Database 11gR2 Development

of

Very Large Data Bases

presentation for:
Bulgarian Oracle User Group Autumn Conference

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  - OpenWorld, Collaborate, Kaleidoscope, Brazil, Canada, Chile, Costa Rica, Denmark, Estonia, Finland, Germany, Japan, New Zealand, Norway, Peru, Sweden, UK, US, Uruguay
- 11g Beta Tester

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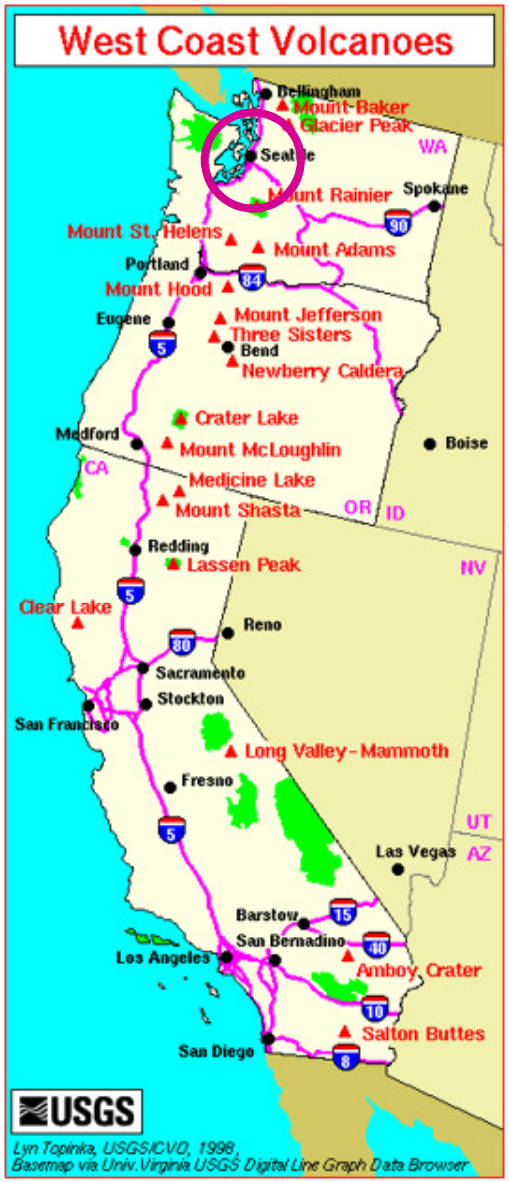

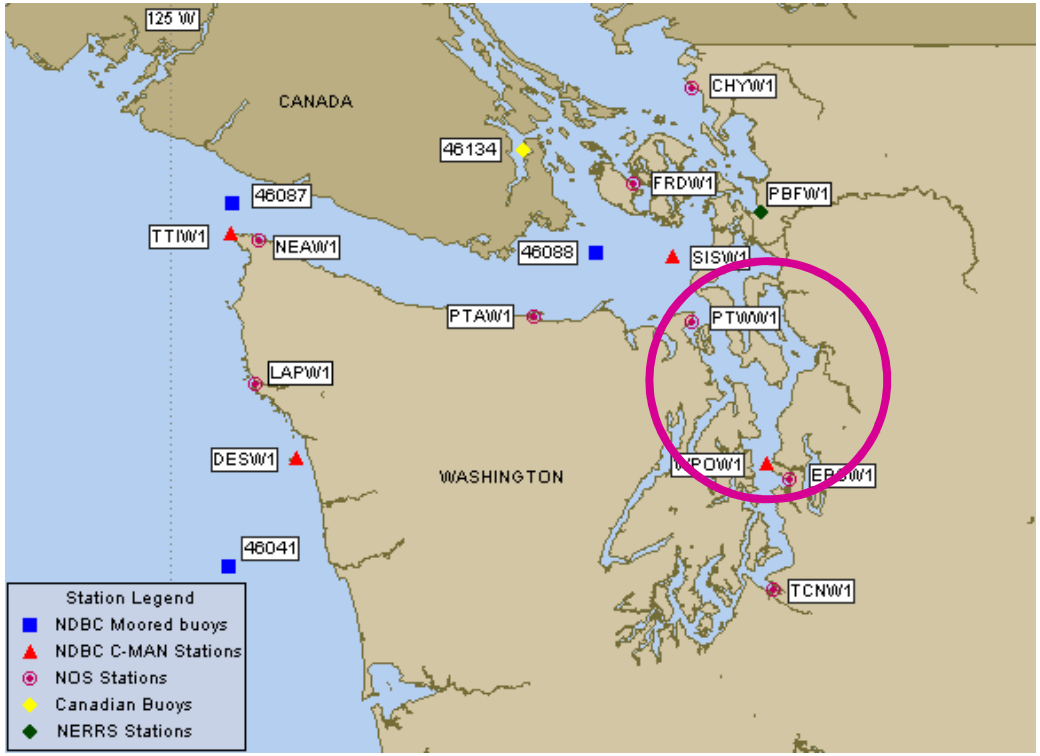

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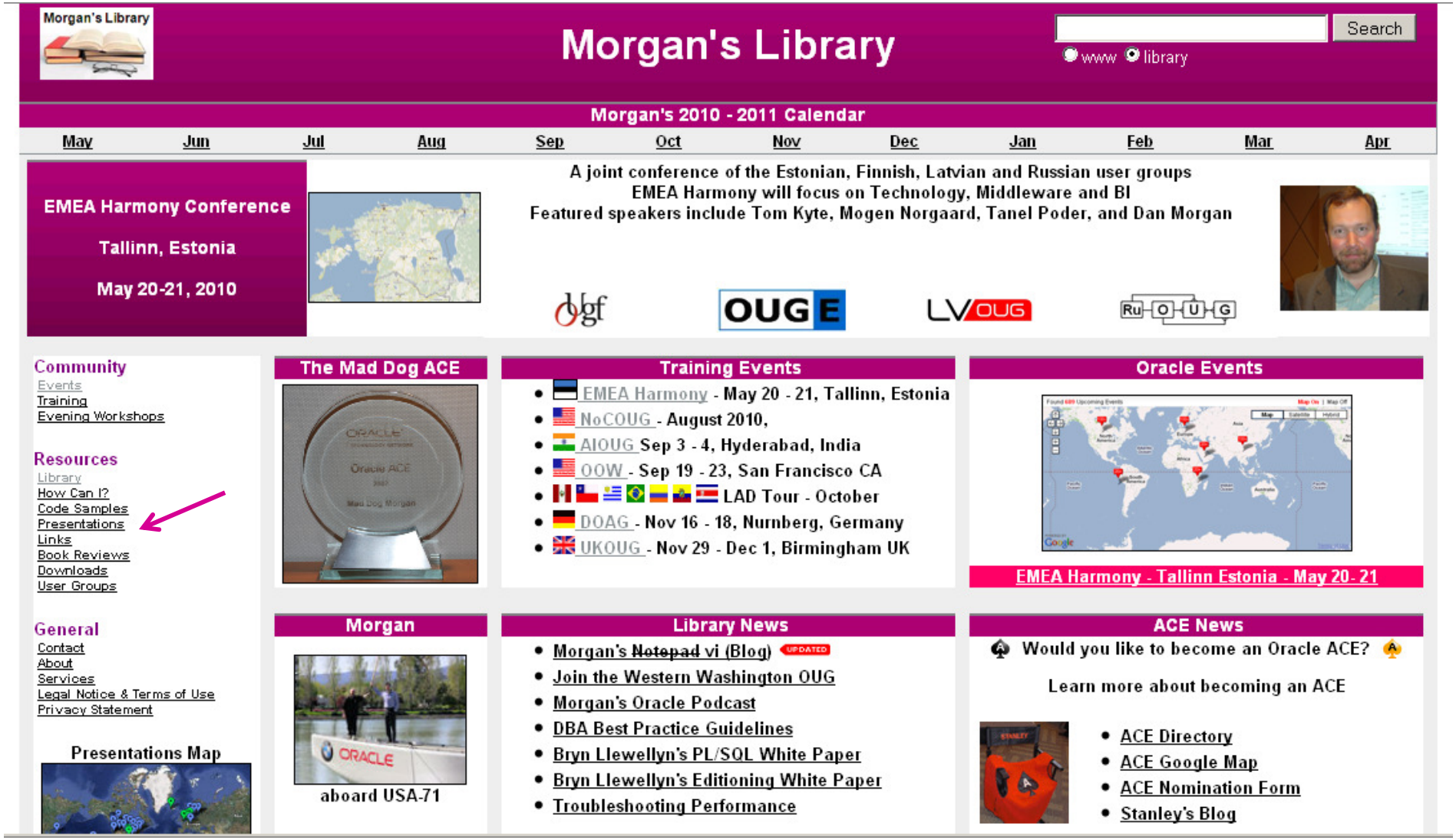
October / November / December

- LAD Tour
  - Lima, Peru
  - Santiago, Chile
  - Montevideo, Uruguay
  - Sao Paulo, Brazil
  - Bogota, Columbia
  - Quito, Ecuador
  - San Jose, Costa Rica
- DOAG
- BGOUG
- UKOUG

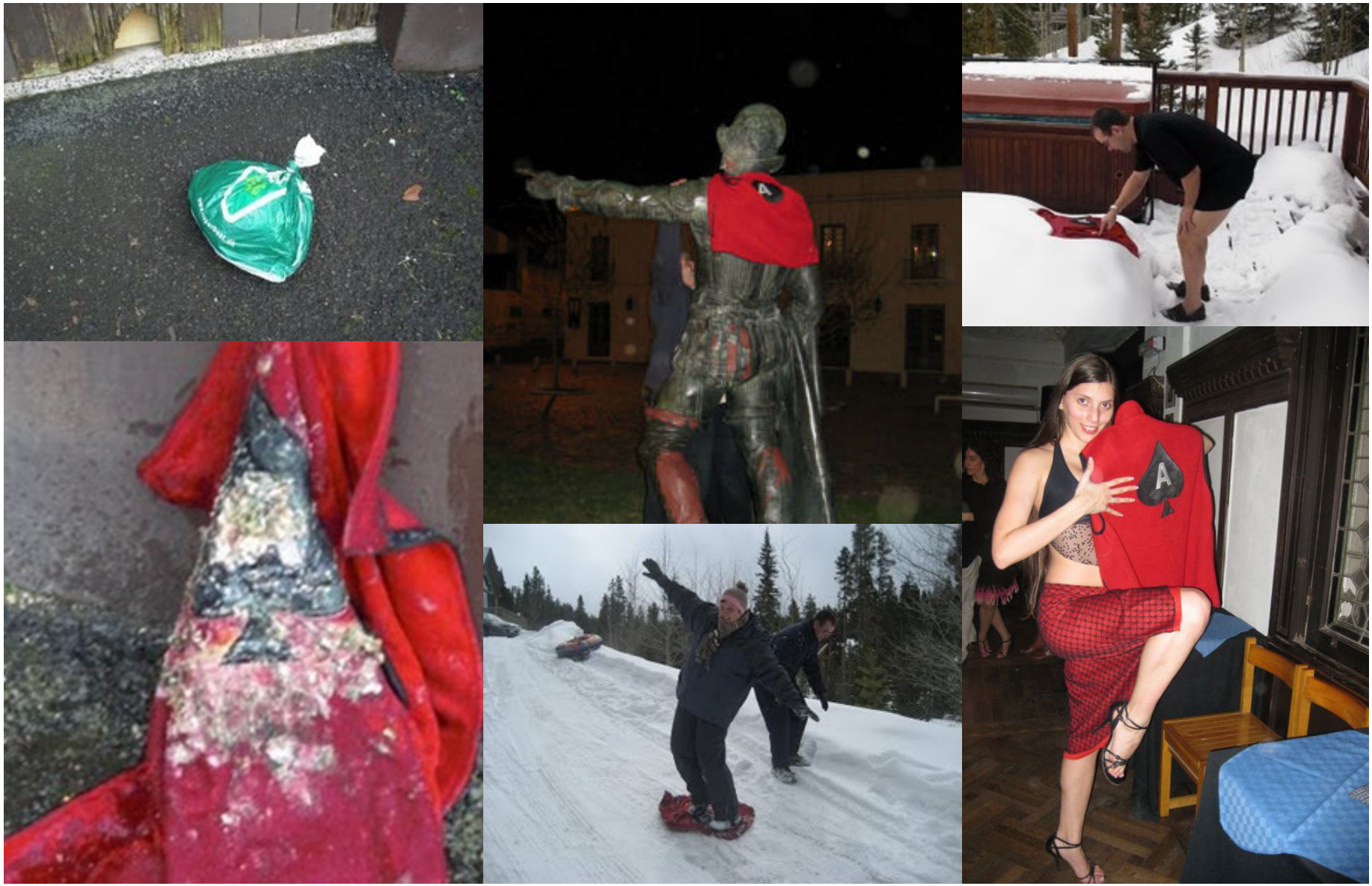
LAD Tour

Morgan's Library: www.morganslibrary.org



Stanley's Travels

Stanley's Travels



LAD Tour

Stanley's Friends

One Take-Away

If it is not necessary ... don't do it!

Syllabus

- What is a VLDB
- Partitioning Options
- Cost Based Optimizer
- Resource Utilization
- Parallel Access
- Metadata Staging
- Developer Practices
- Stats Collection
- Storage

Discussion

What is a VLDB

Define Large

- The size of the storage footprint?
- The size of the queries?
- The size of the DML statements?
- The number of transactions per second?
- The number of simultaneously connected users?

WORKLOAD REPOSITORY report for

DB Name	DB Id	Instance	Inst num	Startup Time	Release	RAC
OPM01P	782247420	opm01p6	6	18-Aug-10 21:08	11.1.0.7.0	YES

Host Name	Platform	CPUs	Cores	Sockets	Memory (GB)
usp9004b	Solaris[tm] OE (64-bit)	128	64	16	503.16

	Snap Id	Snap Time	Sessions	Cursors/Session
Begin Snap:	7037	15-Sep-10 13:00:18	406	7.5
End Snap:	7038	15-Sep-10 14:01:28	318	8.5
Elapsed:		61.17 (mins)		
DB Time:		6,076.88 (mins)		

Are my customer's happy?

Instance Efficiency Percentages (Target 100%)

Buffer Nowait %:	99.80	Redo NoWait %:	100.00
Buffer Hit %:	97.34	In-memory Sort %:	99.99
Library Hit %:	99.97	Soft Parse %:	98.79
Execute to Parse %:	99.29	Latch Hit %:	99.57
Parse CPU to Parse Elapsd %:	0.00	% Non-Parse CPU:	96.60

No!

Foreground Wait Events

- s - second, ms - millisecond - 1000th of a second
- Only events with Total Wait Time (s) >= .001 are shown
- ordered by wait time desc, waits desc (idle events last)
- %Timeouts: value of 0 indicates value was < .5%. Value of null is truly 0

Event	Waits	%Time -outs	Total Wait Time (s)	Avg wait (ms)	Waits /txn	% DB time
cursor: pin S wait on X	559,981	100	11,250	20	15.41	23.77
db file sequential read	1,824,756	0	4,231	2	50.23	8.94
unspecified wait event	462,648	0	1,996	4	12.73	4.22
gc buffer busy acquire	322,335	0	1,342	4	8.87	2.84
external table misc IO	57,038	0	1,131	20	1.57	2.39
db file scattered read	69,467	0	989	14	1.91	2.09
PX Deq: reap credit	68,532,223	100	630	0	1,886.33	1.33
IPC send completion sync	3,694,966	98	389	0	101.70	0.82
PX Deq: Slave Session Stats	132,529	12	350	3	3.65	0.74
external table read	96,704	0	339	4	2.66	0.72
PX Nsq: PQ load info query	1,668	97	328	197	0.05	0.69
read by other session	91,147	0	300	3	2.51	0.63
latch free	4,480	0	297	66	0.12	0.63
gc cr grant 2-way	417,285	0	272	1	11.49	0.57
DFS lock handle	13,528	11	261	19	0.37	0.55
gc cr multi block request	547,105	0	217	0	15.06	0.46
enq: PS - contention	186,170	56	201	1	5.12	0.42
kksfbc child completion	2,097	100	138	66	0.06	0.29

No!

Dictionary Cache Stats

- "Pct Misses" should be very low (< 2% in most cases)
- "Final Usage" is the number of cache entries being used

Cache	Get Requests	Pct Miss	Scan Reqs	Pct Miss	Mod Reqs	Final Usage
dc_awr_control	94	1.06	0		1	1
dc_constraints	75	81.33	0		75	268
dc_database_links	12,557	0.00	0		0	3
dc_files	18,320	0.00	0		0	482
dc_global_oids	414,904	0.00	0		0	355
dc_histogram_data	303,148	0.46	0		307	146,041
dc_histogram_defs	4,462,445	0.10	0		714	496,635
dc_object_grants	23,089	0.00	0		0	1,094
dc_objects	2,748,959	0.45	0		2,384	281,443
dc_partition_scns	3	0.00	0		0	5
dc_profiles	12,918	0.00	0		0	4
dc_rollback_segments	6,824,069	0.00	0		0	1,662
dc_segments	242,656	4.68	0		9,231	877,062
dc_sequences	396	3.28	0		396	33
dc_table_scns	43	37.21	0		0	8
dc_tablespace_quotas	8,495	21.27	0		2,365	66
dc_tablespaces	11,893,072	0.00	0		0	38
dc_users	10,119,305	0.00	0		15	6,827
global database name	8,789	0.00	0		0	2
outstanding_alerts	182	75.82	0		1	26

Discussion

Partitioning Options

Oracle's Online Docs

Oracle Database Search Results: VLDB

VLDB Search

Oracle Database 11g Release 2 (11.2) documentation All of Oracle.com

Results 1 to 10 of about 90 for **VLDB**.

VLDB and Partitioning
A very large database has no minimum absolute size.
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CHAPTER Introduction to Very Large Databases
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SQL Language Reference • Search this book • Hide this book • Contents • PDF

TASK Striping Using Oracle ASM
Oracle Automatic Storage Management (Oracle ASM) always stripes across all devices presented to it as a disk group.
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CHAPTER Storage Management for VLDBs
Storage performance in data warehouse environments often translates into I/O throughput (MB/s).
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Scalability and Manageability
A very important characteristic of a **VLDB** is its large size.
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1999

- Simple
  - Partition by Hash
  - Partition by Range
- Composite
  - Range - Hash

2001

- 9.0.#
  - Partition by List
- 9.2.0
  - Range – List Composite

2004

- 10gR1
  - Nothing New
- 10gR2
  - Nothing New

2007

- Partition by Interval
- Partition by Reference
- Partition by System
- Partition by Virtual Column
- New Composite Partitioning Options
  - Hash – Hash
  - List – Hash
  - List – List
  - List – Range
  - Range – Range

Optimizing Partitioning

- Subpartition
  - Have a thorough understanding of partition pruning
  - Partition-subpartition into as many buckets as logically possible
- Do not use one large tablespace
- Set tablepaces to READ ONLY when you can
- Set partitions to READ ONLY when you can
- Understand stats collection and collection bugs
- Make Instance ID part of the partition key
  or
- Make Instance ID part of the primary key
- Do not make partition keys the leading column in an index

Partition Indexing and Constraints

- Local, not global
  - In 11gR2 set local indexes not used to UNUSABLE
- Be very careful using bitmap indexes
  - How much redo is generated by updating one byte in one row?
- Use Function Based Indexes to avoid indexing values that will never be used
- Make column NOT NULL if possible
- Do not make primary key columns NOT NULL
- Index foreign keys to minimize locking (perhaps)

Partition Indexing in 11gR2

```
CREATE TABLE range_part (
prof_history_id NUMBER(10),
record_date     DATE NOT NULL)
PARTITION BY RANGE (record_date) (
PARTITION yr0 VALUES LESS THAN (TO_DATE('01-JAN-2010','DD-MON-YYYY')),
PARTITION yr1 VALUES LESS THAN (TO_DATE('01-JAN-2011','DD-MON-YYYY')),
PARTITION yr2 VALUES LESS THAN (TO_DATE('01-JAN-2012','DD-MON-YYYY')),
PARTITION yr9 VALUES LESS THAN (MAXVALUE));

CREATE INDEX ix_range_part_phid
ON range_part(prof_history_id)
LOCAL UNUSABLE;

ALTER INDEX ix_range_part_phid REBUILD PARTITION yr1;

ALTER INDEX ix_range_part_phid REBUILD PARTITION yr2;

ALTER INDEX ix_range_part_phid MODIFY PARTITION yr1 UNUSABLE;
```

Discussion

Cost Based Optimizer
dbms_xplan.display

Optimizer Plans (the way it was)

```
SELECT DISTINCT E1_2.OBJECT_ID
   FROM PMCM.ELEMENT_DETAIL E1_1, PMCM.ELEMENT_DETAIL E1_2, PMCM.MARK_NETW_HIERARCHY H1,
        PMCM.ELEMENT_DETAIL E2_1, PMCM.ELEMENT_DETAIL E2_2, PMCM.MARK_NETW_HIERARCHY H2
   WHERE E1_1.OBJECT_ID = H1.PARENT_ID
     AND E1_2.OBJECT_ID = H1.OBJECT_ID
     AND E2_1.OBJECT_ID = H2.PARENT_ID
     AND E2_2.OBJECT_ID = H2.OBJECT_ID
     AND E1_1.CURRENT_IND = 'Y' AND E2_1.CURRENT_IND = 'Y'
     AND E2_1.CURRENT_IND = 'Y' AND E2_2.CURRENT_IND = 'Y'
     AND H1.CURRENT_IND = 'Y' AND H2.CURRENT_IND = 'Y'
     AND H1.HIERARCHY_TYPE = 'NETWORK' AND H2.HIERARCHY_TYPE = 'NETWORK'
     AND H1.PARENT_TYPE IN ('BSC','RNC')  AND H2.PARENT_TYPE IN ('BSC','RNC')
     AND E2_2.ELEMENT_TYPE = 'CELL' AND E1_2.ELEMENT_TYPE = 'CELL'
     AND H1.PARENT_TYPE IN ('BSC','RNC')
     AND E1_1.ELEMENT_NAME = E2_1.ELEMENT_NAME
     AND E1_1.ELEMENT_ID = E2_1.ELEMENT_ID
     AND E1_2.ELEMENT_NAME = E2_2.ELEMENT_NAME
     AND E1_2.ELEMENT_ID = E2_2.ELEMENT_ID
     AND E1_2.USEID LIKE '*%' AND E2_2.USEID NOT LIKE '*%';
```

Id	Operation	Name	Rows	Bytes	TempSpc	Cost (%CPU)	Time	Pstart	Pstop
0	SELECT STATEMENT		1	78		74M (40)	50:54:42		
1	TEMP TABLE TRANSFORMATION								
2	LOAD AS SELECT								
3	PARTITION RANGE ALL		22M	1111M		38153 (11)	00:01:34	1	29
* 4	TABLE ACCESS FULL	ELEMENT_DETAIL	22M	1111M		38153 (11)	00:01:34		
5	LOAD AS SELECT								
6	PARTITION HASH ALL		337K	9231K		3514 (15)	00:00:09	1	16
* 7	TABLE ACCESS FULL	MARK_NETW_HIERARCHY	337K	9231K		3514 (15)	00:00:09		
8	SORT AGGREGATE		1	78					
* 9	HASH JOIN		927G	65T	534M	74M (40)	50:53:00		
10	VIEW		22M	277M		16808 (12)	00:00:42		
11	TABLE ACCESS FULL	SYS_TEMP_0FDA7485F_6A66C42E	22M	1111M		16808 (12)	00		
* 12	HASH JOIN		21G	1272G	534M	1616K (43)	01:06:04		
13	VIEW		22M	277M		16808 (12)	00:00:42		
14	TABLE ACCESS FULL	SYS_TEMP_0FDA7485F_6A66C42E	22M	1111M		16808 (12)	0		
* 15	HASH JOIN		476M	23G	524M	97327 (22)	00:03:59		
* 16	HASH JOIN		10M	401M	8704K	34520 (10)	00:01:25		
* 17	HASH JOIN		234K	5948K	8256K	783 (10)	00:00:02		
18	VIEW		337K	4286K		142 (14)	00:00:01		
19	TABLE ACCESS FULL	SYS_TEMP_0FDA74860_6A66C42E	337K	3956K		142 (14)	00:00:01		
20	VIEW		337K	4286K		142 (14)	00:00:01		
21	TABLE ACCESS FULL	SYS_TEMP_0FDA74860_6A66C42E	337K	3956K		142 (14)	00:00:01		
22	VIEW		22M	277M		16808 (12)	00:00:42		
23	TABLE ACCESS FULL	SYS_TEMP_0FDA7485F_6A66C42E	22M	1111M		16808 (12)	00:00:42		
24	VIEW		22M	277M		16808 (12)	00:00:42		
25	TABLE ACCESS FULL	SYS_TEMP_0FDA7485F_6A66C42E	22M	1111M		16808 (12)	0		

Optimizer Plans (tuning gone terribly wrong)

Id	Operation	Name	Rows	Bytes	TempSpc	Cost (%CPU)	Time	Pstart	Pstop
0	SELECT STATEMENT		1	78		14T(100)	999:59:59		
1	TEMP TABLE TRANSFORMATION								
2	LOAD AS SELECT								
3	PARTITION RANGE ALL		22M	1111M		38153 (11)	00:01:34	1	29
* 4	TABLE ACCESS FULL	ELEMENT_DETAIL	22M	1111M		38153 (11)	00:01:34		
5	LOAD AS SELECT								
6	PARTITION HASH ALL		337K	9231K		3514 (15)	00:00:09	1	16
* 7	TABLE ACCESS FULL	MARK_NETW_HIERARCHY	337K	9231K		3514 (15)	00:00:09		
8	SORT AGGREGATE		1	78					
9	MERGE JOIN		471P	15E		14T(100)	999:59:59		
10	MERGE JOIN		10P	616P		694G (81)	999:59:59		
11	MERGE JOIN		231T	10P		377G (64)	999:59:59		
12	SORT JOIN		334T	11P	28P	377G (64)	999:59:59		
13	MERGE JOIN CARTESIAN		334T	11P		140G (14)	999:59:59		
* 14	HASH JOIN		989M	23G	534M	96010 (38)	00:03:56		
15	VIEW		22M	277M		16808 (12)	00:00:42		
16	TABLE ACCESS FULL	SYS_TEMP_0FDA7485B_6A66C42E	22M	1111M		16808 (12)	00:00:42		
17	VIEW		22M	277M		16808 (12)	00:00:42		
18	TABLE ACCESS FULL	SYS_TEMP_0FDA7485B_6A66C42E	22M	1111M		16808 (12)	00:00:42		
19	BUFFER SORT		337K	4286K		140G (14)	999:59:59		
20	VIEW		337K	4286K		142 (14)	00:00:01		
21	TABLE ACCESS FULL	SYS_TEMP_0FDA7485C_6A66C42E	337K	3956K		142 (14)	00:00:01		
* 22	SORT JOIN		337K	4286K	12M	844 (14)	00:00:03		
23	VIEW		337K	4286K		142 (14)	00:00:01		
24	TABLE ACCESS FULL	SYS_TEMP_0FDA7485C_6A66C42E	337K	3956K		142 (14)	00:00:01		
* 25	SORT JOIN		22M	277M	855M	65084 (16)	00:02:40		
26	VIEW		22M	277M		16808 (12)	00:00:42		
27	TABLE ACCESS FULL	SYS_TEMP_0FDA7485B_6A66C42E	22M	1111M		16808 (12)	0		
* 28	SORT JOIN		22M	277M	855M	65084 (16)	00:02:40		
29	VIEW		22M	277M		16808 (12)	00:00:42		
30	TABLE ACCESS FULL	SYS_TEMP_0FDA7485B_6A66C42E	22M	1111M		16808 (12)	0		

Optimizer Plans (making it better)

```
WITH ed AS (SELECT object_id, element_id, element_name, element_type, useid
            FROM pmcm.element_detail
            WHERE element_type = 'CELL'
            AND current_ind = 'Y'),
     mnh AS (SELECT parent_id, object_id
             FROM pmcm.mark_netw_hierarchy
             WHERE current_ind = 'Y'
             AND hierarchy_type = 'NETWORK'
             AND parent_type IN ('BSC', 'RNC'))
SELECT COUNT(*)
FROM ed e1_1, ed e1_2, ed e2_1, ed e2_2, mnh h1, mnh h2
WHERE e1_1.object_id = h1.parent_id AND   e1_2.object_id = h1.object_id
AND   e2_1.object_id = h2.parent_id AND   e2_2.object_id = h2.object_id
AND   e1_1.element_name = e2_1.element_name
AND   e1_1.element_id = e2_1.element_id
AND   e1_2.element_name = e2_2.element_name
AND   e1_2.element_id = e2_2.element_id
AND   e1_2.useid LIKE '*%'
AND   e2_2.useid NOT LIKE '*%';
```

```
-----------------------------------------------------------------------------------------------------------------------
| Id  | Operation                                | Name                | Rows  | Bytes |TempSpc| Cost (%CPU)| Time     |
-----------------------------------------------------------------------------------------------------------------------
|   0 | SELECT STATEMENT                         |                     |     1 |   214 |       |   100K  (6)| 00:04:08 |
|   1 |  HASH UNIQUE                             |                     |     1 |   214 |       |   100K  (6)| 00:04:08 |
|*  2 |   HASH JOIN                              |                     |     1 |   214 |    12M|   100K  (6)| 00:04:08 |
|   3 |    PARTITION HASH ALL                    |                     |   337K|  9231K|       |  3514  (15)| 00:00:09 |
|*  4 |     TABLE ACCESS FULL                    | MARK_NETW_HIERARCHY |   337K|  9231K|       |  3514  (15)| 00:00:00 |
|*  5 |    HASH JOIN                             |                     |   207K|    36M|    22M| 95860   (6)| 00:03:56 |
|   6 |     PARTITION RANGE ALL                  |                     |   586K|    15M|       | 16233   (2)| 00:00:40 |
|   7 |      TABLE ACCESS BY LOCAL INDEX ROWID   | ELEMENT_DETAIL      |   586K|    15M|       | 16233      | ??:??:?? |
|*  8 |       INDEX SKIP SCAN                    | ED_ET_TECH_CI       |   586K|       |       | 12791   (1)| 00:00:3? |
|*  9 |     HASH JOIN                            |                     |   207K|    31M|    22M| 77982   (7)| 00:03:12 |
|  10 |      PARTITION RANGE ALL                 |                     |   586K|    15M|       | 16233   (2)| 00:00:40 |
|  11 |       TABLE ACCESS BY LOCAL INDEX ROWID  | ELEMENT_DETAIL      |   586K|    15M|       | 16233      | ??:??:?? |
|* 12 |        INDEX SKIP SCAN                   | ED_ET_TECH_CI       |   586K|       |       | 12791   (1)| 00:00:?? |
|* 13 |      HASH JOIN                           |                     |   179K|    22M|    12M| 60372   (8)| 00:02:29 |
|  14 |       PARTITION HASH ALL                 |                     |   337K|  9231K|       |  3514  (15)| 00:00:09 |
|* 15 |        TABLE ACCESS FULL                 | MARK_NETW_HIERARCHY |   337K|  9231K|       |  3514  (15)| 00:00:?? |
|* 16 |       HASH JOIN                          |                     |   184K|    17M|    10M| 55886   (8)| 00:02:18 |
|  17 |        PARTITION RANGE ALL               |                     |   184K|  9008K|       | 37137   (8)| 00:01:32 |
|* 18 |         TABLE ACCESS FULL                | ELEMENT_DETAIL      |   184K|  9008K|       | 37137   (8)| 00:01:32 |
|  19 |        PARTITION RANGE ALL               |                     |   576K|    28M|       | 17383   (8)| 00:00:43 |
|* 20 |         TABLE ACCESS BY LOCAL INDEX ROWID| ELEMENT_DETAIL      |   576K|    28M|       | 17383   (8)| ??:??:?? |
|* 21 |          INDEX SKIP SCAN                 | ED_ET_TECH_CI       |   583K|       |       | 13939   (9)| 00:00:35 |
-----------------------------------------------------------------------------------------------------------------------
```

Discussion

Resource Utilization

Rationing Resource

- Resource Manager
- Consumer Groups
- Services
  - You do not need RAC to take advantage of services
  - Map services to resource plans

Resource Utilization

```
SQL> SELECT resource_name, current_utilization, max_utilization, limit_value
  2  FROM v$resource_limit
  3  ORDER BY 1;
RESOURCE_NAME                  CURRENT_UTILIZATION MAX_UTILIZATION LIMIT_VALU
------------------------------ ------------------- --------------- ----------
branches                                         2              24  UNLIMITED
cmtcallbk                                        0               3  UNLIMITED
dml_locks                                       88              88  UNLIMITED
enqueue_locks                                  980            2195      62224
enqueue_resources                              827            1320  UNLIMITED
gcs_resources                               285534          791769     972477
gcs_shadows                                 194845          394603     972477
ges_big_msgs                                    68             337  UNLIMITED
ges_cache_ress                               51272           57938  UNLIMITED
ges_locks                                        0               0  UNLIMITED
ges_procs                                      414            1124       2007
ges_reg_msgs                                   617            1482  UNLIMITED
ges_ress                                         0               0  UNLIMITED
ges_rsv_msgs                                     0               1       1000
k2q_locks                                        3              20  UNLIMITED
max_rollback_segments                          234             236      65535
max_shared_servers                               1               1  UNLIMITED
parallel_max_servers                           647             990       3600
processes                                      417            1129       2000
sessions                                       393            1438       2500
sort_segment_locks                             123             348  UNLIMITED
temporary_table_locks                            0               5  UNLIMITED
transactions                            4282503752      4294967295  UNLIMITED
```

Discussion

Parallel Access

Parallel Issues

- Minimize the urge to run everything in parallel
- In 11gR2 set
  - PARALLEL_DEGREE_LIMIT
    - Limit the degree of parallelism used to ensure parallel server processes do not flood the system
  - PARALLEL_DEGREE_POLICY
    - See Arup Nanda's article in Oracle Magazine
  - PARALLEL_FORCE LOCAL
    - On a RAC cluster force parallel query slaves to stay on the local instance and not parallelize across nodes increasing interconnect traffic
  - To use AutomaticDOP you must run CALIBRATE_IO
  - FIFO queue can become a denial of service attack
- DBMS_STATS and a lot of code is often configured by developers with a parallel degree > 1
- Beware of end users with a little knowledge

Discussion

Metadata Staging

Staging Issues

- Loaders need to store information about what they do
  - Especially if updates or deletes take place
  - Especially if summarizations (aggregations) are run
- Materialized Views
- Use first level summaries to generate second level summaries: Do not go back to the raw data

Discussion

Developer Practices

Some of us are not afraid to show ours in public

This Is One Query (page 1 of 5)

Complete List of SQL Text

SQL Id	SQL Text
0cjpvvqy854kh	SELECT 'ERICSSON_CSCORE.EOS' AS TABLENAME, sumday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2) accuracy from (select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then MSC end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then MSC end) ontime_count, count (*) num_of_rows from ERICSSON_CSCORE.EOS where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60)rawt, (select max(datetime)sumday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then MSC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(s ysdate)+7/24 then MSC end) summarised_ontime_count, sum(entries) num_of_sumrows from ERICSSON_CSCORE.EOS_DY where datetime = trunc(sysdate)-1)sumt union all SELECT 'ERICSSON_CSCORE.MSCSTATS' AS TABLENAME, sumday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2) accuracy from (select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then MSC end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then MSC end) ontime_count, count (*) num_of_rows from ERICSSON_CSCORE.MSCSTATS where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60)rawt, (select max(datetime)sumday, count(dist inct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then MSC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then MSC end) summarised_ontime_count, sum(entries) num_of_sumrows from ERICSSON_CSCORE.MSCSTATS_DY where datetime = trunc(sysdate)-1)sumt union all SELECT 'ERICSSON_CSCORE.MTRAFTYPE' AS TABLENAME, sumday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2) accuracy from (select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then MSC end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then MSC end) ontime_count , count (*) num_of_rows from ERICSSON_CSCORE.MTRAFTYPE where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60)rawt, (select max(datetime)sumday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then MSC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then MSC end) summarised_ontime_count, sum(entries) num_of_sumrows from ERICSSON_CSCORE.MTRAFTYPE_DY where datetime = trunc(sysdate)-1)sumt union all SELECT 'ERICSSON_GERAN.CELLGPRS' AS TABLENAME, sumday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2) accuracy from (select count(distinct case when trunc(d atetime_ins, 'mi') > trunc(sysdate)+3/24 then BSC end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then BSC end) ontime_count, count (*) num_of_rows from ERICSSON_GERAN.CELLGPRS where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60)rawt, (select max(datetime)sumday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then BSC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then BSC end) summarised_ontime_count, sum(entries) num_of_sumrows from ERICSSON_GERAN.CELLGPRS_DY where datetime = trunc(sysdate)-1)sumt union all SELECT 'ERICSSON_GERAN.CELLSTATS' AS TABLENAME, sumday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_ count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2) accuracy from (select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then BSC end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then BSC end) ontime_count, count (*) num_of_rows from ERICSSON_GERAN.CELLSTATS where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60)rawt, (select max(datetime)sumday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then BSC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then BSC end) summarised_ontime_count, sum(entries) num_of_sumrows from ERICSSON_GERAN.CELLSTATS_DY where datetime = trunc(sysdate)-1)sumt union all SELECT 'ERICSSON_PSCORE.MM' AS TABLENAME, sumday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count,

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(ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count,
2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count curr ent_raw_elements,
summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff,
percent(num_of_sumrows, num_of_rows, 2) accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then SGSNID end) late_count, count(distinct case when trunc(datetime_ins, 'mi') <
trunc(sysdate)+3/24 then SGSNID end) ontime_count, count (*) num_of_rows from ERICSSON_PSCORE.MM where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct case
when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then SGSNID end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then SGSNID end) summarised_ontime_count, sum(entries)
num_of_sumrows from ERICSSON_PSCORE.MM_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT 'ERICSSON_PSCORE.SGSNSTAT' AS TABLENAME, sunday, CASE WHEN percent(summarised_ontime_count,
(ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0
else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+la te_count, 2)percentage_of_total_by5am,
percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count
current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2)
accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then SGSNID end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then SGSNID end) ontime_count,
count (*) num_of_rows from ERICSSON_PSCORE.SGSNSTAT where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct case when trunc(datetime_ins, 'mi') >
trunc(sysdate)+7/24 then SGSNID end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then SGSNID end) summarised_ontime_count, sum(entries) num_of_sumrows from
ERICSSON_PSCORE.SGSNSTAT_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT 'ERICSSON_UTRAN.RBS_CARRIER' AS TABLENAME, sunday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count),
2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count- late_count), 2) < 0 then 0 else
100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am,
percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count
current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2)
accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then NODEB end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then NODEB end) ontime_count,
count (*) num_of_rows from ERICSSON_UTRAN.RBS_CARRIER where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct case when trunc(datetime_ins, 'mi') >
trunc(sysdate)+7/24 then NODEB end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then NODEB end) summarised_ontime_count, sum(entries) num_of_sumrows from
ERICSSON_UTRAN.RBS_CARRIER_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT 'ERICSSON_UTRAN.RBS_EDCHRES' AS TABLENAME, sunday, CASE WHEN percent(summarised_ontime_count, (ontime_count-l
ate_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else
100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am,
percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count
current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2)
accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then NODEB end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then NODEB end) ontime_count,
count (*) num_of_rows from ERICSSON_UTRAN.RBS_EDCHRES where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct case when trunc(datetime_ins, 'mi') >
trunc(sysdate)+7/24 then NODEB end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then NODEB end) summarised_ontime_count, sum(entries) num_of_sumrows from ERICSSON_UT
RAN.RBS_EDCHRES_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT 'ERICSSON_UTRAN.RBS_HSDSCHRES' AS TABLENAME, sunday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100
THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else
100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am,
percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count
current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2)
accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then NODEB end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then NODEB end) ontime_count,
count (*) num_of_rows from ERICSSON_UTRAN.RBS_HSDSCHRES where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct case when trunc(datetime_ins, 'mi') >
trunc(sysdate)+7/24 then NODEB e nd) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then NODEB end) summarised_ontime_count, sum(entries) num_of_sumrows from
ERICSSON_UTRAN.RBS_HSDSCHRES_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT 'ERICSSON_UTRAN.RNC_IURLINK' AS TABLENAME, sunday, CASE WHEN percent(summarised_ontime_count, (ontime_count-
late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else
100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am,
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percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count
current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2)
accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then RNC end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then RNC end) ontime_count, count (*)
num_of_rows from ERICSSON_UTRAN.RNC_IURLINK where dateti me between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24
then RNC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then RNC end) summarised_ontime_count, sum(entries) num_of_sumrows from ERICSSON_UTRAN.RNC_IURLINK_DY
where datetime = trunc(sysdate)-1 )sumt union all SELECT 'ERICSSON_UTRAN.RNC_RNCFUNC' AS TABLENAME, sunday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE
percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count,
(ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count,
ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count
SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2) accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') >
trunc(sysdate)+3/24 then RNC end) late_c ount, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then RNC end) ontime_count, count (*) num_of_rows from ERICSSON_UTRAN.RNC_RNCFUNC where datetime
between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then RNC end) summarised_late_count, count(distinct case when
trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then RNC end) summarised_ontime_count, sum(entries) num_of_sumrows from ERICSSON_UTRAN.RNC_RNCFUNC_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT
'ERICSSON_UTRAN.RNC_UCELL' AS TABLENAME, sunday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END
percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed,
percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count
current_raw_elements, summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-
late_count availabl e_at_cutoff, percent(num_of_sumrows, num_of_rows, 2) accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then RNC end) late_count, count(distinct case when
trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then RNC end) ontime_count, count (*) num_of_rows from ERICSSON_UTRAN.RNC_UCELL where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select
max(datetime)sunday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then RNC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then RNC end)
summarised_ontime_count, sum(entries) num_of_sumrows from ERICSSON_UTRAN.RNC_UCELL_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT 'NORTEL_CSCORE.BASE_OM' AS TABLENAME, sunday, CASE WHEN
percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count,
(ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count,
2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_
late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows,
num_of_rows, 2) accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then MSC end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then MSC end)
ontime_count, count (*) num_of_rows from NORTEL_CSCORE.BASE_OM where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct case when trunc(datetime_ins, 'mi') >
trunc(sysdate)+7/24 then MSC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then MSC end) summarised_ontime_count, sum(entries) num_of_sumrows from
NORTEL_CSCORE.BASE_OM_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT 'NORTEL_CSCORE.C7SP' AS TABLENAME, sunday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN
100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else
100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_c
ount+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count current_summary_elements,
summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2) accuracy from ( select
count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then MSC end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then MSC end) ontime_count, count (*) num_of_rows from
NORTEL_CSCORE.C7SP where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then MSC end)
summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then MSC end) summarised_ontime_count, sum(entries) num_of_sumrows from NORTEL_CSCORE.C7SP_DY where datetime =
trunc(sysdate)-1 )sumt union all SELECT 'NORTEL_CSCORE.CCS7' AS TABLENAME, sunday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count,
(ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end
percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2)
current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM,
late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2) accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then MSC end)
```

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```
late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then MSC end) ontime_count, count (*) num_of_rows from NORTEL_CSCORE.CCS7 where datetime between trunc(sysdate)-1 and
trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then MSC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') <
trunc(sysdate)+7/24 then MSC end) summarised_ontime_count, sum(entries) num_of_sumrows from NORTEL_CSCORE.CCS7_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT 'NORTEL_CSCORE.LOCATIONAREACODE' AS
TABLENAME, sunday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cut off, case when
100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count,
ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements,
summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff,
percent(num_of_sumrows, num_of_rows, 2) accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then MSC end) late_count, count(distinct case when trunc(datetime_ins, 'mi') <
trunc(sysdate)+3/24 then MSC end) ontime_count, count (*) num_of_rows from NORTEL_CSCORE.LOCATIONAREACODE where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday,
count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then MSC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then MSC end) summarised_ontime_count,
sum(entries) num_of_sumrows from NORTEL_CSCORE.LOCATIONAREACODE_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT 'NORTEL_CSCORE.MSCCP_CP' AS TABLENAME, sund ay, CASE WHEN
percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count,
(ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count,
2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements,
summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff,
percent(num_of_sumrows, num_of_rows, 2) accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then MSC end) late_count, count(distinct case when trunc(datetime_ins, 'mi') <
trunc(sysdate)+3/24 then MSC end) ontime_count, count (*) num_of_rows from NORTEL_CSCORE.MSCCP_CP where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct
case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then MSC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then MSC end) summarised_ontime_c ount, sum(entries)
num_of_sumrows from NORTEL_CSCORE.MSCCP_CP_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT 'NORTEL_CSCORE.MSCCP' AS TABLENAME, sunday, CASE WHEN percent(summarised_ontime_count, (ontime_count-
late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else
100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am,
percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count
current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2)
accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then MSC end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then MSC end) ontime_count, count (*)
num_of_rows from NORTEL_CSCORE.MSCCP where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(s ysdate)+7/24 then
MSC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then MSC end) summarised_ontime_count, sum(entries) num_of_sumrows from NORTEL_CSCORE.MSCCP_DY where datetime =
trunc(sysdate)-1 )sumt union all SELECT 'NORTEL_CSCORE.TRKGRP' AS TABLENAME, sunday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count,
(ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end
percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2)
current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM,
late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2) accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then MSC end)
late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then MSC end) ontime_count, count (*) num_of_rows from NORTEL_CSCORE.TRKGRP where dateti me between trunc(sysdate)-1 and
trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then MSC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') <
trunc(sysdate)+7/24 then MSC end) summarised_ontime_count, sum(entries) num_of_sumrows from NORTEL_CSCORE.TRKGRP_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT 'NORTEL_CSCORE.VLR6' AS TABLENAME,
sunday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when
100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count,
ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements,
summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff,
percent(num_of_sumrows, num_of_rows, 2) accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then MSC end) late_count, count(d istinct case when trunc(datetime_ins, 'mi') <
trunc(sysdate)+3/24 then MSC end) ontime_count, count (*) num_of_rows from NORTEL_CSCORE.VLR6 where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sunday, count(distinct case
```

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```
when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then MSC end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then MSC end) summarised_ontime_count, sum(entries)
num_of_sumrows from NORTEL_CSCORE.VLR6_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT 'NORTEL_PSCORE.GSCGMM' AS TABLENAME, sumday, CASE WHEN percent(summarised_ontime_count, (ontime_count-
late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else
100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am,
percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count
current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumro ws, num_of_rows, 2)
accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then SGSN end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then SGSN end) ontime_count, count
(*) num_of_rows from NORTEL_PSCORE.GSCGMM where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sumday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24
then SGSN end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then SGSN end) summarised_ontime_count, sum(entries) num_of_sumrows from NORTEL_PSCORE.GSCGMM_DY where
datetime = trunc(sysdate)-1 )sumt union all SELECT 'NORTEL_PSCORE.GSCSM_ACT' AS TABLENAME, sumday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE
percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count,
(ontime_count-late_count), 2) end percent_of_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count,
ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements, summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count
SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2) accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') >
trunc(sysdate)+3/24 then SGSN end) late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then SGSN end) ontime_count, count (*) num_of_rows from NORTEL_PSCORE.GSCSM_ACT where datetime
between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sumday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then SGSN end) summarised_late_count, count(distinct case when
trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then SGSN end) summarised_ontime_count, sum(entries) num_of_sumrows from NORTEL_PSCORE.GSCSM_ACT_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT
'NORTEL_PSCORE.GSCSM' AS TABLENAME, sumday, CASE WHEN percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END
percent_of_cutoff, case when 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_of_cutoff_not_summed,
percent(summarised_ontime_count, ontime_count+late_count, 2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count
current_raw_elements, summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-
late_count available_at_cutoff, percent(num_of_sumrows, num_of_rows, 2) accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then SGSN end) late_count, count(distinct case when
trunc(datetime_ins, 'mi') < trunc(sysdate)+3/24 then SGSN end) ontime_count, count (*) num_of_rows from NORTEL_PSCORE.GSCSM where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select
max(datetime)sumday, count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then SGSN end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then SGSN end)
summarised_ontime_count, sum(entries) num_of_sumrows from NORTEL_PSCORE.GSCSM_DY where datetime = trunc(sysdate)-1 )sumt union all SELECT 'NORTEL_PSCORE.GSDSTATS' AS TABLENAME, sumday, CASE WHEN
percent(summarised_ontime_count, (ontime_count-late_count), 2) > 100 THEN 100 ELSE percent(summarised_ontime_count, (ontime_count-late_count), 2) END percent_of_cutoff, case when 100-percent(summarised_ontime_count,
(ontime_count-late_count), 2) < 0 then 0 else 100-percent(summarised_ontime_count, (ontime_count-late_count), 2) end percent_o f_cutoff_not_summed, percent(summarised_ontime_count, ontime_count+late_count,
2)percentage_of_total_by5am, percent(summarised_ontime_count+summarised_late_count, ontime_count+late_count, 2) current_percentage, ontime_count+late_count current_raw_elements,
summarised_ontime_count+summarised_late_count current_summary_elements, summarised_ontime_count-summarised_late_count SUM_ELEMENTS_AT5AM, late_count late_raw_elements, ontime_count-late_count available_at_cutoff,
percent(num_of_sumrows, num_of_rows, 2) accuracy from ( select count(distinct case when trunc(datetime_ins, 'mi') > trunc(sysdate)+3/24 then SGSN end) late_count, count(distinct case when trunc(datetime_ins, 'mi') <
trunc(sysdate)+3/24 then SGSN end) ontime_count, count (*) num_of_rows from NORTEL_PSCORE.GSDSTATS where datetime between trunc(sysdate)-1 and trunc(sysdate)-1/24/60 )rawt, ( select max(datetime)sumday, count(distinct
case when trunc(datetime_ins, 'mi') > trunc(sysdate)+7/24 then SGSN end) summarised_late_count, count(distinct case when trunc(datetime_ins, 'mi') < trunc(sysdate)+7/24 then SGSN end) summarised_ontime_count, sum(entries)
num_of_sumrows from NORTEL_PSCORE.GSDSTATS_DY where datetime = trunc(sysdate)-1 )sumt
```

Unnecessary SQL

```
PROCEDURE get_records(pCustID IN NUMBER) AUTHID DEFINER IS
 vCount PLS_INTEGER;
BEGIN
  SELECT COUNT(*)
  INTO vCount
  FROM customers
  WHERE cust_id = pCustID;

  IF vCount > 0 THEN
    process_customer_recs(pCustID);
  END IF;
END get_records;
/
```

```
PROCEDURE process_customer_recs(pCustID IN NUMBER) AUTHID DEFINER IS
 CURSOR cust_cur IS
 SELECT transno, trans_type, transdate
 FROM customers
 WHERE cust_id = pCustID;
BEGIN
  ... do stuff ...
END process_customer_recs;
/
```

Unnecessary Dynamic SQL

```
PROCEDURE gather_schema_stats(pschema IN VARCHAR2, pGlobalOption IN BOOLEAN := TRUE) IS
BEGIN
  IF pschema IS NOT NULL THEN
    DBMS_STATS.UNLOCK_SCHEMA_STATS (pschema);

    IF pGlobalOption = TRUE THEN
      EXECUTE IMMEDIATE 'BEGIN DBMS_STATS.GATHER_SCHEMA_STATS(OWNNAME => ''' ||
        pschema || ''',' ||
        '  ESTIMATE_PERCENT => 25, METHOD_OPT => ''FOR ALL INDEXED COLUMNS SIZE 254'',  DEGREE => 4,' ||
        '  CASCADE => TRUE, granularity => ''GLOBAL'', OPTIONS => ''GATHER STALE'', no_invalidate => TRUE); END;';
    ELSE
      EXECUTE IMMEDIATE 'BEGIN DBMS_STATS.GATHER_SCHEMA_STATS(OWNNAME => ''' ||
        pschema || ''',' ||
        '  ESTIMATE_PERCENT => 25,  METHOD_OPT => ''FOR ALL INDEXED COLUMNS SIZE 254'',  DEGREE => 4,' ||
        '  CASCADE => TRUE, OPTIONS => ''GATHER STALE'', no_invalidate => TRUE); END;';
    END IF;

    add_to_log_table(clogInformation, 827533, 'Schema stats gathered for schema ' || upper(pschema));
    -- Lock schema stats
    DBMS_STATS.LOCK_SCHEMA_STATS (pschema);
  END IF;
EXCEPTION
  WHEN OTHERS THEN
    --log error in COMMON_LOGS table
    add_to_log_table(clogmajor, 827516, 'Error in Gather_Schema_stats for schema ' ||
                     upper(pschema) || ' - message:' || SQLERRM);
END;
```

```
dbms_stats.gather_schema_stats(pschema, ESTIMATE_PERCENT => 25,
METHOD_OPT => 'FOR ALL INDEXED COLUMNS SIZE 254', DEGREE => 4,
CASCADE => TRUE, granularity => 'GLOBAL', OPTIONS => 'GATHER STALE', no_invalidate => TRUE);

 dbms_stats.gather_schema_stats(pschema, ESTIMATE_PERCENT => 25,
METHOD_OPT => 'FOR ALL INDEXED COLUMNS SIZE 254', DEGREE => gcDegree,
CASCADE => TRUE, granularity => 'GLOBAL', OPTIONS => 'GATHER STALE', no_invalidate => TRUE);
```

Bind Variable Usage

```
SQL> SELECT owner, COUNT(*)
  2  FROM dba_source
  3  WHERE owner NOT LIKE '%SYS%'
  4  AND UPPER(text) LIKE '%EXECUTE IMMEDIATE%'
  5  GROUP BY owner
  6  ORDER BY 1;

OWNER                          COUNT(*)
------------------------------ ----------
ORACLE_OCM                              8
OSSBACKEND                              9
PMCM                                   54
SRE                                    21
WEBWIZ                                 20
ZZYZX                                  39
```

Bind Variables Demo

```
DECLARE
 x NUMBER(10);
BEGIN
  FOR i IN 1 .. 50000
  LOOP
    EXECUTE IMMEDIATE 'SELECT ' || i || ' INTO :b1 FROM dual'
    INTO x;
  END LOOP;
END;
/
```

```
DECLARE
 x NUMBER(10);
BEGIN
  FOR i IN 1 .. 50000
  LOOP
    EXECUTE IMMEDIATE 'SELECT :b1 FROM dual'
    INTO x
    USING i;
  END LOOP;
END;
/
```

Unnecessary Concatenation

```
FUNCTION delete_partitions_in_range(pschema    IN VARCHAR2,
                                    ptable     IN VARCHAR2,
                                    pretention IN INTEGER,
                                    parttype   IN INTEGER) RETURN PLS_INTEGER
IS
 ... variable declarations ...

BEGIN
  --add starting processing
  IF ptable <> 'COMMON_LOGS' THEN
    add_to_log_table(cloginformation,
                     827600,
                     upper(pschema) || '.' || upper(ptable) ||
                     ' - Processing (Delete partitions in range)');
  END IF;
  ... code here ...
  LOOP
    BEGIN
      ... code here ...
    EXCEPTION
      WHEN OTHERS THEN
        add_to_log_table(clogmajor,
                         827604,
                         upper(pschema) || '.' || upper(ptable) ||
                         ' - Unable to Delete Partition ' ||
                         partTable(i).Partition_Name || ':' ||
                         SQLERRM);
        RAISE;
    END;
  END LOOP;

  --Add log entry to summarise the partitions added
  IF ((vSummaryMinDate < vmindate) AND (ptable <> 'COMMON_LOGS')) THEN
    add_to_log_table(cloginformation,
                     827605,
                     upper(pschema) || '.' || upper(ptable) ||
                     ' - Deleted partitions from ' ||
                     to_char(vSummaryMinDate, 'YYYY-MM-DD HH24:MI:SS') ||
                     ' to ' || to_char(vmindate, 'YYYY-MM-DD HH24:MI:SS'));
  END IF;
  RETURN partTable.count;
END;
```

Replaced by a variable assignment

```
FUNCTION delete_partitions_in_range(pschema    IN VARCHAR2,
                                    ptable     IN VARCHAR2,
                                    pretention IN INTEGER,
                                    parttype   IN INTEGER) RETURN PLS_INTEGER
IS
 ... variable declarations ...
 cObject VARCHAR2(61) := UPPER(pschema || '.' || ptable);
BEGIN
  --add starting processing
  IF ptable <> 'COMMON_LOGS' THEN
    add_to_log_table(cloginformation,
                     827600,
                     cObject ||
                     ' - Processing (Delete partitions in range)');
  END IF;
  ... code here ...
  LOOP
    BEGIN
      ... code here ...
    EXCEPTION
      WHEN OTHERS THEN
        add_to_log_table(clogmajor,
                         827604,
                         cObject ||
                         ' - Unable to Delete Partition ' ||
                         partTable(i).Partition_Name || ':' ||
                         SQLERRM);
        RAISE;
    END;
  END LOOP;

  --Add log entry to summarise the partitions added
  IF ((vSummaryMinDate < vmindate) AND (ptable <> 'COMMON_LOGS')) THEN
    add_to_log_table(cloginformation,
                     827605,
                     cObject ||
                     ' - Deleted partitions from ' ||
                     to_char(vSummaryMinDate, 'YYYY-MM-DD HH24:MI:SS') ||
                     ' to ' || to_char(vmindate, 'YYYY-MM-DD HH24:MI:SS'));
  END IF;
  RETURN partTable.count;
END;
```

Deterministic Functions

- Indicates that the function returns the same result value whenever it is called with the same values for its parameters

```
SQL> SELECT owner, COUNT(*)
  2  FROM dba_arguments
  3  WHERE sequence = 0
  4  AND owner NOT LIKE '%SYS%'
  5  GROUP BY owner
  6  ORDER BY 1;

OWNER                          COUNT(*)
------------------------------ ----------
PMCM                                   16
OSSBACKEND                              3
OSS_DICTIONARY                          8
SRE                                     6
WEBWIZ                                  2
ZZYZX                                  17
```

```
SQL> SELECT owner, COUNT(*)
  2  FROM dba_source
  3  WHERE owner NOT LIKE '%SYS%'
  4  AND UPPER(text) LIKE '%DETERMINISTIC%'
  5  GROUP BY owner
  6  ORDER BY 1;

OWNER                          COUNT(*)
------------------------------ ----------
ZZYZX                                   1
SRE                                    79
```

```
CREATE OR REPLACE FUNCTION get_date_determ RETURN DATE DETERMINISTIC IS
BEGIN
  RETURN TRUNC(SYSDATE);
END get_date_determ;
/
```

Direct Path

- A direct load operation requires that the object being loaded is locked to prevent DML
- Queries are lock-free and are allowed while the object is being loaded
- The mode of the DML lock, and which DML locks are obtained depend upon the specification of the OCI_ATTR_DIRPATH_PARALLEL option, and if a partition or subpartition load is being done as opposed to an entire table load
- Parallel Insert automatically uses DIRECT PATH
- Whereas a normal insert will not block another insert when you use DIRECT PATH multiple loaders can create blockage (especially bad with RAC)

GV$ Dynamic Performance Views

- V$ is the local instance
- GV$ view hit all instances
  - Creating delays and increased cache fusion interconnect traffic
- Do not query a gv$ unless you really need to collect information from more than one node

```
SELECT name FROM v$database;
```

```
SELECT name FROM gv$database;
```

Long Operations

- DBMS_APPLIATION_INFO.SET_SESSION_LONGOPS

```
dbms_application_info.set_session_longops(
rindex       IN OUT BINARY_INTEGER,
slno         IN OUT BINARY_INTEGER,
op_name      IN     VARCHAR2(64) DEFAULT NULL,
target       IN     BINARY_INTEGER DEFAULT 0,
context      IN     BINARY_INTEGER DEFAULT 0,
sofar        IN     NUMBER DEFAULT 0,
totalwork    IN     NUMBER DEFAULT 0,
target_desc IN     VARCHAR2(32) DEFAULT 'unknown_target',
units        IN     VARCHAR2(32) DEFAULT NULL);
```

PLSQL Warnings

- PLW-07202
  - Bind type will result in conversion away from column type
- PLW-07203
  - Parameter '*string*' may benefit from use of the NOCOPY compiler hint
- PLW-07204
  - Conversion away from column type may result in sub-optimal query plan
- PLW-07205
  - SIMPLE_INTEGER is mixed with BINARY_INTEGER or PLS_INTEGER
- PLW-07206
  - Analysis suggests that the assignment to '*string*' may be unnecessary

```
ALTER SESSION SET PLSQL_WARNINGS='ENABLE:ALL';
```

Result Cache

SQL ordered by Executions

- Total Executions: 29,717,627
- Captured SQL account for 77.4% of Total

Executions	Rows Processed	Rows per Exec	CPU per Exec (s)	Elap per Exec (s)	SQL Id	SQL Module	SQL Text
10,128,178	2,506,529	0.25	0.00	0.00	932srzg1krc33	ASN_07B_DIP(004110016)	SELECT NE_TIMEZONE FROM CMPM.E...
7,576,759	7,579,197	1.00	0.00	0.00	1h698sb62un99	asci_56_RANAPProtocolStats(016110008)	SELECT DISTINCT NE_TIMEZONE FR...
3,914,621	3,848,268	0.98	0.00	0.00	5tbzddgguu8cc	asci_56_RANAPProtocolStats(016110008)	SELECT SYS_VERSION FROM CMPM.T...
311,645	311,604	1.00	0.00	0.00	7gtztzv329wg0		select c.name, u.name from co...
301,428	301,325	1.00	0.00	0.00	36s446f9cnwhw		SELECT C.NAME FROM COL$ C WHER...
200,692	200,669	1.00	0.00	0.00	4vs91dcv7u1p6	OMS	insert into sys.aud$(sessioni...
65,044	65,035	1.00	0.00	0.00	fz9xwpt2cvt0k		SELECT par_type, param_clob, ...
64,949	3,945,482	60.75	0.00	0.00	f5ra7dru5fk5n	XML_P7R_RNC_RCS(003110008)	SELECT NAME, PATH, READ, WR...
64,801	64,807	1.00	0.00	0.00	fhzj09a7fnrnb	XML_V7I_IN_LP_DC(00811000V)	SELECT DBTIMEZONE, LENGTH(DBT...
64,632	64,542	1.00	0.00	0.00	15jnrrb6016nd	XML_V7I_IN_LP_DC(00811000V)	SELECT SESSIONTIMEZONE, LENGT...

```
CREATE OR REPLACE FUNCTION rcache(p_srvr_id IN servers.srvr_id%TYPE) RETURN BOOLEAN
RESULT_CACHE RELIES_ON(servers) IS
  srvrow servers%ROWTYPE;
 BEGIN
   SELECT *
   INTO srvrow
   FROM servers
   WHERE srvr_id = p_srvr_id;
   RETURN TRUE;
 EXCEPTION
   WHEN OTHERS THEN
     RETURN FALSE;
 END rcache;
 /
```

```
SELECT /*+ RESULT_CACHE */ srvr_id
FROM (
  SELECT srvr_id, SUM(cnt) SUMCNT
  FROM (
    SELECT DISTINCT srvr_id, 1 AS CNT
    FROM servers
    UNION ALL
    SELECT DISTINCT srvr_id, 1
    FROM serv_inst)
  GROUP BY srvr_id)
WHERE sumcnt = 2;
```

Sequence Optimization

- High volume insert intensive applications using sequence generated keys add extra overhead
- NOCACHE is the worst for performance
- CACHE NOORDER is the best for performance
- Services may help improve performance even for CACHE NOORDER sequences if the insert application uses a service with only one Preferred Instance
- This eliminates the Interconnect traffic and synchronization overhead required to coordinate the next value from amongst all the instances when using CACHE ORDER

Sequence Caching

```
SQL> SELECT sequence_owner, cache_size, COUNT(*)
  2  FROM dba_sequences
  3  WHERE sequence_owner IN ('ADMIN','PMCM','OPS','OSSBACKEND','OSS_DICTIONARY','SRE','WEBWIZ','ZZYZX')
  4  GROUP BY sequence_owner, cache_size
  5  ORDER BY 1,2;
```

SEQUENCE_OWNER	CACHE_SIZE	COUNT(*)
ADMIN	20	1
PMCM	1000	2
OPS	0	1
OSSBACKEND	0	11
OSS_DICTIONARY	0	23
SRE	0	33
SRE	20	7
WEBWIZ	20	24
ZZYZX	0	21
ZZYZX	20	44

"You would be amazed what setting a sequence cache via alter sequence to 100,000 or more can do during a large load -- amazed."

~ Tom Kyte

Sequence Ordering

```
SQL> SELECT sequence_owner, order_flag, COUNT(*)
  2  FROM dba_sequences
  3  WHERE sequence_owner IN ('ADMIN','PMCM','OPS','OSSBACKEND','OSS_DICTIONARY','SRE','WEBWIZ','ZZYZX')
  4  GROUP BY sequence_owner, order_flag
  5  ORDER BY 1,2;
```

SEQUENCE_OWNER	O	COUNT(*)
ADMIN	N	1
PMCM	N	2
OPS	N	1
OSSBACKEND	N	5
OSSBACKEND	Y	6
OSS_DICTIONARY	N	7
OSS_DICTIONARY	Y	16
SRE	N	39
SRE	Y	1
WEBWIZ	Y	24
ZZYZX	N	59
ZZYZX	Y	6

Discussion

Stats Collection

Stats Collection Issues

- RAC will parallelize across nodes
- You can not collect full stats ... it isn't going to happen
- BLOCK sample ... not row sample
- COPY_STATS
- SET_STATS

```
dbms_stats.copy_table_stats(
ownname      IN VARCHAR2,
tabname      IN VARCHAR2,
srcpartname  IN VARCHAR2,
dstpartname  IN VARCHAR2,
scale_factor IN NUMBER  DEFAULT 1,
flags        IN NUMBER  DEFAULT NULL,
force        IN BOOLEAN DEFAULT FALSE);
```

```
dbms_stats.set_table_stats(
ownname       VARCHAR2,
tabname       VARCHAR2,
partname      VARCHAR2 DEFAULT NULL,
stattab       VARCHAR2 DEFAULT NULL,
statid        VARCHAR2 DEFAULT NULL,
numrows       NUMBER   DEFAULT NULL,
numblks       NUMBER   DEFAULT NULL,
avgrlen       NUMBER   DEFAULT NULL,
flags         NUMBER   DEFAULT NULL,
statown       VARCHAR2 DEFAULT NULL,
no_invalidate BOOLEAN  DEFAULT to_no_invalidate_type(get_param('NO_INVALIDATE')),
cachedblk     NUMBER   DEFAULT NULL,
cachehit      NUMBER   DEFAULT NULL,
force         BOOLEAN  DEFAULT FALSE);
```

Optimizer Bugs Can Bite

```
SELECT table_name, column_name, low_value, high_value
FROM dba_tab_cols
WHERE owner = 'EG' AND data_type = 'DATE' AND rownum < 6;

TABLE_NAME                     COLUMN_NAME                    LOW_VALUE       HIGH_VALUE
------------------------------ ------------------------------ --------------- ---------------
ALARM_DATA                     LAST_DATA_DATE                 786E0415010101  786E070A010101
ALARM_DATA                     DATA_DATE                      786E0415010101  786E0518010101
APSTATS                        DATETIME                       786E0709010101  786E0809100101

set serveroutput on

DECLARE
 d1 DATE;
 d2 DATE;

 r1 RAW(32) := '786E0415010101';
 r2 RAW(32) := '786E070A010101';
 r3 RAW(32) := '786E0415010101';
 r4 RAW(32) := '786E0518010101';
 r5 RAW(32) := '786E0709010101';
 r6 RAW(32) := '786E0809100101';
BEGIN
  dbms_stats.convert_raw_value(r1, d1);
  dbms_output.put_line(d1);
  dbms_stats.convert_raw_value(r2, d2);
  dbms_output.put_line(d2);
  dbms_stats.convert_raw_value(r3, d1);
  dbms_output.put_line(d1);
  dbms_stats.convert_raw_value(r4, d2);
  dbms_output.put_line(d2);
  dbms_stats.convert_raw_value(r5, d1);
  dbms_output.put_line(d1);
  dbms_stats.convert_raw_value(r6, d2);
  dbms_output.put_line(d2);
END;
/

21-APR-2010 00:00:00
10-JUL-2010 00:00:00
21-APR-2010 00:00:00
24-MAY-2010 00:00:00
09-JUL-2010 00:00:00
09-AUG-2010 15:00:00
```

Setting High and Low Values

```
DECLARE
 sr_arr   dbms_stats.statrec;
 new_low  DATE := TO_DATE('01-JAN-2002');
 new_high DATE := TO_DATE('31-DEC-2012');
 vals_arr dbms_stats.datearray;
BEGIN
  sr_arr.eavs := 0;
  sr_arr.chvals := NULL;
  sr_arr.epc := 2;

  vals_arr := dbms_stats.datearray(new_low, new_high);

  sr_arr.bkvals := dbms_stats.numarray(10000,1000000);
  dbms_stats.prepare_column_values(sr_arr, vals_arr);
  dbms_stats.set_column_stats(USER, 'PREPTEST', 'LAST_DDL_TIME', NULL, srec => sr_arr);
END;
/
```

Discussion

Storage

Storage Related Issues

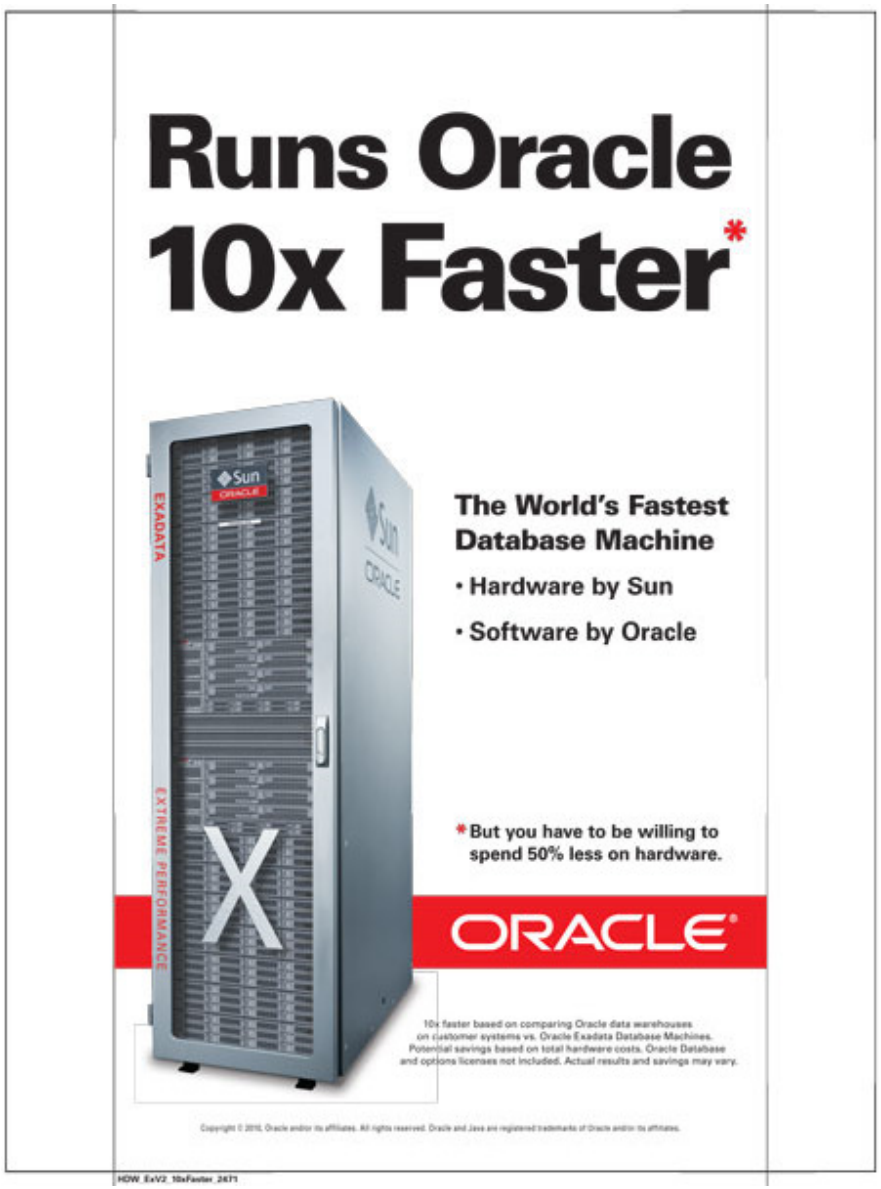
- VLDBs tend to be DSS or DW systems
- A lot of total nonsense has been written about using big block sizes (32K)
  - Is it a RAC cluster?
  - Will it ever be a RAC cluster?
- One tablespace per day
  - You are not going to load a dev or test environment without Transportable Tablespaces
- Advanced Compression (255 column maximum width)
- AUD$ Table
  - DBSNMP queries are not optimized
  - Storage defaults are not optimized

```
SQL> select pct_free, pct_used from dba_tables where table_name = 'AUD$';

  PCT_FREE   PCT_USED
---------- ----------
        10         40
```

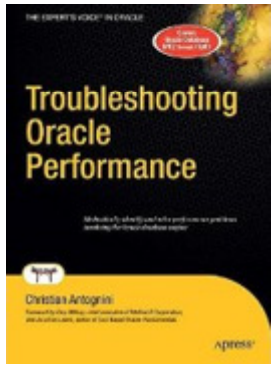
Buy the right hardware

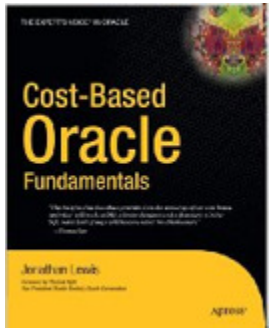
- Bigger <> Better



Resources

- http://tahiti.oracle.com
- http://technet.oracle.com - OTN Forums
- Indexing ... Richard Foote
- Books
  - Cary Milsap
  - Christian Antognini
  - Jonathan Lewis





Questions

ERROR at line 1:
ORA-00028: your session has been killed

All demos at morganslibrary.org

- **Library**

Thank you