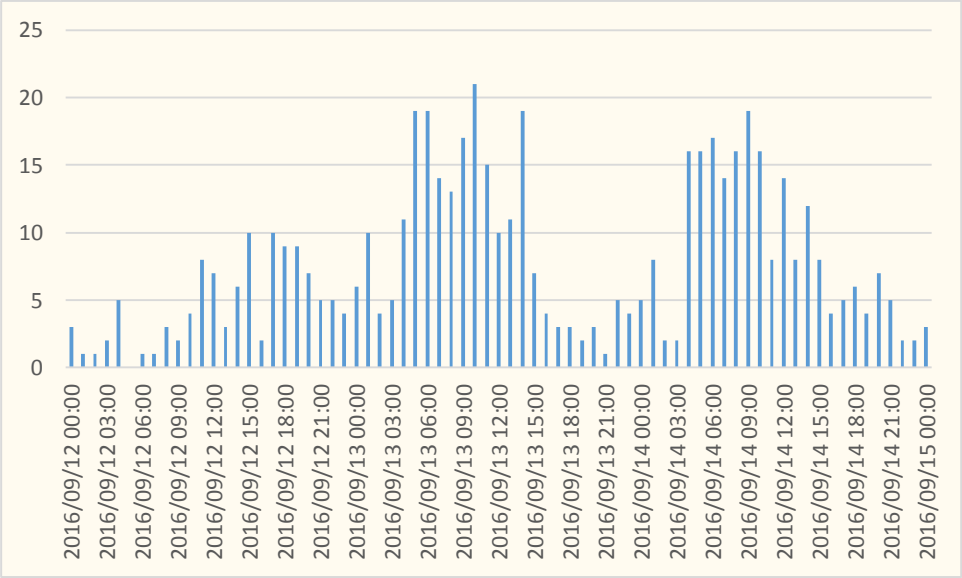


**Figure 25: Redo log switch DWPRD1**

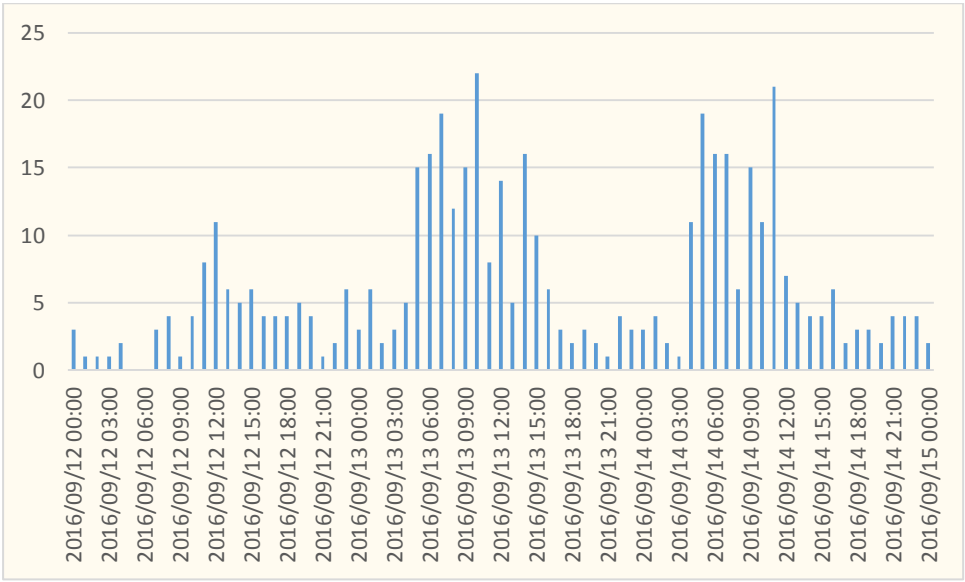


**Figure 26: Redo log switch DWPRD2**

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

# 5. Findings

## 5.1. 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.

## 5.2. 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.

## 5.3. 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.

## 5.4. 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.

## 5.5. 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_TRANSFER | IDX_FT_PROCESSING_DATE (PROCESSING_DATE) | IDX_FT_PROCESSDATE_CREDITACC (PROCESSING_DATE:CREDIT_ACCT_NO) |
| **2** | DWH | FUNDS_TRANSFER | 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_TRANSFER | IDX_FT_PROCESSING_DATE (PROCESSING_DATE) | IDX_FT_PROCESSDATE_CREDITACC (PROCESSING_DATE:CREDIT_ACCT_NO) |
| **5** | DWH2013 | FUNDS_TRANSFER | IDX_FT_PROCESSING_DATE (PROCESSING_DATE) | IDX_FT_PROCESSDATE_DEBITACC (PROCESSING_DATE:DEBIT_ACCT_NO) |
| **6** | DWH2013 | LMM_ACCOUNT_BALANCES | LMM_ACCOUNT_BALANCES_CONT (BANK_ID:CONTRACT_NUMBER) | PK_LMM (BANK_ID:CONTRACT_NUMBER:PROCESS_DATE) |
| **7** | DWH2013 | RE_CONSOL_SPEC_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_TRANSFER | IDX_FT_PROCESSING_DATE (PROCESSING_DATE) | IDX_FT_PROCESSDATE_CREDITACC (PROCESSING_DATE:CREDIT_ACCT_NO) |
| **12** | DWH2014 | FUNDS_TRANSFER | IDX_FT_PROCESSING_DATE (PROCESSING_DATE) | IDX_FT_PROCESSDATE_DEBITACC (PROCESSING_DATE:DEBIT_ACCT_NO) |
| **13** | DWH2014 | RE_CONSOL_SPEC_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_TRANSFER | IDX_FT_PROCESSING_DATE (PROCESSING_DATE) | IDX_FT_PROCESSDATE_CREDITACC (PROCESSING_DATE:CREDIT_ACCT_NO) |
| **18** | DWH2015 | FUNDS_TRANSFER | IDX_FT_PROCESSING_DATE (PROCESSING_DATE) | IDX_FT_PROCESSDATE_DEBITACC (PROCESSING_DATE:DEBIT_ACCT_NO) |
| **19** | DWH2015 | RE_CONSOL_SPEC_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_QUERY | PLSQL_PROFILER_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_PARAM | SNP_DIAG_PARAM_FK1 (I_DIAGRAM) | PK_SNP_DIAG_PARAM (I_DIAGRAM:PARAM_NAME) |
| **27** | KRM | SNP_GRP_STATE | 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_LOG | 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_FOLDER | MOD_FOLDER_FK1 (PAR_I_MOD_FOLDER) | AK_MOD_FOLDER (PAR_I_MOD_FOLDER:MOD_FOLDER_NAME) |
| **53** | KRM | SNP_OBJECT_ID_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_LPI_RUN | LPIRPARAM_LPIR_FK (I_LP_INST:NB_RUN) | PK_PARAM_LPI_RUN (I_LP_INST:NB_RUN:PARAM_NAME) |
| **56** | KRM | SNP_PARAM_SESS | PARAM_SESS_FK (SESS_NO) | PK_PARAM_SESS (SESS_NO:PARAM_NAME) |
| **57** | KRM | SNP_PARTITION | IX_PARTITION_TABLE (I_TABLE) | AK_PARTITION (I_TABLE:PARTITION_NAME) |
| **58** | KRM | SNP_POP_CONSTRAINT | POP_CONSTRAINT_FK1 (I_POP) | PK_POP_CONSTRAINT (I_POP:CONST_TYPE:CONST_NAME) |
| **59** | KRM | SNP_POP_MAPPING | PMAP_PCOL_FK (I_POP_COL) | PK_POP_MAPPING (I_POP_COL:I_DATA_SET) |
| **60** | KRM | SNP_SCEN_REPORT | SCEN_REPORT_FK1 (SCEN_NO) | PK_SCEN_REPORT (SCEN_NO:SCEN_RUN_NO) |
| **61** | KRM | SNP_SCEN_STEP | SCEN_STEP_FK1 (SCEN_NO) | PK_SCEN_STEP (SCEN_NO:NNO) |
| **62** | KRM | SNP_SCEN_TASK | 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_TASK | SESS_TASK_FK1 (SESS_NO:NNO) | PK_SESS_TASK (SESS_NO:NNO:SCEN_TASK_NO) |
| **68** | KRM | SNP_SESS_TASK_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_NAME) |
| **69** | KRM | SNP_STATE2 | SNP_STATE2_FK1 (I_GRP_STATE) | AK_SNP_STATE (I_GRP_STATE:STATE_CODE) |
| **70** | KRM | SNP_STEP_REPORT | STEP_REPORT_FK1 (SCEN_NO:SCEN_RUN_NO) | PK_STEP_REPORT (SCEN_NO:SCEN_RUN_NO:NNO:NB_RUN) |
| **71** | KRM | SNP_SUB_MODEL | SUB_MODEL_FK1 (I_MOD) | AK_SMOD (I_MOD:COD_SMOD) |
| **72** | KRM | SNP_SUB_MODEL | 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_EXIT | 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_PLAN_AGENT | VAR_PLAN_AGENT_FK1 (I_PLAN_AGENT) | PK_VAR_PLAN_AGENT (I_PLAN_AGENT:VAR_NAME) |
| **78** | KRM | SNP_VAR_SCEN | 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_BIPLATFORM | CALCMGRDEPLOYDETAILS | IDXCALCMGRDEPLOYDETAILS1 (OBJECTID:OBJECTTYPE) | UKCALCMGRDEPLOYDETAILS1 (OBJECTID:OBJECTTYPE:APPLICATIONID:APPLICATION:APPLICATIONTYPE) |
| **81** | KRM_BIPL | CALCMGROBJE | IDXCALCMGROBJECTLINKS1 | UKCALCMGROBJECTLINKS1 |

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|---|---|---|---|---|
| | ATFORM | CTLINKS | (PARENTID:PARENTTYPE) | (PARENTID:PARENTTYPE:CHILDID:CHILDTYPE:CHILDINDEX) |
| **82** | KRM_BIPLATFORM | QRTZ_FIRED_TRIGGERS | IDX_QRTZ_FT_TRIG_NAME (TRIGGER_NAME) | IDX_QRTZ_FT_TRIG_NM_GP (TRIGGER_NAME:TRIGGER_GROUP) |
| **83** | KRM_BIPLATFORM | QRTZ_TRIGGERS | IDX_QRTZ_T_NEXT_FIRE_TIME (NEXT_FIRE_TIME) | IDX_QRTZ_T_NFT_ST (NEXT_FIRE_TIME:TRIGGER_STATE) |
| **84** | KRM_WORK_REPO | SNP_COL | COL_FK1 (I_TABLE) | AK_COL (I_TABLE:COL_NAME) |
| **85** | KRM_WORK_REPO | SNP_COND | COND_FK1 (I_TABLE) | AK_COND (I_TABLE:COND_NAME) |
| **86** | KRM_WORK_REPO | SNP_DIAG_PARAM | SNP_DIAG_PARAM_FK1 (I_DIAGRAM) | PK_SNP_DIAG_PARAM (I_DIAGRAM:PARAM_NAME) |
| **87** | KRM_WORK_REPO | SNP_GRP_STATE | SNP_GRP_STATE_FK1 (I_PROJECT) | AK_SNP_GRP_STATE (I_PROJECT:GRP_STATE_CODE) |
| **88** | KRM_WORK_REPO | SNP_JOIN | JOIN_FK1 (I_TABLE_FK) | AK_JOIN (I_TABLE_FK:FK_NAME) |
| **89** | KRM_WORK_REPO | SNP_JOIN_COL | JOIN_COL_FK1 (I_JOIN) | AK_JOIN_COL (I_JOIN:POS) |
| **90** | KRM_WORK_REPO | SNP_JOIN_COL | JOIN_COL_FK1 (I_JOIN) | PK_JOIN_COL (I_JOIN:I_COL_FK) |
| **91** | KRM_WORK_REPO | SNP_KEY | KEY_FK1 (I_TABLE) | AK_KEY (I_TABLE:KEY_NAME) |
| **92** | KRM_WORK_REPO | SNP_KEY_COL | KEY_COL_FK1 (I_KEY) | PK_KEY_COL (I_KEY:I_COL) |
| **93** | KRM_WORK_REPO | SNP_LINE_TRT | LINE_TRT_FK1 (I_TRT) | PK_LINE_TRT (I_TRT:ORD_TRT) |
| **94** | KRM_WORK_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_WORK_REPO | SNP_LPI_EXC_LOG | 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_WORK_REPO | SNP_LPI_RUN | LPI_RUN_LPI_FK (I_LP_INST) | PK_LPI_RUN (I_LP_INST:NB_RUN) |
| **97** | KRM_WORK_REPO | SNP_LPI_STEP | LPI_STEP_LPI_FK (I_LP_INST) | LPI_STEP_EXC_FK (I_LP_INST:I_LP_STEP_EXCEPT) |
| **98** | KRM_WORK_REPO | SNP_LPI_STEP | LPI_STEP_LPI_FK (I_LP_INST) | LPI_STEP_STEP_FK (I_LP_INST:PAR_I_LP_STEP) |
| **99** | KRM_WORK_REPO | SNP_LPI_STEP | LPI_STEP_LPI_FK (I_LP_INST) | LPI_STEP_VAR_FK (I_LP_INST:VAR_NAME) |
| **100** | KRM_WORK_REPO | SNP_LPI_STEP | LPI_STEP_LPI_FK (I_LP_INST) | PK_LPI_STEP (I_LP_INST:I_LP_STEP) |
| **101** | KRM_WORK_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_WORK_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_WORK_REPO | SNP_LPI_VAR | LPI_VAR_LPI_FK (I_LP_INST) | PK_LPI_VAR (I_LP_INST:VAR_NAME) |
| **104** | KRM_WORK_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_WORK_REPO | SNP_LP_STEP | LP_STEP_LP_FK (I_LOAD_PLAN) | LP_STEP_EXC_FK (I_LOAD_PLAN:I_LP_STEP_EXCEPT) |
| **106** | KRM_WORK_REPO | SNP_LP_STEP | LP_STEP_LP_FK (I_LOAD_PLAN) | LP_STEP_STEP_FK (I_LOAD_PLAN:PAR_I_LP_STEP) |
| **107** | KRM_WORK_REPO | SNP_LP_STEP | LP_STEP_LP_FK (I_LOAD_PLAN) | LP_STEP_VAR_FK (I_LOAD_PLAN:VAR_NAME) |
| **108** | KRM_WORK_REPO | SNP_LP_STEP | LP_STEP_LP_FK (I_LOAD_PLAN) | PK_LP_STEP (I_LOAD_PLAN:I_LP_STEP) |
| **109** | KRM_WORK_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_WORK_REPO | SNP_LP_VAR | LP_VAR_LP_FK (I_LOAD_PLAN) | PK_LP_VAR (I_LOAD_PLAN:VAR_NAME) |
| **111** | KRM_WORK_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_WORK_REPO | SNP_MOD_FOLDER | MOD_FOLDER_FK1 (PAR_I_MOD_FOLDER) | AK_MOD_FOLDER (PAR_I_MOD_FOLDER:MOD_FOLDER_NAME) |
| **113** | KRM_WORK_REPO | SNP_OBJECT_ID_COL | SNP_OID_COL_FK2 (I_OBJECT_ID) | PK_OBJECT_ID_COL (I_OBJECT_ID:COL_ORDER) |
| **114** | KRM_WORK_REPO | SNP_OBJ_DIAG | SNP_OBJ_DIAG_FK1 (I_DIAGRAM) | PK_SNP_OBJ_DIAG (I_DIAGRAM:I_OBJECTS:I_INSTANCE:SYN_NUMB) |
| **115** | KRM_WORK_REPO | SNP_PARAM_LPI_RUN | LPIRPARAM_LPIR_FK (I_LP_INST:NB_RUN) | PK_PARAM_LPI_RUN (I_LP_INST:NB_RUN:PARAM_NAME) |
| **116** | KRM_WORK_REPO | SNP_PARAM_SESS | PARAM_SESS_FK (SESS_NO) | PK_PARAM_SESS (SESS_NO:PARAM_NAME) |
| **117** | KRM_WORK_REPO | SNP_PARTITION | IX_PARTITION_TABLE (I_TABLE) | AK_PARTITION (I_TABLE:PARTITION_NAME) |
| **118** | KRM_WORK_REPO | SNP_POP_CONSTRAINT | POP_CONSTRAINT_FK1 (I_POP) | PK_POP_CONSTRAINT (I_POP:CONST_TYPE:CONST_NAME) |
| **119** | KRM_WORK_REPO | SNP_POP_MAPPING | PMAP_PCOL_FK (I_POP_COL) | PK_POP_MAPPING (I_POP_COL:I_DATA_SET) |
| **120** | KRM_WORK_REPO | SNP_SCEN_REPORT | SCEN_REPORT_FK1 (SCEN_NO) | PK_SCEN_REPORT (SCEN_NO:SCEN_RUN_NO) |
| **121** | KRM_WORK_REPO | SNP_SCEN_STEP | SCEN_STEP_FK1 (SCEN_NO) | PK_SCEN_STEP (SCEN_NO:NNO) |
| **122** | KRM_WORK_REPO | SNP_SCEN_TASK | SCEN_TASK_FK1 (SCEN_NO:NNO) | PK_SCEN_TASK (SCEN_NO:NNO:SCEN_TASK_NO) |
| **123** | KRM_WORK_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_WORK_REPO | SNP_SEQ_SCEN | SEQ_SCEN_FK1 (SCEN_NO) | PK_SEQ_SCEN (SCEN_NO:SEQ_NAME) |
| **125** | KRM_WORK_REPO | SNP_SEQ_SESS | SEQ_SESS_FK1 (SESS_NO) | PK_SEQ_SESS (SESS_NO:SEQ_NAME) |
| **126** | KRM_WORK_REPO | SNP_SESS_STEP | SESS_STEP_FK1 (SESS_NO) | PK_SESS_STEP (SESS_NO:NNO) |
| **127** | KRM_WORK_REPO | SNP_SESS_TASK | SESS_TASK_FK1 (SESS_NO:NNO) | PK_SESS_TASK (SESS_NO:NNO:SCEN_TASK_NO) |
| **128** | KRM_WORK_REPO | SNP_SESS_TASK_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_NAME) |
| **129** | KRM_WORK_REPO | SNP_STATE2 | SNP_STATE2_FK1 (I_GRP_STATE) | AK_SNP_STATE (I_GRP_STATE:STATE_CODE) |
| **130** | KRM_WORK_REPO | SNP_STEP_REPORT | STEP_REPORT_FK1 (SCEN_NO:SCEN_RUN_NO) | PK_STEP_REPORT (SCEN_NO:SCEN_RUN_NO:NNO:NB_RUN) |
| **131** | KRM_WORK_REPO | SNP_SUB_MODEL | SUB_MODEL_FK1 (I_MOD) | AK_SMOD (I_MOD:COD_SMOD) |
| **132** | KRM_WORK_REPO | SNP_SUB_MODEL | SUB_MODEL_FK1 (I_MOD) | PK_SUB_MODEL (I_MOD:I_SMOD) |
| **133** | KRM_WORK_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_WORK_REPO | SNP_UE_USED | UE_USED_FK2 (I_USER_EXIT) | PK_UE_USED (I_USER_EXIT:I_INSTANCE:I_UE_ORIG) |
| **135** | KRM_WORK_REPO | SNP_USER_EXIT | USER_EXIT_FK1 (I_TRT) | AK_USER_EXIT (I_TRT:UE_NAME) |
| **136** | KRM_WORK_REPO | SNP_VAR | VAR_FK1 (I_PROJECT) | AK_VAR (I_PROJECT:VAR_NAME) |
| **137** | KRM_WORK_REPO | SNP_VAR_PLAN_AGENT | VAR_PLAN_AGENT_FK1 (I_PLAN_AGENT) | PK_VAR_PLAN_AGENT (I_PLAN_AGENT:VAR_NAME) |

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| **138** | KRM_WORK_REPO | SNP_VAR_SCEN | VAR_SCEN_FK1 (SCEN_NO) | PK_VAR_SCEN (SCEN_NO:VAR_NAME) |
| **139** | KRM_WORK_REPO | SNP_VAR_SESS | VAR_SESS_FK1 (SESS_NO) | PK_VAR_SESS (SESS_NO:VAR_NAME) |
| **140** | TCB_BIPLATFORM | CALCMGRDEPLOYDETAILS | IDXCALCMGRDEPLOYDETAILS1 (OBJECTID:OBJECTTYPE) | UKCALCMGRDEPLOYDETAILS1 (OBJECTID:OBJECTTYPE:APPLICATIONID:APPLICATION:APPLICATIONTYPE) |
| **141** | TCB_BIPLATFORM | CALCMGROBJECTLINKS | IDXCALCMGROBJECTLINKS1 (PARENTID:PARENTTYPE) | UKCALCMGROBJECTLINKS1 (PARENTID:PARENTTYPE:CHILDID:CHILDTYPE:CHILDINDEX) |
| **142** | TCB_BIPLATFORM | QRTZ_FIRED_TRIGGERS | IDX_QRTZ_FT_TRIG_NAME (TRIGGER_NAME) | IDX_QRTZ_FT_TRIG_NM_GP (TRIGGER_NAME:TRIGGER_GROUP) |
| **143** | TCB_BIPLATFORM | QRTZ_TRIGGERS | IDX_QRTZ_T_NEXT_FIRE_TIME (NEXT_FIRE_TIME) | IDX_QRTZ_T_NFT_ST (NEXT_FIRE_TIME:TRIGGER_STATE) |
| **144** | TCB_DWH_HOMEBANKING | PLSQL_PROFILER_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_SEQ_ID) |
| **146** | TCB_DWH_VAS | MCO_TCB_NEW_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_CODE:COMPANY_USER:COMPANY_HACHTOAN) |
| **149** | TCB_DWH_VAS | TMP_TBL_CIC_CMS_COLLECTION_CB | IDX_TMP_TBL_CIC_CMS_COLL_CB (ACCOUNT_NUMBER) | IDX_TMP_TBL_CIC_CMS_0106 (ACCOUNT_NUMBER:CARD_NUMBER) |
| **150** | TCB_ETL_REPO | SNP_ACTION | SNP_ACTION_FK1 (I_GRP_ACTION) | AK_ACTION (I_GRP_ACTION:ACTION_NAME) |
| **151** | TCB_ETL_REPO | SNP_ALLOC_AGENT | ALLOC_AGENT_FK1 (I_CONTEXT) | PK_ALLOC_AGENT (I_CONTEXT:I_LAGENT) |
| **152** | TCB_ETL_REPO | SNP_COL | COL_FK1 (I_TABLE) | AK_COL (I_TABLE:COL_NAME) |
| **153** | TCB_ETL_REPO | SNP_COND | COND_FK1 (I_TABLE) | AK_COND (I_TABLE:COND_NAME) |
| **154** | TCB_ETL_REPO | SNP_CONNECT_PROP | CONNECT_PROP_FK1 (I_CONNECT) | PK_CONNECT_PROP (I_CONNECT:PROP_KEY) |
| **155** | TCB_ETL_REPO | SNP_CONV_DT | CONV_DT_FK1 (SRC_DT) | PK_CONV_DT (SRC_DT:I_TARG_TECHNO) |
| **156** | TCB_ETL_REPO | SNP_DATASOURCE | DS_CONNECT_FK (I_CONNECT) | PK_DATASOURCE (I_CONNECT:I_AGENT) |
| **157** | TCB_ETL_REPO | SNP_DIAG_PARAM | SNP_DIAG_PARAM_FK1 (I_DIAGRAM) | PK_SNP_DIAG_PARAM (I_DIAGRAM:PARAM_NAME) |
| **158** | TCB_ETL_REPO | SNP_DT | DT_FK1 (I_TECHNO) | AK_DT1 (I_TECHNO:DT_DRIVER) |
| **159** | TCB_ETL_REPO | SNP_DT | DT_FK1 (I_TECHNO) | AK_DT2 (I_TECHNO:DT_SOURCE) |
| **160** | TCB_ETL_REPO | SNP_GRP_ACTION | GRP_ACTION_FK1 (I_TECHNO) | AK_GRP_ACTION (I_TECHNO:GRP_NAME) |
| **161** | TCB_ETL_REPO | SNP_GRP_ACTION | GRP_ACTION_FK1 (I_TECHNO) | AK_GRP_ACTION2 (I_TECHNO:GRP_CODE) |
| **162** | TCB_ETL_REPO | SNP_GRP_STATE | SNP_GRP_STATE_FK1 (I_PROJECT) | AK_SNP_GRP_STATE (I_PROJECT:GRP_STATE_CODE) |
| **163** | TCB_ETL_REPO | SNP_HOST_MOD | 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_REPO | SNP_INST_OBJ | INST_OBJ_FK1 (I_OBJECTS) | PK_INST_OBJ (I_OBJECTS:I_INSTANCE) |
| **166** | TCB_ETL_REPO | SNP_JOIN | JOIN_FK1 (I_TABLE_FK) | AK_JOIN (I_TABLE_FK:FK_NAME) |
| **167** | TCB_ETL_REPO | SNP_JOIN_COL | JOIN_COL_FK1 (I_JOIN) | AK_JOIN_COL (I_JOIN:POS) |
| **168** | TCB_ETL_REPO | SNP_JOIN_COL | JOIN_COL_FK1 (I_JOIN) | PK_JOIN_COL (I_JOIN:I_COL_FK) |
| **169** | TCB_ETL_REPO | SNP_KEY | KEY_FK1 (I_TABLE) | AK_KEY (I_TABLE:KEY_NAME) |
| **170** | TCB_ETL_REPO | SNP_KEY_COL | KEY_COL_FK1 (I_KEY) | PK_KEY_COL (I_KEY:I_COL) |
| **171** | TCB_ETL_REPO | SNP_LANG_TECHNO | LANG_TECHNO_FK2 (I_TECHNO) | PK_LANG_TECHNO (I_TECHNO:I_LANG) |
| **172** | TCB_ETL_REPO | SNP_LB_AGENT | SNP_LB_AGT_FK1 (I_MASTER) | PK_LB_AGENT (I_MASTER:I_SLAVE) |
| **173** | TCB_ETL_REPO | SNP_LE_TECHNO | LE_TECHNO_FK1 (I_LANG_ELT) | PK_LE_TECHNO (I_LANG_ELT:I_TECHNO) |
| **174** | TCB_ETL_REPO | SNP_LINE_ACTION | LINE_ACTION_FK1 (I_ACTION) | PK_LINE_ACTION (I_ACTION:ORD_ACTION) |
| **175** | TCB_ETL_REPO | SNP_LINE_TRT | LINE_TRT_FK1 (I_TRT) | PK_LINE_TRT (I_TRT:ORD_TRT) |
| **176** | TCB_ETL_REPO | 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_REPO | SNP_LPI_EXC_LOG | 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_REPO | SNP_LPI_RUN | LPI_RUN_LPI_FK (I_LP_INST) | PK_LPI_RUN (I_LP_INST:NB_RUN) |
| **179** | TCB_ETL_REPO | SNP_LPI_STEP | LPI_STEP_LPI_FK (I_LP_INST) | LPI_STEP_EXC_FK (I_LP_INST:I_LP_STEP_EXCEPT) |
| **180** | TCB_ETL_REPO | SNP_LPI_STEP | LPI_STEP_LPI_FK (I_LP_INST) | LPI_STEP_STEP_FK (I_LP_INST:PAR_I_LP_STEP) |
| **181** | TCB_ETL_REPO | SNP_LPI_STEP | LPI_STEP_LPI_FK (I_LP_INST) | LPI_STEP_VAR_FK (I_LP_INST:VAR_NAME) |
| **182** | TCB_ETL_REPO | SNP_LPI_STEP | LPI_STEP_LPI_FK (I_LP_INST) | PK_LPI_STEP (I_LP_INST:I_LP_STEP) |
| **183** | TCB_ETL_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) |
| **184** | TCB_ETL_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) |
| **185** | TCB_ETL_REPO | SNP_LPI_VAR | LPI_VAR_LPI_FK (I_LP_INST) | PK_LPI_VAR (I_LP_INST:VAR_NAME) |
| **186** | TCB_ETL_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) |
| **187** | TCB_ETL_REPO | SNP_LP_STEP | LP_STEP_LP_FK (I_LOAD_PLAN) | LP_STEP_EXC_FK (I_LOAD_PLAN:I_LP_STEP_EXCEPT) |
| **188** | TCB_ETL_REPO | SNP_LP_STEP | LP_STEP_LP_FK (I_LOAD_PLAN) | LP_STEP_STEP_FK (I_LOAD_PLAN:PAR_I_LP_STEP) |
| **189** | TCB_ETL_REPO | SNP_LP_STEP | LP_STEP_LP_FK (I_LOAD_PLAN) | LP_STEP_VAR_FK (I_LOAD_PLAN:VAR_NAME) |
| **190** | TCB_ETL_REPO | SNP_LP_STEP | LP_STEP_LP_FK (I_LOAD_PLAN) | PK_LP_STEP (I_LOAD_PLAN:I_LP_STEP) |
| **191** | TCB_ETL_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) |
| **192** | TCB_ETL_REPO | 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_REPO | SNP_MOD_FOLDER | MOD_FOLDER_FK1 (PAR_I_MOD_FOLDER) | AK_MOD_FOLDER (PAR_I_MOD_FOLDER:MOD_FOLDER_NAME) |
| **195** | TCB_ETL_REPO | SNP_MTXT_PART | MTXT_PART_FK1 (I_TXT) | PK_MTXT_P (I_TXT:TXT_ORD) |
| **196** | TCB_ETL_REPO | SNP_OBJECT_ID_COL | SNP_OID_COL_FK2 (I_OBJECT_ID) | PK_OBJECT_ID_COL (I_OBJECT_ID:COL_ORDER) |
| **197** | TCB_ETL_REPO | SNP_OBJ_DIAG | SNP_OBJ_DIAG_FK1 (I_DIAGRAM) | PK_SNP_OBJ_DIAG (I_DIAGRAM:I_OBJECTS:I_INSTANCE:SYN_NUMB) |
| **198** | TCB_ETL_REPO | SNP_PARAM_LPI_RUN | LPIRPARAM_LPIR_FK (I_LP_INST:NB_RUN) | PK_PARAM_LPI_RUN (I_LP_INST:NB_RUN:PARAM_NAME) |
| **199** | TCB_ETL_REPO | SNP_PARAM_SESS | PARAM_SESS_FK (SESS_NO) | PK_PARAM_SESS (SESS_NO:PARAM_NAME) |
| **200** | TCB_ETL_REPO | SNP_PARTITION | IX_PARTITION_TABLE (I_TABLE) | AK_PARTITION (I_TABLE:PARTITION_NAME) |
| **201** | TCB_ETL_REPO | SNP_POP_CONSTRAINT | POP_CONSTRAINT_FK1 (I_POP) | PK_POP_CONSTRAINT (I_POP:CONST_TYPE:CONST_NAME) |
| **202** | TCB_ETL_REPO | SNP_POP_MAPPING | PMAP_PCOL_FK (I_POP_COL) | PK_POP_MAPPING (I_POP_COL:I_DATA_SET) |
| **203** | TCB_ETL_REPO | SNP_PROF_METH | PROF_METH_FK1 (I_PROF) | PK_PROF_METH (I_PROF:I_METH) |
| **204** | TCB_ETL_REPO | SNP_PSCHEMA | PSCHEMA_FK1 (I_CONNECT) | AK_PSCHEMA (I_CONNECT:CATALOG_NAME:SCHEMA_NAME) |
| **205** | TCB_ETL_REPO | SNP_PSCHEMA_CONT | PSCHEMA_CONT_FK1 (I_CONTEXT) | PK_PSCHEMA_CONT (I_CONTEXT:I_LSCHEMA) |
| **206** | TCB_ETL_REPO | SNP_SCEN_REPORT | SCEN_REPORT_FK1 (SCEN_NO) | PK_SCEN_REPORT (SCEN_NO:SCEN_RUN_NO) |
| **207** | TCB_ETL_REPO | SNP_SCEN_STEP | SCEN_STEP_FK1 (SCEN_NO) | PK_SCEN_STEP (SCEN_NO:NNO) |
| **208** | TCB_ETL_REPO | SNP_SCEN_TASK | SCEN_TASK_FK1 (SCEN_NO:NNO) | PK_SCEN_TASK (SCEN_NO:NNO:SCEN_TASK_NO) |
| **209** | TCB_ETL_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) |
| **210** | TCB_ETL_REPO | SNP_SEQ_SCEN | SEQ_SCEN_FK1 (SCEN_NO) | PK_SEQ_SCEN (SCEN_NO:SEQ_NAME) |
| **211** | TCB_ETL_REPO | SNP_SEQ_SESS | SEQ_SESS_FK1 (SESS_NO) | PK_SEQ_SESS (SESS_NO:SEQ_NAME) |
| **212** | TCB_ETL_REPO | SNP_SESS_STEP | SESS_STEP_FK1 (SESS_NO) | PK_SESS_STEP (SESS_NO:NNO) |
| **213** | TCB_ETL_REPO | SNP_SESS_TASK | SESS_TASK_FK1 (SESS_NO:NNO) | PK_SESS_TASK (SESS_NO:NNO:SCEN_TASK_NO) |
| **214** | TCB_ETL_REPO | SNP_SESS_TASK_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_NAME) |
| **215** | TCB_ETL_REPO | SNP_STATE2 | SNP_STATE2_FK1 (I_GRP_STATE) | AK_SNP_STATE (I_GRP_STATE:STATE_CODE) |
| **216** | TCB_ETL_REPO | SNP_STEP_REPORT | STEP_REPORT_FK1 (SCEN_NO:SCEN_RUN_NO) | PK_STEP_REPORT (SCEN_NO:SCEN_RUN_NO:NNO:NB_RUN) |
| **217** | TCB_ETL_REPO | SNP_SUB_MODEL | SUB_MODEL_FK1 (I_MOD) | AK_SMOD (I_MOD:COD_SMOD) |
| **218** | TCB_ETL_REPO | SNP_SUB_MODEL | SUB_MODEL_FK1 (I_MOD) | PK_SUB_MODEL (I_MOD:I_SMOD) |
| **219** | TCB_ETL_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) |
| **220** | TCB_ETL_REPO | 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_REPO | SNP_USER_METH | USER_METH_FK1 (I_WUSER) | PK_USER_METH (I_WUSER:I_METH) |
| **223** | TCB_ETL_REPO | SNP_USER_OBJ_METH | USER_OBJ_METH_FK1 (I_METH) | AK_USER_OBJ_METH (I_METH:I_WUSER:I_CONTEXT:I_OBJECTS:I_INSTANCE) |
| **224** | TCB_ETL_REPO | SNP_USER_PROF | USER_PROF_FK1 (I_WUSER) | PK_USER_PROF (I_WUSER:I_PROF) |
| **225** | TCB_ETL_REPO | SNP_VAR | VAR_FK1 (I_PROJECT) | AK_VAR (I_PROJECT:VAR_NAME) |
| **226** | TCB_ETL_REPO | SNP_VAR_PLAN_AGENT | VAR_PLAN_AGENT_FK1 (I_PLAN_AGENT) | PK_VAR_PLAN_AGENT (I_PLAN_AGENT:VAR_NAME) |
| **227** | TCB_ETL_REPO | SNP_VAR_SCEN | VAR_SCEN_FK1 (SCEN_NO) | PK_VAR_SCEN (SCEN_NO:VAR_NAME) |
| **228** | TCB_ETL_REPO | 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_ACCOUNT | IDX_SYNCT24_HBK_FMP_ACC (ACCOUNT_ID) | IDX_SYNCT24_HBK_FMP_ACC_CUS (ACCOUNT_ID:CUST_ID) |
| **232** | TCB_LIVE2012 | HBK_BALANCE | IDX_HBK_BAL_ACCT (ACCOUNT_ID) | PK_HBK_BAL (ACCOUNT_ID:CUST_ID) |
| **233** | TCB_LIVE2012 | STMT_ENTRY | STMT_ENTRY_BOOKING_DATE (BOOKING_DATE) | IDX_FACT_STMT_ENTRY (BOOKING_DATE:CUSTOMER_ID:PRODUCT_CATEGORY:COMPANY_CODE:CURRENCY:ACCOUNT_OFFICER:ACCOUNT_NUMBER:DEPARTMENT_CODE: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_AGENT | 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_DATASOURCE | DS_CONNECT_FK (I_CONNECT) | PK_DATASOURCE (I_CONNECT:I_AGENT) |
| **241** | TCB_LIVE_REPO | SNP_DIAG_PARAM | 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_ACTION | GRP_ACTION_FK1 (I_TECHNO) | AK_GRP_ACTION (I_TECHNO:GRP_NAME) |
| **245** | TCB_LIVE_REPO | SNP_GRP_ACTION | GRP_ACTION_FK1 (I_TECHNO) | AK_GRP_ACTION2 (I_TECHNO:GRP_CODE) |
| **246** | TCB_LIVE_REPO | SNP_GRP_STATE | SNP_GRP_STATE_FK1 (I_PROJECT) | AK_SNP_GRP_STATE (I_PROJECT:GRP_STATE_CODE) |
| **247** | TCB_LIVE_REPO | SNP_HOST_MOD | SNP_HM_FK1 (I_HOST) | PK_SNP_HOST_MOD2 (I_HOST:I_MODULE) |
| **248** | TCB_LIVE_REPO | SNP_INDEX_TYPE | 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_TECHNO | LANG_TECHNO_FK2 (I_TECHNO) | PK_LANG_TECHNO (I_TECHNO:I_LANG) |
| **256** | TCB_LIVE_REPO | SNP_LB_AGENT | SNP_LB_AGT_FK1 (I_MASTER) | PK_LB_AGENT (I_MASTER:I_SLAVE) |
| **257** | TCB_LIVE_REPO | SNP_LE_TECHNO | LE_TECHNO_FK1 (I_LANG_ELT) | PK_LE_TECHNO (I_LANG_ELT:I_TECHNO) |
| **258** | TCB_LIVE_REPO | SNP_LINE_ACTION | 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_LOG | 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_FOLDER | MOD_FOLDER_FK1 (PAR_I_MOD_FOLDER) | AK_MOD_FOLDER (PAR_I_MOD_FOLDER:MOD_FOLDER_NAME) |
| **279** | TCB_LIVE_REPO | SNP_MTXT_PART | MTXT_PART_FK1 (I_TXT) | PK_MTXT_P (I_TXT:TXT_ORD) |
| **280** | TCB_LIVE_REPO | SNP_OBJECT_ID_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_LPI_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_SESS | PARAM_SESS_FK (SESS_NO) | PK_PARAM_SESS (SESS_NO:PARAM_NAME) |
| **284** | TCB_LIVE_REPO | SNP_PARTITION | IX_PARTITION_TABLE (I_TABLE) | AK_PARTITION (I_TABLE:PARTITION_NAME) |
| **285** | TCB_LIVE_REPO | SNP_POP_CONSTRAINT | POP_CONSTRAINT_FK1 (I_POP) | PK_POP_CONSTRAINT (I_POP:CONST_TYPE:CONST_NAME) |
| **286** | TCB_LIVE_REPO | SNP_POP_MAPPING | PMAP_PCOL_FK (I_POP_COL) | PK_POP_MAPPING (I_POP_COL:I_DATA_SET) |
| **287** | TCB_LIVE_REPO | SNP_PROF_METH | 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_REPORT | SCEN_REPORT_FK1 (SCEN_NO) | PK_SCEN_REPORT (SCEN_NO:SCEN_RUN_NO) |
| **291** | TCB_LIVE_REPO | SNP_SCEN_STEP | SCEN_STEP_FK1 (SCEN_NO) | PK_SCEN_STEP (SCEN_NO:NNO) |
| **292** | TCB_LIVE_REPO | SNP_SCEN_TASK | 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_TASK | SESS_TASK_FK1 (SESS_NO:NNO) | PK_SESS_TASK (SESS_NO:NNO:SCEN_TASK_NO) |
| **298** | TCB_LIVE_REPO | SNP_SESS_TASK_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_NAME) |
| **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_REPORT | 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_MODEL | SUB_MODEL_FK1 (I_MOD) | AK_SMOD (I_MOD:COD_SMOD) |
| **302** | TCB_LIVE_REPO | SNP_SUB_MODEL | 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_EXIT | USER_EXIT_FK1 (I_TRT) | AK_USER_EXIT (I_TRT:UE_NAME) |

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| **306** | TCB_LIVE_REPO | SNP_USER_METH | 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_INSTANCE) |
| **308** | TCB_LIVE_REPO | SNP_USER_PROF | 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_PLAN_AGENT | VAR_PLAN_AGENT_FK1 (I_PLAN_AGENT) | PK_VAR_PLAN_AGENT (I_PLAN_AGENT:VAR_NAME) |
| **311** | TCB_LIVE_REPO | SNP_VAR_SCEN | 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_PARAM | SNP_DIAG_PARAM_FK1 (I_DIAGRAM) | PK_SNP_DIAG_PARAM (I_DIAGRAM:PARAM_NAME) |
| **316** | TCB_LIVE_WORK | SNP_GRP_STATE | 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_LOG | 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_FOLDER | MOD_FOLDER_FK1 (PAR_I_MOD_FOLDER) | AK_MOD_FOLDER (PAR_I_MOD_FOLDER:MOD_FOLDER_NAME) |
| **342** | TCB_LIVE_WORK | SNP_OBJECT_ID_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_LPI_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_SESS | PARAM_SESS_FK (SESS_NO) | PK_PARAM_SESS (SESS_NO:PARAM_NAME) |
| **346** | TCB_LIVE_WORK | SNP_PARTITION | IX_PARTITION_TABLE (I_TABLE) | AK_PARTITION (I_TABLE:PARTITION_NAME) |
| **347** | TCB_LIVE_WORK | SNP_POP_CONSTRAINT | POP_CONSTRAINT_FK1 (I_POP) | PK_POP_CONSTRAINT (I_POP:CONST_TYPE:CONST_NAME) |
| **348** | TCB_LIVE_WORK | SNP_POP_MAPPING | PMAP_PCOL_FK (I_POP_COL) | PK_POP_MAPPING (I_POP_COL:I_DATA_SET) |
| **349** | TCB_LIVE_WORK | SNP_SCEN_REPORT | SCEN_REPORT_FK1 (SCEN_NO) | PK_SCEN_REPORT (SCEN_NO:SCEN_RUN_NO) |
| **350** | TCB_LIVE_WORK | SNP_SCEN_STEP | SCEN_STEP_FK1 (SCEN_NO) | PK_SCEN_STEP (SCEN_NO:NNO) |
| **351** | TCB_LIVE_WORK | SNP_SCEN_TASK | 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_TASK | SESS_TASK_FK1 (SESS_NO:NNO) | PK_SESS_TASK (SESS_NO:NNO:SCEN_TASK_NO) |
| **357** | TCB_LIVE_WORK | SNP_SESS_TASK_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_NAME) |
| **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_REPORT | 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_MODEL | SUB_MODEL_FK1 (I_MOD) | AK_SMOD (I_MOD:COD_SMOD) |
| **361** | TCB_LIVE_WORK | SNP_SUB_MODEL | 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_EXIT | 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_PLAN_AGENT | VAR_PLAN_AGENT_FK1 (I_PLAN_AGENT) | PK_VAR_PLAN_AGENT (I_PLAN_AGENT:VAR_NAME) |
| **367** | TCB_LIVE_WORK | SNP_VAR_SCEN | 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_DAILY_INTEREST_DETAIL | 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_TRANS_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_AGENT | 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_ACTION | GRP_ACTION_FK1 (I_TECHNO) | AK_GRP_ACTION (I_TECHNO:GRP_NAME) |
| **377** | TCB_ODI_MASTER | SNP_GRP_ACTION | GRP_ACTION_FK1 (I_TECHNO) | AK_GRP_ACTION2 (I_TECHNO:GRP_CODE) |
| **378** | TCB_ODI_MASTER | SNP_HOST_MOD | 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_TECHNO | LANG_TECHNO_FK2 (I_TECHNO) | PK_LANG_TECHNO (I_TECHNO:I_LANG) |
| **381** | TCB_ODI_MASTER | SNP_LB_AGENT | SNP_LB_AGT_FK1 (I_MASTER) | PK_LB_AGENT (I_MASTER:I_SLAVE) |
| **382** | TCB_ODI_MASTER | SNP_LE_TECHNO | LE_TECHNO_FK1 (I_LANG_ELT) | PK_LE_TECHNO (I_LANG_ELT:I_TECHNO) |
| **383** | TCB_ODI_MASTER | SNP_LINE_ACTION | LINE_ACTION_FK1 (I_ACTION) | PK_LINE_ACTION (I_ACTION:ORD_ACTION) |
| **384** | TCB_ODI_MASTER | SNP_MTXT_PART | MTXT_PART_FK1 (I_TXT) | PK_MTXT_P (I_TXT:TXT_ORD) |
| **385** | TCB_ODI_MASTER | SNP_PROF_METH | 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_METH | 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_INSTANCE) |
| **390** | TCB_ODI_ | SNP_USER_PRE | USER_PREF_FK1 (I_WUSER) | PK_USER_PREF (I_WUSER:I_PREF) |

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| | MASTER | F | | |
| **391** | TCB_ODI_MASTER | SNP_USER_PROF | USER_PROF_FK1 (I_WUSER) | PK_USER_PROF (I_WUSER:I_PROF) |
| **392** | TCB_ODI_MASTER_11G | SNP_ACTION | SNP_ACTION_FK1 (I_GRP_ACTION) | AK_ACTION (I_GRP_ACTION:ACTION_NAME) |
| **393** | TCB_ODI_MASTER_11G | SNP_ALLOC_AGENT | ALLOC_AGENT_FK1 (I_CONTEXT) | PK_ALLOC_AGENT (I_CONTEXT:I_LAGENT) |
| **394** | TCB_ODI_MASTER_11G | SNP_CONNECT_PROP | CONNECT_PROP_FK1 (I_CONNECT) | PK_CONNECT_PROP (I_CONNECT:PROP_KEY) |
| **395** | TCB_ODI_MASTER_11G | SNP_CONV_DT | CONV_DT_FK1 (SRC_DT) | PK_CONV_DT (SRC_DT:I_TARG_TECHNO) |
| **396** | TCB_ODI_MASTER_11G | SNP_DATASOURCE | DS_CONNECT_FK (I_CONNECT) | PK_DATASOURCE (I_CONNECT:I_AGENT) |
| **397** | TCB_ODI_MASTER_11G | SNP_DT | DT_FK1 (I_TECHNO) | AK_DT1 (I_TECHNO:DT_DRIVER) |
| **398** | TCB_ODI_MASTER_11G | SNP_DT | DT_FK1 (I_TECHNO) | AK_DT2 (I_TECHNO:DT_SOURCE) |
| **399** | TCB_ODI_MASTER_11G | SNP_GRP_ACTION | GRP_ACTION_FK1 (I_TECHNO) | AK_GRP_ACTION (I_TECHNO:GRP_NAME) |
| **400** | TCB_ODI_MASTER_11G | SNP_GRP_ACTION | GRP_ACTION_FK1 (I_TECHNO) | AK_GRP_ACTION2 (I_TECHNO:GRP_CODE) |
| **401** | TCB_ODI_MASTER_11G | SNP_HOST_MOD | SNP_HM_FK1 (I_HOST) | PK_SNP_HOST_MOD2 (I_HOST:I_MODULE) |
| **402** | TCB_ODI_MASTER_11G | SNP_INDEX_TYPE | IDXTYPE_TEC_FK1 (I_TECHNO) | AK_INDEX_TYPE (I_TECHNO:INDEX_TYPE_CODE) |
| **403** | TCB_ODI_MASTER_11G | SNP_INST_OBJ | INST_OBJ_FK1 (I_OBJECTS) | PK_INST_OBJ (I_OBJECTS:I_INSTANCE) |
| **404** | TCB_ODI_MASTER_11G | SNP_LANG_TECHNO | LANG_TECHNO_FK2 (I_TECHNO) | PK_LANG_TECHNO (I_TECHNO:I_LANG) |
| **405** | TCB_ODI_MASTER_11G | SNP_LB_AGENT | SNP_LB_AGT_FK1 (I_MASTER) | PK_LB_AGENT (I_MASTER:I_SLAVE) |
| **406** | TCB_ODI_MASTER_11G | SNP_LE_TECHNO | LE_TECHNO_FK1 (I_LANG_ELT) | PK_LE_TECHNO (I_LANG_ELT:I_TECHNO) |
| **407** | TCB_ODI_MASTER_11G | SNP_LINE_ACTION | LINE_ACTION_FK1 (I_ACTION) | PK_LINE_ACTION (I_ACTION:ORD_ACTION) |
| **408** | TCB_ODI_MASTER_11G | SNP_MTXT_PART | MTXT_PART_FK1 (I_TXT) | PK_MTXT_P (I_TXT:TXT_ORD) |
| **409** | TCB_ODI_MASTER_11G | SNP_PROF_METH | 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_11G | SNP_PSCHEMA_CONT | PSCHEMA_CONT_FK1 (I_CONTEXT) | PK_PSCHEMA_CONT (I_CONTEXT:I_LSCHEMA) |
| **412** | TCB_ODI_MASTER_11G | SNP_USER_METH | USER_METH_FK1 (I_WUSER) | PK_USER_METH (I_WUSER:I_METH) |
| **413** | TCB_ODI_MASTER_11G | SNP_USER_OBJ_METH | USER_OBJ_METH_FK1 (I_METH) | AK_USER_OBJ_METH (I_METH:I_WUSER:I_CONTEXT:I_OBJECTS:I_INSTANCE) |
| **414** | TCB_ODI_MASTER_11G | SNP_USER_PROF | 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_PARAM | SNP_DIAG_PARAM_FK1 (I_DIAGRAM) | PK_SNP_DIAG_PARAM (I_DIAGRAM:PARAM_NAME) |
| **418** | TCB_ODI_WORK | SNP_GRP_STATE | 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_FOLDER | MOD_FOLDER_FK1 (PAR_I_MOD_FOLDER) | AK_MOD_FOLDER (PAR_I_MOD_FOLDER:MOD_FOLDER_NAME) |
| **429** | TCB_ODI_WORK | SNP_OBJECT_ID_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_CONSTRAINT | POP_CONSTRAINT_FK1 (I_POP) | PK_POP_CONSTRAINT (I_POP:CONST_TYPE:CONST_NAME) |
| **433** | TCB_ODI_WORK | SNP_POP_CONTEXT | 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_COND | 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_REPORT | SCEN_REPORT_FK1 (SCEN_NO) | PK_SCEN_REPORT (SCEN_NO:SCEN_RUN_NO) |
| **440** | TCB_ODI_WORK | SNP_SCEN_STEP | SCEN_STEP_FK1 (SCEN_NO) | PK_SCEN_STEP (SCEN_NO:NNO) |
| **441** | TCB_ODI_WORK | SNP_SCEN_TASK | 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_TASK | 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_REPORT | 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_MODEL | SUB_MODEL_FK1 (I_MOD) | AK_SMOD (I_MOD:COD_SMOD) |
| **450** | TCB_ODI_WORK | SNP_SUB_MODEL | 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_EXIT | 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_PLAN_AGENT | VAR_PLAN_AGENT_FK1 (I_PLAN_AGENT) | PK_VAR_PLAN_AGENT (I_PLAN_AGENT:VAR_NAME) |
| **456** | TCB_ODI_WORK | SNP_VAR_SCEN | 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_PARAM | SNP_DIAG_PARAM_FK1 (I_DIAGRAM) | PK_SNP_DIAG_PARAM (I_DIAGRAM:PARAM_NAME) |
| **461** | TCB_ODI_WORK_11G | SNP_GRP_STATE | 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_LOG | 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_FOLDER | MOD_FOLDER_FK1 (PAR_I_MOD_FOLDER) | AK_MOD_FOLDER (PAR_I_MOD_FOLDER:MOD_FOLDER_NAME) |
| **487** | TCB_ODI_WORK_11G | SNP_OBJECT_ID_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_LPI_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_SESS | PARAM_SESS_FK (SESS_NO) | PK_PARAM_SESS (SESS_NO:PARAM_NAME) |
| **491** | TCB_ODI_WORK_11G | SNP_PARTITION | IX_PARTITION_TABLE (I_TABLE) | AK_PARTITION (I_TABLE:PARTITION_NAME) |
| **492** | TCB_ODI_WORK_11G | SNP_POP_CONSTRAINT | POP_CONSTRAINT_FK1 (I_POP) | PK_POP_CONSTRAINT (I_POP:CONST_TYPE:CONST_NAME) |
| **493** | TCB_ODI_WORK_11G | SNP_POP_MAPPING | PMAP_PCOL_FK (I_POP_COL) | PK_POP_MAPPING (I_POP_COL:I_DATA_SET) |
| **494** | TCB_ODI_WORK_11G | SNP_SCEN_REPORT | 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_TASK | 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_TASK | SESS_TASK_FK1 (SESS_NO:NNO) | PK_SESS_TASK (SESS_NO:NNO:SCEN_TASK_NO) |
| **502** | TCB_ODI_WORK_11G | SNP_SESS_TASK_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_NAME) |
| **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_REPORT | 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_MODEL | SUB_MODEL_FK1 (I_MOD) | AK_SMOD (I_MOD:COD_SMOD) |
| **506** | TCB_ODI_WORK_11G | SNP_SUB_MODEL | 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_EXIT | 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_PLAN_AGENT | VAR_PLAN_AGENT_FK1 (I_PLAN_AGENT) | PK_VAR_PLAN_AGENT (I_PLAN_AGENT:VAR_NAME) |
| **512** | TCB_ODI_WORK_11G | SNP_VAR_SCEN | 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_PARAM | SNP_DIAG_PARAM_FK1 (I_DIAGRAM) | PK_SNP_DIAG_PARAM (I_DIAGRAM:PARAM_NAME) |
| **517** | TEST_KRM | SNP_GRP_STATE | 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_LOG | 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_FOLDER | MOD_FOLDER_FK1 (PAR_I_MOD_FOLDER) | AK_MOD_FOLDER (PAR_I_MOD_FOLDER:MOD_FOLDER_NAME) |
| **543** | TEST_KRM | SNP_OBJECT_ID_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_LPI_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_SESS | PARAM_SESS_FK (SESS_NO) | PK_PARAM_SESS (SESS_NO:PARAM_NAME) |
| **547** | TEST_KRM | SNP_PARTITION | IX_PARTITION_TABLE (I_TABLE) | AK_PARTITION (I_TABLE:PARTITION_NAME) |
| **548** | TEST_KRM | SNP_POP_CONSTRAINT | POP_CONSTRAINT_FK1 (I_POP) | PK_POP_CONSTRAINT (I_POP:CONST_TYPE:CONST_NAME) |
| **549** | TEST_KRM | SNP_POP_MAPPING | PMAP_PCOL_FK (I_POP_COL) | PK_POP_MAPPING (I_POP_COL:I_DATA_SET) |
| **550** | TEST_KRM | SNP_SCEN_REPORT | SCEN_REPORT_FK1 (SCEN_NO) | PK_SCEN_REPORT (SCEN_NO:SCEN_RUN_NO) |
| **551** | TEST_KRM | SNP_SCEN_STEP | SCEN_STEP_FK1 (SCEN_NO) | PK_SCEN_STEP (SCEN_NO:NNO) |
| **552** | TEST_KRM | SNP_SCEN_TASK | 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_TASK | SESS_TASK_FK1 (SESS_NO:NNO) | PK_SESS_TASK (SESS_NO:NNO:SCEN_TASK_NO) |
| **558** | TEST_KRM | SNP_SESS_TASK_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_NAME) |
| **559** | TEST_KRM | SNP_STATE2 | SNP_STATE2_FK1 (I_GRP_STATE) | AK_SNP_STATE (I_GRP_STATE:STATE_CODE) |
| **560** | TEST_KRM | SNP_STEP_REPORT | STEP_REPORT_FK1 (SCEN_NO:SCEN_RUN_NO) | PK_STEP_REPORT (SCEN_NO:SCEN_RUN_NO:NNO:NB_RUN) |
| **561** | TEST_KRM | SNP_SUB_MODEL | SUB_MODEL_FK1 (I_MOD) | AK_SMOD (I_MOD:COD_SMOD) |

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|---|---|---|---|---|
| **562** | TEST_KRM | SNP_SUB_MODEL | 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_EXIT | 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_PLAN_AGENT | VAR_PLAN_AGENT_FK1 (I_PLAN_AGENT) | PK_VAR_PLAN_AGENT (I_PLAN_AGENT:VAR_NAME) |
| **568** | TEST_KRM | SNP_VAR_SCEN | 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_AGENT | 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_DATASOURCE | DS_CONNECT_FK (I_CONNECT) | PK_DATASOURCE (I_CONNECT:I_AGENT) |
| **577** | TEST_ODI_REPO | SNP_DIAG_PARAM | 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_ACTION | GRP_ACTION_FK1 (I_TECHNO) | AK_GRP_ACTION (I_TECHNO:GRP_NAME) |
| **581** | TEST_ODI_REPO | SNP_GRP_ACTION | GRP_ACTION_FK1 (I_TECHNO) | AK_GRP_ACTION2 (I_TECHNO:GRP_CODE) |
| **582** | TEST_ODI_REPO | SNP_GRP_STATE | SNP_GRP_STATE_FK1 (I_PROJECT) | AK_SNP_GRP_STATE (I_PROJECT:GRP_STATE_CODE) |
| **583** | TEST_ODI_REPO | SNP_HOST_MOD | SNP_HM_FK1 (I_HOST) | PK_SNP_HOST_MOD2 (I_HOST:I_MODULE) |
| **584** | TEST_ODI_REPO | SNP_INDEX_TYPE | 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_TECHNO | LANG_TECHNO_FK2 (I_TECHNO) | PK_LANG_TECHNO (I_TECHNO:I_LANG) |

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| **592** | TEST_ODI_REPO | SNP_LB_AGENT | SNP_LB_AGT_FK1 (I_MASTER) | PK_LB_AGENT (I_MASTER:I_SLAVE) |
| **593** | TEST_ODI_REPO | SNP_LE_TECHNO | LE_TECHNO_FK1 (I_LANG_ELT) | PK_LE_TECHNO (I_LANG_ELT:I_TECHNO) |
| **594** | TEST_ODI_REPO | SNP_LINE_ACTION | 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_LOG | 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_FOLDER | MOD_FOLDER_FK1 (PAR_I_MOD_FOLDER) | AK_MOD_FOLDER (PAR_I_MOD_FOLDER:MOD_FOLDER_NAME) |
| **615** | TEST_ODI_REPO | SNP_MTXT_PART | MTXT_PART_FK1 (I_TXT) | PK_MTXT_P (I_TXT:TXT_ORD) |
| **616** | TEST_ODI_REPO | SNP_OBJECT_ID_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_LPI_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_SESS | PARAM_SESS_FK (SESS_NO) | PK_PARAM_SESS (SESS_NO:PARAM_NAME) |
| **620** | TEST_ODI_REPO | SNP_PARTITION | IX_PARTITION_TABLE (I_TABLE) | AK_PARTITION (I_TABLE:PARTITION_NAME) |

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| **621** | TEST_ODI_REPO | SNP_POP_CONSTRAINT | POP_CONSTRAINT_FK1 (I_POP) | PK_POP_CONSTRAINT (I_POP:CONST_TYPE:CONST_NAME) |
| **622** | TEST_ODI_REPO | SNP_POP_MAPPING | PMAP_PCOL_FK (I_POP_COL) | PK_POP_MAPPING (I_POP_COL:I_DATA_SET) |
| **623** | TEST_ODI_REPO | SNP_PROF_METH | 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_REPORT | SCEN_REPORT_FK1 (SCEN_NO) | PK_SCEN_REPORT (SCEN_NO:SCEN_RUN_NO) |
| **627** | TEST_ODI_REPO | SNP_SCEN_STEP | SCEN_STEP_FK1 (SCEN_NO) | PK_SCEN_STEP (SCEN_NO:NNO) |
| **628** | TEST_ODI_REPO | SNP_SCEN_TASK | 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_TASK | SESS_TASK_FK1 (SESS_NO:NNO) | PK_SESS_TASK (SESS_NO:NNO:SCEN_TASK_NO) |
| **634** | TEST_ODI_REPO | SNP_SESS_TASK_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_NAME) |
| **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_REPORT | 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_MODEL | SUB_MODEL_FK1 (I_MOD) | AK_SMOD (I_MOD:COD_SMOD) |
| **638** | TEST_ODI_REPO | SNP_SUB_MODEL | 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_EXIT | USER_EXIT_FK1 (I_TRT) | AK_USER_EXIT (I_TRT:UE_NAME) |
| **642** | TEST_ODI_REPO | SNP_USER_METH | 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_INSTANCE) |
| **644** | TEST_ODI_REPO | SNP_USER_PROF | 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_PLAN_AGENT | VAR_PLAN_AGENT_FK1 (I_PLAN_AGENT) | PK_VAR_PLAN_AGENT (I_PLAN_AGENT:VAR_NAME) |
| **647** | TEST_ODI_REPO | SNP_VAR_SCEN | 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) |

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| | REPO | | | |

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

## 5.6. 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.

## 5.7. 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_YNGAYBC | MCO_TCB_NEW | 1,075,267,021 | 614 |
| **DWH2015** | IDX_ACCOUNT_C_CUSTOMER | ACCOUNT | 953,357,391 | 2,756,352 |
| **DWH2015** | PK_ACCOUNT_C | ACCOUNT | 953,357,391 | 926,294,317 |

| | | | | |
|---|---|---|---|---|
| **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_DATE | 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_CONST | 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_ID_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_SOGIAODICH_IDX | KRM_SYN_PORT_FTP_ALL | 148,629,814 | 3,249 |
| **DWH2015** | LMM_ACCOUNT_BALANCES_DATE | LMM_ACCOUNT_BALANCES | 140,633,160 | 298 |
| **DWH2015** | PK_IDX_LMM_ACC_BAL | LMM_ACCOUNT_BALANCES | 140,633,160 | 146,337,779 |
| **DWH** | PK_CMS_COLLECTIONCENTRALBANK_C | CMS_COLLECTIONCENTRALBANK | 128,103,870 | 125,605,140 |
| **DWH2015** | PK_CMS_COLLECTIONCENTRALBANK_C | CMS_COLLECTIONCENTRALBANK | 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 |

| | | | | |
|---|---|---|---|---|
| | EDITACC | | | |
| **DWH2015** | IDX_FT_PROCESSDATE_DEBITACC | 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_CREDITACC | FUNDS_TRANSFER | 26,586,724 | 7,939,320 |
| **DWH** | IDX_FT_PROCESSDATE_DEBITACC | 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_REQUEST | AC_CHARGE_REQUEST | 9,928,956 | 9,923,461 |
| **DWH** | LMM_ACCOUNT_BALANCES_DATE | LMM_ACCOUNT_BALANCES | 8,467,318 | 158 |
| **DWH2015** | PK_DNCI | DC_NEW_COLLECTION_ITEM | 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_TSD | 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_SOGIAODICH_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_TSD | 1,510,525 | 1,485,063 |
| **DWH** | PK_CITCB_TSD_CONST | CHOICE_INTEREST_TCB_TSD | 1,434,348 | 1,437,230 |
| **DWH2015** | PK_CITCB_TSD | CHOICE_INTEREST_TCB_TSD | 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_TSD | 881,578 | 881,578 |
| **DWH2015** | IDX_EB_SYSTEM_DATE | EB_SYSTEM_SUMMARY_TCB_SV | 835,141 | 297 |
| **DWH** | PK_LMMSD_TSD_CONST | LMM_SCHEDULE_DATES_TSD | 821,252 | 821,252 |
| **DWH2015** | PK_AZA_TSD | AZ_ACCOUNT_TSD | 550,050 | 550,050 |
| **DWH** | PK_DNCI_CONST | DC_NEW_COLLECTION_ITEM | 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_TSD | 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_TSD | 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_COCODE_IDX | KRM_SYN_PORT_TODAY_MKB | 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_CONST | AC_ACCOUNT_LINK_TSD | 23,744 | 23,744 |
| **DWH** | PK_SAM_TSD | SEC_ACC_MASTER_TSD | 14,025 | 13,870 |
| **DWH2015** | PK_ACCOUNT_CLOSURE_TSD | 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_TSD_CONST | ACCOUNT_CLOSURE_TSD | 955 | 955 |
| **DWH2015** | PK_PDPA_TSD | PD_PARAMETER_TSD | 894 | 894 |
| **DWH2015** | PK_EBSS | EB_SYSTEM_SUMMARY_TCB | 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_DATE | 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 |

| | | | | |
|---|---|---|---|---|
| **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_TSD | 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_ID_IDX | KRM_SUM_PORT_FTP | 0 | 0 |
| **KRM_RPT** | PORT_FTP_BASE_U_COCODE_IDX | KRM_SUM_PORT_FTP | 0 | 0 |
| **KRM_RPT** | PORT_FTP_BASE_U_SOGIAODICH_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_BALANCES | EB_CONTRACT_BALANCES_TEMP3 | | 13,784,711 |
| **DWH** | IDX_MSG_OSBV1_QUERY_OP | ESB_MESSAGES_OSBV1_QUERY | | 0 |
| **DWH** | IDX_MSG_OSBV1_QUERY_REQ | ESB_MESSAGES_OSBV1_QUERY | | 0 |
| **DWH** | IDX_MSG_OSBV1_QUERY_SID | ESB_MESSAGES_OSBV1_QUERY | | 0 |
| **DWH** | PK_SASL_TSD | SA_SCORE_LIMIT_TSD | | |
| **DWH** | PK_SASP_TSD | SA_SCORE_PARAMETER_TSD | | |
| **DWH2013** | IDX_ACCOUNT_PROCESS_DATE | ACCOUNT | | 302 |

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|---|---|---|---|---|
| **DWH2013** | PK_ACCOUNT_C | ACCOUNT | | 1,090,267,520 |
| **DWH2013** | PK_ACCOUNT_C_CUSTOMER | ACCOUNT | | 2,647,148 |
| **DWH2013** | PK_ACCOUNT_CLOSURE_TSD | 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_TSD | | 1,421,834 |
| **DWH2013** | PK_CMS_COLLECTIONCENTRALBANK_C | CMS_COLLECTIONCENTRALBANK | | 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_ITEM | | 5,186,472 |
| **DWH2013** | PK_EB_SYSTEM_SUMMARY | EB_SYSTEM_SUMMARY | | 100,128 |
| **DWH2013** | PK_EBSS | EB_SYSTEM_SUMMARY_TCB | | 302 |
| **DWH2013** | IDX_EB_SYSTEM_DATE | EB_SYSTEM_SUMMARY_TCB_SV | | 302 |
| **DWH2013** | PK_FX_TSD | FOREX_TSD | | 192,941 |
| **DWH2013** | PK_FTCT_TSD | FT_COMMISSION_TYPE_TSD | | 2,888 |
| **DWH2013** | IDX_FT_PROCESSDATE_CREDITACC | FUNDS_TRANSFER | | 13,555,168 |
| **DWH2013** | IDX_FT_PROCESSDATE_DEBITACC | 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_TSD | | 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_BALANCES_CONT | LMM_ACCOUNT_BALANCES | | 1,420,966 |
| **DWH2013** | LMM_ACCOUNT_BALANCES_DATE | LMM_ACCOUNT_BALANCES | | 302 |
| **DWH2013** | PK_LMM | LMM_ACCOUNT_BALANCES | | 132,210,859 |
| **DWH2013** | PK_LMM_SCH_TSD | LMM_SCHEDULES_TSD | | 7,879,312 |
| **DWH2013** | PK_LMMSD_TSD | LMM_SCHEDULE_DATES_TSD | | 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_TSD | | 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_TSD | | 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_DATE | STMT_ENTRY | | 302 |
| **DWH2013** | PK_TRA_TSD | TRANSACTION_CODE_TSD | | 745 |
| **DWH2013** | PK_USE_TSD | USERTBL_TSD | | 1,246,373 |
| **DWH2014** | IDX_ACCOUNT_C_CUSTOMER | ACCOUNT | | 2,690,912 |
| **DWH2014** | PK_ACCOUNT_C | ACCOUNT | | 1,012,498,718 |
| **DWH2014** | PK_ACCOUNT_CLOSURE_TSD | ACCOUNT_CLOSURE_TSD | | 3,645 |
| **DWH2014** | PK_ACACCT_LINK_TSD | AC_ACCOUNT_LINK_TSD | | 491,048 |
| **DWH2014** | IDX_AC_CHARGE_REQUEST | 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_TSD | | 1,434,114 |
| **DWH2014** | PK_CMS_COLLECTIONCENTRALBANK_C | CMS_COLLECTIONCENTRALBANK | | 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_ITEM | | 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_TCB | | 297 |
| **DWH2014** | IDX_EB_SYSTEM_DATE | EB_SYSTEM_SUMMARY_TCB_SV | | 297 |
| **DWH2014** | PK_FX_TSD | FOREX_TSD | | 144,100 |
| **DWH2014** | IDX_FT_PROCESSDATE_CREDITACC | FUNDS_TRANSFER | | 14,923,566 |
| **DWH2014** | IDX_FT_PROCESSDATE_DEBITACC | 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_TSD | | 931,244 |
| **DWH2014** | PK_LIM_TSD | LIMIT_TSD | | 19,463,623 |
| **DWH2014** | LMM_ACCOUNT_BALANCES_DATE | LMM_ACCOUNT_BALANCES | | 297 |
| **DWH2014** | PK_IDX_LMM_ACC_BAL | LMM_ACCOUNT_BALANCES | | 143,308,445 |
| **DWH2014** | PK_LMM_SCH_TSD | LMM_SCHEDULES_TSD | | 7,854,773 |
| **DWH2014** | PK_LMMSD_TSD | LMM_SCHEDULE_DATES_TSD | | 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_TSD | | 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_TSD | | 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 |

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|---|---|---|---|---|
| **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_DATE | 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_DIMENSION | TBL_PMS_DATA_DIMENSION | | 0 |
| **EDW_ADM** | IDX_PMS_DATA_DIMENSION | TBL_PMS_DATA_DIMENSION | | 0 |
| **EDW_DMT** | IDX_AR_BHVR_FCT_CDR_DT | 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_PARTITION_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_PRINTED | TBL_MV_STMT_PRINTED | | 0 |
| **T24REP** | PK_TBL_MV_STMT_PRINTED | TBL_MV_STMT_PRINTED | | |

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

## 5.8. 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_ACCOUNT_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_20140724_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_KEY | SBV_CONSOL_KEY_PROC_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_TRANSACTION | IDX_ACCOUNTING_STATUS | 2,182,286 | 4 | 01/15/2014 17:16:43 |
| **KRM_RPT** | KRM_SYN_R01_ALM | TEMP_R01_UDATE | 1,250,862 | 1 | 09/16/2013 22:37:55 |
| **KRM_APP** | PORT_TODAY_TMP1 | PT_TMP1_A01_IDX | 295,779 | 2 | 09/20/2013 23:08:37 |
| **KRM_ETL** | SBV_RE_STAT_LINE_CONT | SBV_RE_STAT_PROC_DATE_IDX | 278,360 | 1 | 01/02/2013 00:36:24 |
| **DWH_QUERY** | TBL_MCO_20140724_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_ALM_FRM_PORT | PORT_R01_UDATE | 61,205 | 1 | 08/18/2013 21:11:58 |
| **KRM_RPT** | KRM_SYN_R01_ALM_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_TMP3 | PT_TMP3_A01_IDX | 30,800 | 3 | 09/20/2013 23:06:11 |
| **TCB_DWH_VAS** | R_TBL_CIC_GD_K3QHTD_NGB | IDX_R_TBL_CIC_GD_K3QHTD_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_ADJ_FNC_ST | IDX_MV_AR_DIM_EXCPN_IND | 4,104 | 2 | 09/20/2016 13:17:22 |
| **DWH_QUERY** | TMP_ANHVT1_MV_AR_DIM | IDX_MV_AR_DIM_EXCPN_IND | 1,981 | 2 | 01/26/2015 19:18:23 |

| | | | | | |
|---|---|---|---|---|---|
| **KRM_RPT** | KRM_SYN_PORT_FTP_ALL | PORT_FTP_ALL_TP_ADJ5_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_GRP_TP | 1,297 | 8 | 07/09/2014 23:26:48 |
| **EDW_STG** | T_DMT_AR_3 | IDX_T_DM_AR_SRC_STM_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.

## 5.9. Restructure large tables indexes

### 5.9.1. 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<br>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.

### 5.9.2. 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<br>PRODCODE<br>CONTRACT_NO<br>PROCESS_DATE | 14GB | NO |

**Recommendation**: Recreate index PK_CATEG_CONST as LOCAL.

### 5.9.3. 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<br>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_002 cover MTH column. Consider drop index IDX_R312_TAB11F_003 as number of distinct value is low (YTD: 3, ORDER_: 5).

### 5.9.4. 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<br>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.

### 5.9.5. 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.

### 5.9.6. 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.

### 5.9.7. 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.

### 5.9.8. 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.

### 5.9.9. 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.

### 5.9.10. 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<br>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.

### 5.9.11. 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<br>ACCOUNT_NUMBER | 11 GB | NO |
| **IDX_STMT_ENTRY_BD_CUS** | BOOKING_DATE<br>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.

## 5.10. 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.

### 5.10.1. 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... |

| Stat Name | Statement Total | Per Execution | % Snap Total |
|---|---|---|---|
| Elapsed Time (ms) | 15,098,266 | 7,401.11 | 1.05 |
| CPU Time (ms) | 3,658,595 | 1,793.43 | 0.67 |
| Executions | 2,040 | | |
| Buffer Gets | 68,533,143 | 33,594.68 | 0.19 |
| Disk Reads | 3,367,202 | 1,650.59 | 0.02 |
| Parse Calls | 8 | 0.00 | 0.00 |
| Rows | 2,037,721 | 998.88 | |
| User I/O Wait Time (ms) | 4,497,607 | | |
| Cluster Wait Time (ms) | 5,440,474 | | |

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.

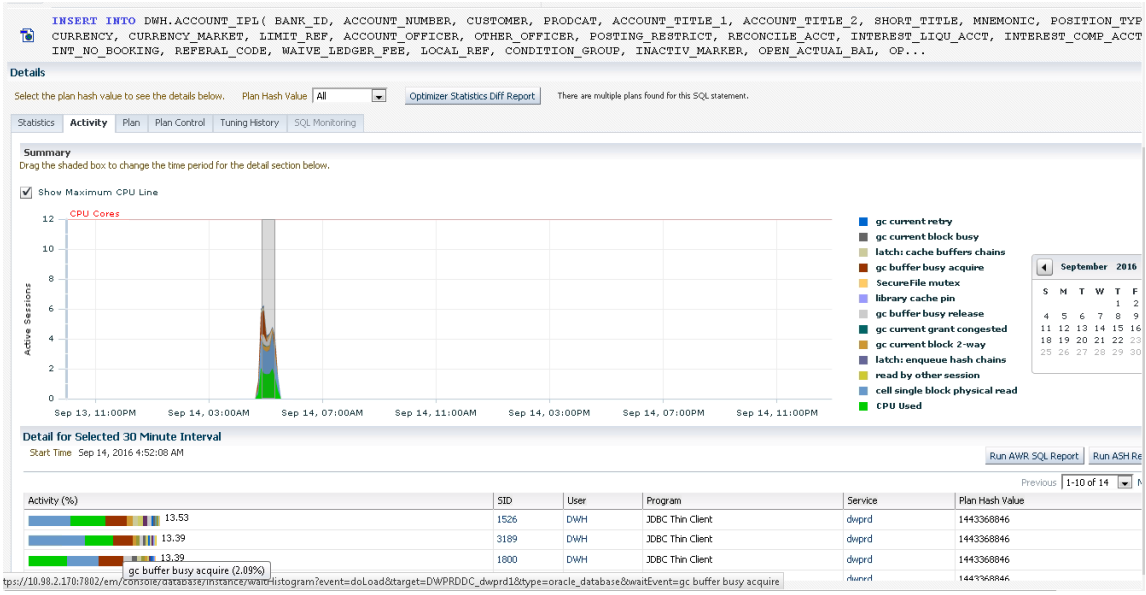


Table DWH.ACCOUNT_IPL: size 20.8 GB, 4,105,838 rows, non-partition.

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.

### 5.10.2. 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')
```

| Id | Operation | Name | Rows | Cost (%CPU) |
|---|---|---|---|---|
| 0 | UPDATE STATEMENT | | | 176K(100) |
| 1 | UPDATE | ECM_SWIFTTRANSACTION | | |
| 2 | FILTER | | | |
| 3 | TABLE ACCESS STORAGE FULL | ECM_SWIFTTRANSACTION | 98966 | 856 (1) |
| 4 | TABLE ACCESS BY INDEX ROWID | I$_ECM_SWIFTTRANSACTION | 1 | 2 (0) |
| 5 | INDEX RANGE SCAN | I$_ECM_SWIFTTRANSACTION_IDX | 1 | 1 (0) |
| 6 | TABLE ACCESS STORAGE FULL FIRST ROWS | C$_0ECM_SWIFTTRANSACTION | 1 | 2464 (1) |

| Stat Name | Statement Total | Per Execution | % Snap Total |
|---|---|---|---|
| Elapsed Time (ms) | 8,695,300 | 8,695,299.82 | 0.61 |

| | | | |
|---|---|---|---|
| CPU Time (ms) | 8,458,210 | 8,458,210.16 | 1.54 |
| Executions | 1 | | |
| Buffer Gets | 1,316,588,382 | 1,316,588,382.00 | 3.57 |
| Disk Reads | 38,173 | 38,173.00 | 0.00 |
| Parse Calls | 1 | 1.00 | 0.00 |
| Rows | 47 | 47.00 | |

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.

### 5.10.3. 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
```

| Id | Operation | Name | Rows | Cost (%CPU) |
|---|---|---|---|---|
| 0 | INSERT STATEMENT | | | 60727 (100) |
| 1 | LOAD TABLE CONVENTIONAL | | | |
| 2 | FILTER | | | |
| 3 | NESTED LOOPS | | 1 | 60727 (1) |
| 4 | TABLE ACCESS STORAGE FULL | F_QUANLYTHE | 1 | 60697 (1) |
| 5 | XPATH EVALUATION | | | |

| Stat Name | Statement Total | Per Execution | % Snap Total |
|---|---|---|---|
| Elapsed Time (ms) | 7,766,069 | 184,906.39 | 0.54 |
| CPU Time (ms) | 5,618,136 | 133,765.14 | 1.03 |
| Executions | 42 | | |
| Buffer Gets | 231,107,248 | 5,502,553.52 | 0.63 |
| Disk Reads | 6,568,147 | 156,384.45 | 0.05 |
| Parse Calls | 0 | 0.00 | 0.00 |
| Rows | 2,009,262 | 47,839.57 | |
| User I/O Wait Time (ms) | 1,495,894 | | |
| Cluster Wait Time (ms) | 232,769 | | |

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).

### 5.10.4. 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
```

| Stat Name | Statement Total | Per Execution | % Snap Total |
|---|---|---|---|
| Elapsed Time (ms) | 12,711,395 | 6,355,697.28 | 0.89 |
| CPU Time (ms) | 339,155 | 169,577.71 | 0.06 |
| Executions | 2 | | |
| Buffer Gets | 0 | 0.00 | 0.00 |

| | | | |
|---|---|---|---|
| Disk Reads | 0 | 0.00 | 0.00 |
| Parse Calls | 2 | 1.00 | 0.00 |
| Rows | 3,873,230 | 1,936,615.00 | |

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
```

### 5.10.5. 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
```

| Id | Operation | Name | Rows | Cost (%CPU) |
|---|---|---|---|---|
| 0 | INSERT STATEMENT | | | 911K(100) |
| 1 | LOAD TABLE CONVENTIONAL | | | |
| 2 | FILTER | | | |
| 3 | NESTED LOOPS | | 11M | 911K (1) |
| 4 | TABLE ACCESS STORAGE FULL | F_IC_HOME_BANKING_TCB | 28961 | 123K (1) |
| 5 | XPATH EVALUATION | | | |

| Stat Name | Statement Total | Per Execution | % Snap Total |
|---|---|---|---|
| Elapsed Time (ms) | 5,812,985 | 290,649.25 | 0.41 |
| CPU Time (ms) | 3,425,850 | 171,292.51 | 0.63 |
| Executions | 20 | | |
| Buffer Gets | 17,947,653 | 897,382.65 | 0.05 |
| Disk Reads | 9,135,750 | 456,787.50 | 0.07 |
| Parse Calls | 4 | 0.20 | 0.00 |
| Rows | 896,164 | 44,808.20 | |

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).

### 5.10.6. 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
```

| Id | Operation | Name | Rows | Cost (%CPU) |
|---|---|---|---|---|
| 0 | INSERT STATEMENT | | | 1808K(100) |
| 1 | LOAD TABLE CONVENTIONAL | | | |
| 2 | FILTER | | | |
| 3 | NESTED LOOPS | | 26M | 1808K (1) |
| 4 | TABLE ACCESS STORAGE FULL | F_STMT_ENTRY | 64389 | 54990 (1) |
| 5 | XPATH EVALUATION | | | |

| Stat Name | Statement Total | Per Execution | % Snap Total |
|---|---|---|---|
| Elapsed Time (ms) | 4,260,331 | 177,513.79 | 0.30 |
| CPU Time (ms) | 3,739,546 | 155,814.40 | 0.68 |
| Executions | 24 | | |
| Buffer Gets | 63,286,518 | 2,636,938.25 | 0.17 |
| Disk Reads | 710,943 | 29,622.63 | 0.01 |
| Parse Calls | 3 | 0.13 | 0.00 |
| Rows | 1,127,370 | 46,973.75 | |

TABLE DWH_BK.F_STMT_ENTRY: Size 839 MB, 1.110.225 rows, no statistics.

**Recommendation**: Create index on F_STMT_ENTRY(IDSEQ).

### 5.10.7. 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) |
|---|---|---|---|---|
| 0 | INSERT STATEMENT | | | 1039K(100) |
| 1 | LOAD TABLE CONVENTIONAL | | | |
| 2 | FILTER | | | |
| 3 | NESTED LOOPS | | 14M | 1039K (1) |
| 4 | TABLE ACCESS STORAGE FULL | F_VISA_OFFUS_TCB | 35930 | 61368 (1) |
| 5 | XPATH EVALUATION | | | |

| Stat Name | Statement Total | Per Execution | % Snap Total |
|---|---|---|---|
| Elapsed Time (ms) | 3,477,907 | 79,043.33 | 0.24 |
| CPU Time (ms) | 1,715,318 | 38,984.51 | 0.31 |
| Executions | 44 | | |
| Buffer Gets | 18,535,652 | 421,264.82 | 0.05 |
| Disk Reads | 10,027,277 | 227,892.66 | 0.07 |
| Parse Calls | 2 | 0.05 | 0.00 |
| Rows | 2,128,320 | 48,370.91 | |

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).

### 5.10.8. 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
```

| Id | Operation | Name | Rows | Cost (%CPU) |
|---|---|---|---|---|
| 0 | INSERT STATEMENT | | | 4695K(100) |
| 1 | LOAD TABLE CONVENTIONAL | | | |
| 2 | FILTER | | | |
| 3 | NESTED LOOPS | | 69M | 4695K (1) |
| 4 | TABLE ACCESS STORAGE FULL | F_QUANLY_INFO_UPDATE_LKGD | 169K | 70837 (1) |
| 5 | XPATH EVALUATION | | | |

| Stat Name | Statement Total | Per Execution | % Snap Total |
|---|---|---|---|
| Elapsed Time (ms) | 2,829,523 | 40,421.76 | 0.20 |
| CPU Time (ms) | 1,389,724 | 19,853.20 | 0.25 |
| Executions | 70 | | |
| Buffer Gets | 39,953,829 | 570,768.99 | 0.11 |
| Disk Reads | 6,985,441 | 99,792.01 | 0.05 |
| Parse Calls | 2 | 0.03 | 0.00 |
| Rows | 3,475,984 | 49,656.91 | |

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).

### 5.10.9. 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) |

| | | | | |
|---|---|---|---|---|
| 1 | LOAD TABLE CONVENTIONAL | | | |
| 2 | FILTER | | | |
| 3 | NESTED LOOPS | | 25M | 1731K (1) |
| 4 | TABLE ACCESS STORAGE FULL | F_PD_BALANCES_HIST | 62523 | 29664 (1) |
| 5 | XPATH EVALUATION | | | |

| Stat Name | Statement Total | Per Execution | % Snap Total |
|---|---|---|---|
| Elapsed Time (ms) | 10,696,553 | 382,019.74 | 1.10 |
| CPU Time (ms) | 9,179,765 | 327,848.77 | 2.03 |
| Executions | 28 | | |
| Buffer Gets | 286,434,145 | 10,229,790.89 | 1.07 |
| Disk Reads | 2,948,652 | 105,309.00 | 0.04 |
| Parse Calls | 0 | 0.00 | 0.00 |
| Rows | 1,349,577 | 48,199.18 | |

**Recommendation**: Create index on F_PD_BALANCES_HIST(IDSEQ).

### 5.10.10. 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)
```

| Stat Name | Statement Total | Per Execution | % Snap Total |
|---|---|---|---|
| Elapsed Time (ms) | 3,376,889 | 2,163.29 | 0.24 |
| CPU Time (ms) | 900,703 | 577.00 | 0.16 |
| Executions | 1,561 | | |
| Buffer Gets | 22,107,567 | 14,162.44 | 0.06 |
| Disk Reads | 1,911,008 | 1,224.22 | 0.01 |
| Parse Calls | 13 | 0.01 | 0.00 |
| Rows | 1,553,019 | 994.89 | |

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

### 5.10.11. 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) |
|---|---|---|---|---|
| 0 | INSERT STATEMENT | | | 734K(100) |
| 1 | LOAD AS SELECT | | | |
| 2 | TABLE ACCESS BY INDEX ROWID | COMPANY | 1 | 2 (0) |
| 3 | INDEX UNIQUE SCAN | PK_COMPANY | 1 | 1 (0) |
| 4 | TABLE ACCESS BY INDEX ROWID | COMPANY | 1 | 2 (0) |
| 5 | INDEX UNIQUE SCAN | PK_COMPANY | 1 | 1 (0) |
| 6 | TABLE ACCESS BY INDEX ROWID | SECTOR | 1 | 2 (0) |
| 7 | INDEX UNIQUE SCAN | PK_SECTOR | 1 | 1 (0) |
| 8 | TABLE ACCESS BY INDEX ROWID | INDUSTRY | 1 | 2 (0) |
| 9 | INDEX UNIQUE SCAN | PK_IND | 1 | 1 (0) |
| 10 | TABLE ACCESS BY INDEX ROWID | CUSTOMER | 1 | 3 (0) |
| 11 | INDEX UNIQUE SCAN | PK_CUSTOMER_CONST | 1 | 2 (0) |
| 12 | HASH JOIN OUTER | | 1453K | 734K (1) |
| 13 | HASH JOIN OUTER | | 1453K | 573K (1) |
| 14 | PARTITION RANGE SINGLE | | 1453K | 466K (1) |
| 15 | TABLE ACCESS STORAGE FULL | ACCOUNT | 1453K | 466K (1) |
| 16 | TABLE ACCESS STORAGE FULL | CUSTOMER | 4351K | 25063 (3) |
| 17 | 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 |

| | | | |
|---|---|---|---|
| CPU Time (ms) | 2,067,296 | 2,067,295.72 | 0.38 |
| Executions | 1 | | |
| Buffer Gets | 84,131,196 | 84,131,196.00 | 0.23 |
| Disk Reads | 3,621,377 | 3,621,377.00 | 0.03 |
| Parse Calls | 1 | 1.00 | 0.00 |
| Rows | 3,795,023 | 3,795,023.00 | |

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 | Fundamentals of the Large Pool |
| Note:268581.1 | Obsolete / Deprecated Initialization Parameters in 10G |

**Checkpoints:**

| | |
|---|---|
| Note:265831.1 | Automatic Checkpoint Tuning in 10g |
| Note:274264.1 | REDO LOGS SIZING ADVISORY in 10g |

**Statistics:**

| | |
|---|---|
| Note: 266040.1 | Automatic statistics Gathering in oracle 10G |
| Note: 252597.1 | Relation between Table Monitoring and STATISTICS_LEVEL parameter in 10g |
| Note:281790.1 | Oracle Database 10g DBMS_STATS Package FORCE argument |
| Note: 283890.1 | Oracle Database 10g Locking Statistics |

Locally Managed Tablespaces:

| | |
|---|---|
| Note:93771.1 | Introduction to Locally-Managed Tablespaces |
| Note:262472.1 | 10g: BIGFILE Type Tablespaces Versus SMALLFILE Type |

Tuning CPU Resources

| | |
|---|---|
| Note: 33824.1 | Statistic - recursive cpu usage |
| Note: 164768.1 | Diagnosing High CPU Utilization |
| Note: 33828.1 | Statistic - cpu used by this session (Reference Note) |
| Note: 33854.1 | Statistic - parse time elapsed (Reference Note) |
| Note: 33853.1 | Statistic - parse time cpu (Reference Note) |
| Note: 33828.1 | Statistic - cpu used by this session (Reference Note) |
| Note: 276103.1 | PERFORMANCE TUNING USING 10g ADVISORS AND MANAGEABILITY FEATURES |

**MTS and Large Pool:**

Tuning I/O

| | |
|---|---|
| Note: 30286.1 | I/O Tuning with Different RAID Configurations |
| Note: 1037322.6 | WHAT IS THE DB_FILE_MULTIBLOCK_READ_COUNT PARAMETER |
| Note: 148342.1 | Avoiding I/O Disk Contention |
| Note: 245055.1 | Oracle Database 10g Enhanced wait model |
| Note: 272360.1 | Tablespace Groups for SQL Operations in 10g |
| Note: 242090.1 | 10g NEW FEATURE on SEGMENT SHRINK |

Optimizing SQL Statements

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

Tuning Network Resources

| | |
|---|---|
| Note: 44694.1 | SQL*Net Packet Sizes (SDU and TDU Parameters) |
| Note: 1005123.6 | Tuning SQL*Net for better performance |

**MTS and Large Pool:**

Tuning Memory

| | |
|---|---|
| Note: 257643.1 | Oracle Database 10g Automated SGA Memory Tuning |
| Note: 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

**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.