【优化】COUNT(1)、COUNT(*)、COUNT(常量)、COUNT(主键)、COUNT(ROWID)、COUNT(非空列)、COUNT(允许为空列)、COUNT(DISTINCT 列名)

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博客地址：http://blog.itpub.net/26736162/abstract/1/

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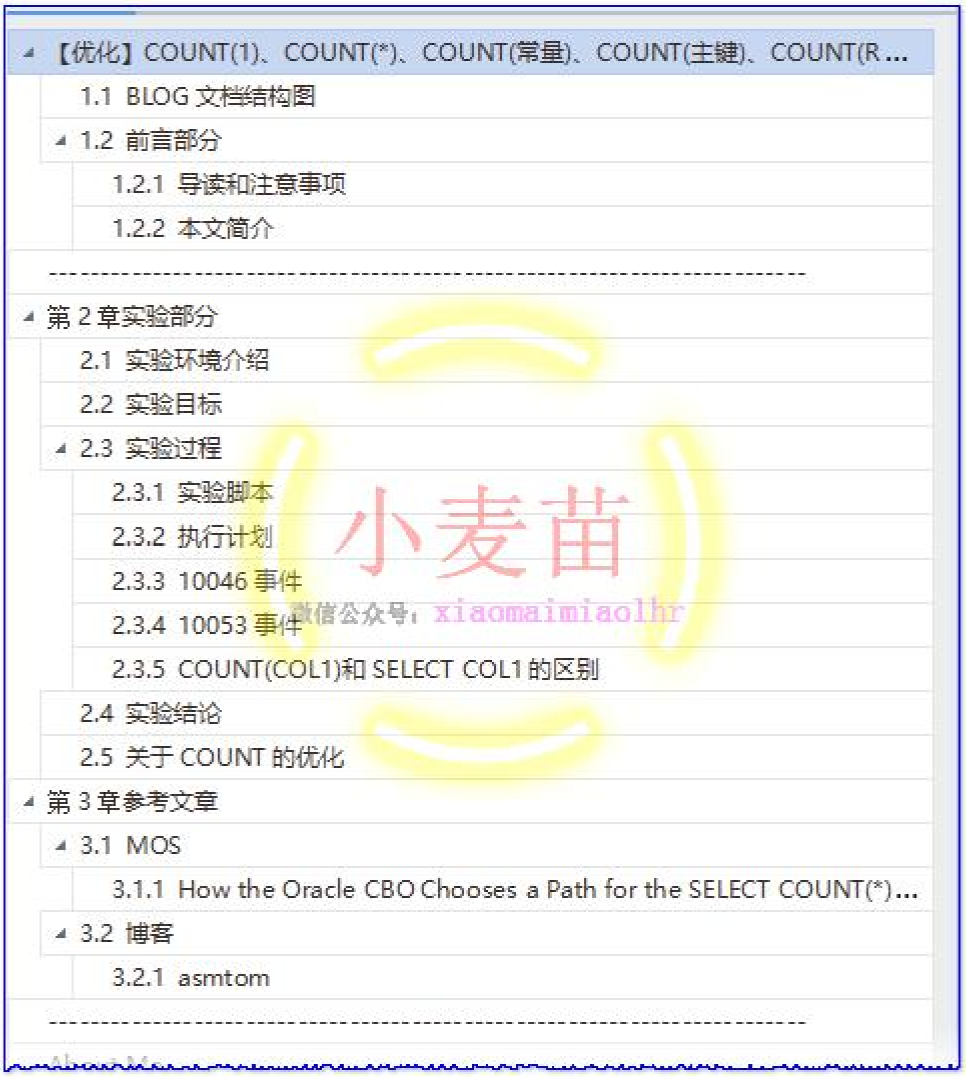
1.1 BLOG 文档结构图



1.2 前言部分

1.2.1 导读和注意事项

各位技术爱好者，看完本文后，你可以掌握如下的技能，也可以学到一些其它你所不知道的知识，~O(∩_∩)O~：

① COUNT(1)和 COUNT(*)的区别（重点）

② 10046 和 10053 的使用

③ “SELECT COUNT(列)”和“SELECT 列”在选择索引方面的区别

④ COUNT 计数的优化

Tips:

① 本文在 itpub（http://blog.itpub.net/26736162）、博客园（http://www.cnblogs.com/lhrbest）和微信公众号（xiaomaimiaolhr）上有同步更新。

② 文章中用到的所有代码、相关软件、相关资料及本文的 pdf 版本都请前往小麦苗的云盘下载，小麦苗的云盘地址见：http://blog.itpub.net/26736162/viewspace-1624453/。

③ 若网页文章代码格式有错乱，请下载 pdf 格式的文档来阅读。

④ 在本篇 BLOG 中，代码输出部分一般放在一行一列的表格中。

⑤ 本文适合于 Oracle 初中级人员阅读，Oracle 大师请略过本文。

本文若有错误或不完善的地方请大家多多指正，您的批评指正是我写作的最大动力。

1.2.2 本文简介

看了很多有关 COUNT(1)和 COUNT(*)的区别和效率，众说纷纭。最终还是决定自己动手实验一番。

第 2 章 实验部分

2.1 实验环境介绍

项目	source db
db 类型	RAC
db version	11.2.0.3.0
db 存储	ASM
OS 版本及 kernel 版本	RHEL 6.5

2.2 实验目标

弄清楚 COUNT(1)、COUNT(*)、COUNT(常量)、COUNT(主键)、COUNT(ROWID)、COUNT(非空列)、COUNT(允许为空列)、COUNT(DISTINCT 列名)之间的区别，以及它们之间的效率问题。

2.3 实验过程

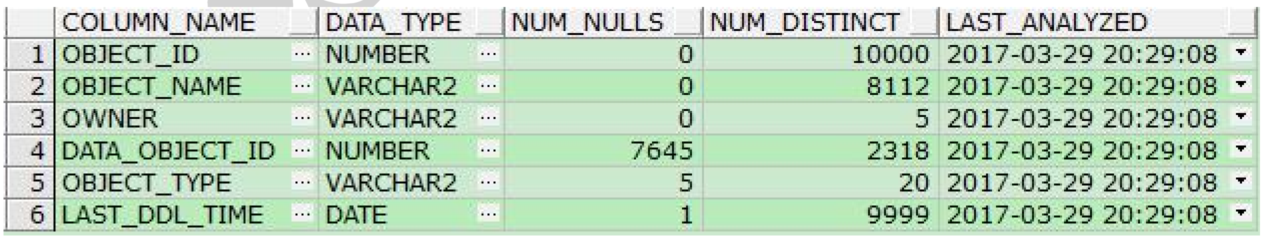
2.3.1 实验脚本

```
--创建 1W 行的表
DROP TABLE T_COUNT_LHR;
CREATE TABLE T_COUNT_LHR AS
SELECT OBJECT_ID,
       OBJECT_NAME,
       OWNER,
       DATA_OBJECT_ID,
       OBJECT_TYPE,
       LAST_DDL_TIME
  FROM DBA_OBJECTS D
 WHERE D.OBJECT_ID IS NOT NULL
   AND D.OBJECT_NAME IS NOT NULL
   AND ROWNUM <= 10000;


--更新空值，
UPDATE T_COUNT_LHR t SET t.object_type='' WHERE Rownum<=5;
UPDATE T_COUNT_LHR t SET t.LAST_DDL_TIME=T.LAST_DDL_TIME+ROWNUM;
UPDATE T_COUNT_LHR t SET t.LAST_DDL_TIME='' WHERE Rownum<=1;
COMMIT;


--添加主键、非空约束、唯一索引、普通索引
ALTER TABLE T_COUNT_LHR ADD CONSTRAINT PK_OBJECT_ID PRIMARY KEY(OBJECT_ID);
ALTER TABLE T_COUNT_LHR MODIFY OBJECT_NAME NOT NULL;
CREATE UNIQUE INDEX IDX_LDT ON T_COUNT_LHR(LAST_DDL_TIME);
CREATE  INDEX IDX_DATA_OBJECT_ID ON T_COUNT_LHR(DATA_OBJECT_ID);
CREATE  INDEX IDX_DATA_OWNER ON T_COUNT_LHR(OWNER);
ALTER TABLE T_COUNT_LHR MODIFY OWNER NOT NULL;


--收集统计信息
EXEC dbms_stats.gather_table_stats(USER,'T_COUNT_LHR');
SELECT d.COLUMN_NAME,d.DATA_TYPE,d.NUM_NULLS,d.NUM_DISTINCT,d.LAST_ANALYZED FROM cols d WHERE
d.TABLE_NAME='T_COUNT_LHR';
```



	COLUMN_NAME	DATA_TYPE	NUM_NULLS	NUM_DISTINCT	LAST_ANALYZED
1	OBJECT_ID	NUMBER	0	10000	2017-03-29 20:29:08
2	OBJECT_NAME	VARCHAR2	0	8112	2017-03-29 20:29:08
3	OWNER	VARCHAR2	0	5	2017-03-29 20:29:08
4	DATA_OBJECT_ID	NUMBER	7645	2318	2017-03-29 20:29:08
5	OBJECT_TYPE	VARCHAR2	5	20	2017-03-29 20:29:08
6	LAST_DDL_TIME	DATE	1	9999	2017-03-29 20:29:08

表的信息如下所示：

列名	是否主键	是否允许为空	是否有索引	数据类型	空值的行数	不同值的行数	总行数
OBJECT_ID	Y	N	唯一索引	NUMBER	0	10000	10000
OBJECT_NAME		N	无	VARCHAR2	0	8112	10000
OWNER		N	普通索引（IDX_OWNER）	VARCHAR2	0	5	10000
DATA_OBJECT_ID		Y	普通索引（IDX_DATA_OBJECT_ID）	NUMBER	7645	2318	10000

OBJECT_TYPE		Y	无	VARCHAR2	5	20	10000
LAST_DDL_TIME		Y	唯一索引（IDX_LDT）	DATE	1	9999	10000

需要统计如下几种情况：

```
SELECT COUNT(1) FROM T_COUNT_LHR;--走索引
SELECT COUNT(*) FROM T_COUNT_LHR;--走索引
SELECT COUNT(ROWID) FROM T_COUNT_LHR; --走索引
SELECT COUNT(OBJECT_ID) FROM T_COUNT_LHR; --走索引
SELECT COUNT(OBJECT_NAME) FROM T_COUNT_LHR;--走索引
SELECT COUNT(OWNER) FROM T_COUNT_LHR D;--走索引
SELECT COUNT(D.DATA_OBJECT_ID) FROM T_COUNT_LHR D; --走索引
SELECT COUNT(D.LAST_DDL_TIME) FROM T_COUNT_LHR D;--走索引
SELECT COUNT(D.LAST_DDL_TIME) FROM T_COUNT_LHR D WHERE D.LAST_DDL_TIME IS NOT NULL;--走索引
SELECT D.LAST_DDL_TIME FROM T_COUNT_LHR D; --不走索引
SELECT D.LAST_DDL_TIME FROM T_COUNT_LHR D WHERE D.LAST_DDL_TIME IS NOT NULL;--走索引
SELECT COUNT(DISTINCT DATA_OBJECT_ID) FROM T_COUNT_LHR D;--不走索引
SELECT COUNT(DISTINCT OWNER) FROM T_COUNT_LHR D;--走索引
SELECT COUNT(DISTINCT DATA_OBJECT_ID) FROM T_COUNT_LHR D WHERE DATA_OBJECT_ID IS NOT NULL ;--走索引
```

2.3.2 执行计划

介绍	**SQL 命令**	**执行计划**	**返回行数**
COUNT(1)和COUNT(常量)是一样的，SELECT COUNT(*) "COUNT(1)" FROM "LHR"."T_COUNT_LHR" "T_COUNT_LHR"	SELECT COUNT(1) FROM T_COUNT_LHR;	Plan hash value: 1265209789 |-- | Id | Operation | Name | Rows | Cost (%CPU)| Time | |-- | 0 | SELECT STATEMENT | | 1 | 7 (0)| 00:00:01 | | 1 | SORT AGGREGATE | | 1 | | | | 2 | INDEX FAST FULL SCAN| PK_OBJECT_ID | 10000 | 7 (0)| 00:00:01 | |--	10000
SELECT COUNT(*) "COUNT(*)" FROM "LHR"."T_COUNT_LHR" "T_COUNT_LHR"	SELECT COUNT(*) FROM T_COUNT_LHR;	Plan hash value: 1265209789 |-- | Id | Operation | Name | Rows | Cost (%CPU)| Time | |-- | 0 | SELECT STATEMENT | | 1 | 7 (0)| 00:00:01 | | 1 | SORT AGGREGATE | | 1 | | | | 2 | INDEX FAST FULL SCAN| PK_OBJECT_ID | 10000 | 7 (0)| 00:00:01 | |--	10000
SELECT COUNT("T_COUNT_LHR".ROWID) "COUNT(ROWID)" FROM "LHR"."T_COUNT_LHR" "T_COUNT_LHR"	SELECT COUNT(ROWID) FROM T_COUNT_LHR;	Plan hash value: 1265209789 |-- | Id | Operation | Name | Rows | Bytes | Cost (%CPU)| Time | |-- | 0 | SELECT STATEMENT | | 1 | 12 | 7 (0)| 00:00:01 | | 1 | SORT AGGREGATE | | 1 | 12 | | | | 2 | INDEX FAST FULL SCAN| PK_OBJECT_ID | 10000 | 117K| 7 (0)| 00:00:01 | |--	10000

SELECT COUNT(*) "COUNT(OBJECT_ID)" FROM "LHR"."T_COUNT_LHR" "T_COUNT_LHR"	SELECT COUNT(OBJECT_ID) FROM T_COUNT_LHR;	Plan hash value: 1265209789 |--- | Id | Operation | Name | Rows | Cost (%CPU)| Time | |--- | 0 | SELECT STATEMENT | | 1 | 7 (0)| 00:00:01 | | 1 | SORT AGGREGATE | | 1 | | | | 2 | INDEX FAST FULL SCAN| PK_OBJECT_ID | 10000 | 7 (0)| 00:00:01 | |---	10000
SELECT COUNT(*) "COUNT(OBJECT_NAME)" FROM "LHR"."T_COUNT_LHR" "T_COUNT_LHR"	SELECT COUNT(OBJECT_NAME) FROM T_COUNT_LHR;	Plan hash value: 1265209789 |--- | Id | Operation | Name | Rows | Cost (%CPU)| Time | |--- | 0 | SELECT STATEMENT | | 1 | 7 (0)| 00:00:01 | | 1 | SORT AGGREGATE | | 1 | | | | 2 | INDEX FAST FULL SCAN| PK_OBJECT_ID | 10000 | 7 (0)| 00:00:01 | |---	10000
OWNER 列含有索引，非空列，选择主键索引	SELECT COUNT(OWNER) FROM T_COUNT_LHRD;	Plan hash value: 1265209789 |--- | Id | Operation | Name | Rows | Cost (%CPU)| Time | |--- | 0 | SELECT STATEMENT | | 1 | 7 (0)| 00:00:01 | | 1 | SORT AGGREGATE | | 1 | | | | 2 | INDEX FAST FULL SCAN| PK_OBJECT_ID | 10000 | 7 (0)| 00:00:01 | |---	10000
DATA_OBJECT_ID 列允许为空，含有普通索引	SELECT COUNT(D.DATA_OBJECT_ID) FROM T_COUNT_LHRD;	Plan hash value: 2404962198 |--- | Id | Operation | Name | Rows | Bytes | Cost (%CPU)| Time | |--- | 0 | SELECT STATEMENT | | 1 | 2 | 3 (0)| 00:00:01 | | 1 | SORT AGGREGATE | | 1 | 2 | | | | 2 | INDEX FAST FULL SCAN| IDX_DATA_OBJECT_ID | 10000 | 20000 | 3 (0)| 00:00:01 | |---	2355
注意，COUNT（列）计算的是列值为非空的行数	SELECT COUNT(D.LAST_DDL_TIME) FROM T_COUNT_LHRD;	Plan hash value: 887614938 |-- | Id | Operation | Name | Rows | Bytes | Cost (%CPU)| Time | |-- | 0 | SELECT STATEMENT | | 1 | 8 | 9 (0)| 00:00:01 | | 1 | SORT AGGREGATE | | 1 | 8 | | | | 2 | INDEX FAST FULL SCAN| IDX_LDT | 10000 | 80000 | 9 (0)| 00:00:01 | |--	9999

	SELECT COUNT(D.LAST_DDL_TIME) FROM T_COUNT_LHR D WHERE D.LAST_DDL_TIME IS NOT NULL;	Plan hash value: 887614938 |--- | Id | Operation | Name | Rows | Bytes | Cost (%CPU)| Time | |--- | 0 | SELECT STATEMENT | | 1 | 8 | 9 (0)| 00:00:01 | | 1 | SORT AGGREGATE | | 1 | 8 | | | |* 2 | INDEX FAST FULL SCAN| IDX_LDT | 9999 | 79992 | 9 (0)| 00:00:01 | |---	9999
由于列中存在空值，所以不会选择索引。加上 IS NOT NULL 就可以选择索引了。	SELECT D.LAST_DDL_TIME FROM T_COUNT_LHR D;	Plan hash value: 2392171920 |--- | Id | Operation | Name | Rows | Bytes | Cost (%CPU)| Time | |--- | 0 | SELECT STATEMENT | | 10000 | 80000 | 22 (0)| 00:00:01 | | 1 | TABLE ACCESS FULL| T_COUNT_LHR | 10000 | 80000 | 22 (0)| 00:00:01 | |---	10000
	SELECT D.LAST_DDL_TIME FROM T_COUNT_LHR D WHERE D.LAST_DDL_TIME IS NOT NULL;	Plan hash value: 2419516343 |-- | Id | Operation | Name | Rows | Bytes | Cost (%CPU)| Time | |-- | 0 | SELECT STATEMENT | | 9999 | 79992 | 9 (0)| 00:00:01 | |* 1 | INDEX FAST FULL SCAN| IDX_LDT | 9999 | 79992 | 9 (0)| 00:00:01 | |--	9999
DISTINCT 允许为空列不会选择索引，而 DISTINCT 非空列会选择索引	SELECT COUNT(DISTINCT DATA_OBJECT_ID) FROM T_COUNT_LHR D;	Plan hash value: 3258478826 |-- | Id | Operation | Name | Rows | Bytes | Cost (%CPU)| Time | |-- | 0 | SELECT STATEMENT | | 1 | 13 | 23 (5)| 00:00:01 | | 1 | SORT AGGREGATE | | 1 | 13 | | | | 2 | VIEW | VW_DAG_0 | 2318 | 30134 | 23 (5)| 00:00:01 | | 3 | HASH GROUP BY | | 2318 | 4636 | 23 (5)| 00:00:01 | | 4 | TABLE ACCESS FULL| T_COUNT_LHR | 10000 | 20000 | 22 (0)| 00:00:01 | |--	2318

	SELECT COUNT(DISTIN CT OWNER) FROM T_COUN T_LHR D;	Plan hash value: 4008695099 |--- | Id | Operation | Name | Rows | Bytes | Cost (%CPU)| Time | |--- | 0 | SELECT STATEMENT | | 1 | 17 | 9 (12)| 00:00:01 | | 1 | SORT AGGREGATE | | 1 | 17 | | | | 2 | VIEW | VW_DAG_0 | 5 | 85 | 9 (12)| 00:00:01 | | 3 | HASH GROUP BY | | 5 | 30 | 9 (12)| 00:00:01 | | 4 | INDEX FAST FULL SCAN| IDX_DATA_OWNER | 10000 | 60000 | 8 (0)| 00:00:01 | |---	5

2.3.3 10046 事件

```
alter session set events '10046 trace name context forever, level 12';
SELECT COUNT(*) FROM T_COUNT_LHR;
alter system flush buffer_cache;
alter system flush shared_pool;
SELECT COUNT(1) FROM T_COUNT_LHR;
alter system flush buffer_cache;
alter system flush shared_pool;
SELECT COUNT(ROWID) FROM T_COUNT_LHR;
alter session set events '10046 trace name context OFF';
select value from v$diag_info where name like '%Default%';
exit
```

```
tkprof orclasm_ora_13825.trc orclasm_ora_13825.out
```

```
alter system flush buffer_cache;
alter system flush shared_pool;
alter session set sql_trace=true;
SELECT COUNT(*) FROM T_COUNT_LHR;
alter system flush buffer_cache;
alter system flush shared_pool;
SELECT COUNT(1) FROM T_COUNT_LHR;
alter system flush buffer_cache;
alter system flush shared_pool;
SELECT COUNT(ROWID) FROM T_COUNT_LHR;
alter session set sql_trace=false;
select value from v$diag_info where name like '%Default%';
```

orclasm_ora_13825.trc   orclasm_ora_13825.out   10046.txt

```
********************************************************************************
count    = number of times OCI procedure was executed
cpu      = cpu time in seconds executing
elapsed  = elapsed time in seconds executing
disk     = number of physical reads of buffers from disk
query    = number of buffers gotten for consistent read
current  = number of buffers gotten in current mode (usually for update)
rows     = number of rows processed by the fetch or execute call

********************************************************************************
```

```
SQL ID: g9rksvy7gkdmj Plan Hash: 1265209789

SELECT COUNT(*)
FROM
 T_COUNT_LHR


call     count       cpu    elapsed       disk      query    current        rows
------- ------  -------- ---------- ---------- ---------- ----------  ----------
Parse        1      0.00       0.00          0          0          0           0
Execute      1      0.00       0.00          0          0          0           0
Fetch        2      0.00       0.55         22         25          0           1
------- ------  -------- ---------- ---------- ---------- ----------  ----------
total        4      0.01       0.56         22         25          0           1

Misses in library cache during parse: 1
Optimizer mode: ALL_ROWS
Parsing user id: 90
Number of plan statistics captured: 1

Rows (1st) Rows (avg) Rows (max)  Row Source Operation
---------- ---------- ----------  ---------------------------------------------------
         1          1          1  SORT AGGREGATE (cr=25 pr=22 pw=0 time=552894 us)
     10000      10000      10000   INDEX FAST FULL SCAN PK_OBJECT_ID (cr=25 pr=22 pw=0 time=2502 us cost=7 size=0
card=10000)(object id 159543)

********************************************************************************

SQL ID: 4abkxq9x7uamj Plan Hash: 1265209789

SELECT COUNT(1)
FROM
 T_COUNT_LHR


call     count       cpu    elapsed       disk      query    current        rows
------- ------  -------- ---------- ---------- ---------- ----------  ----------
Parse        1      0.00       0.01          0          0          0           0
Execute      1      0.00       0.00          0          0          0           0
Fetch        2      0.00       0.00         22         25          0           1
------- ------  -------- ---------- ---------- ---------- ----------  ----------
total        4      0.00       0.01         22         25          0           1

Misses in library cache during parse: 1
Optimizer mode: ALL_ROWS
Parsing user id: 90
Number of plan statistics captured: 1

Rows (1st) Rows (avg) Rows (max)  Row Source Operation
---------- ---------- ----------  ---------------------------------------------------
         1          1          1  SORT AGGREGATE (cr=25 pr=22 pw=0 time=5934 us)
     10000      10000      10000   INDEX FAST FULL SCAN PK_OBJECT_ID (cr=25 pr=22 pw=0 time=2469 us cost=7 size=0
card=10000)(object id 159543)

********************************************************************************

SQL ID: 4tm3jwzff8ub8 Plan Hash: 1265209789

SELECT COUNT(ROWID)
FROM
 T_COUNT_LHR
```

```
call     count       cpu    elapsed       disk      query    current        rows
------- ------  -------- ---------- ---------- ---------- ----------  ----------
Parse        1      0.00       0.00          0          0          0           0
Execute      1      0.00       0.00          0          0          0           0
Fetch        2      0.00       0.01         22         25          0           1
------- ------  -------- ---------- ---------- ---------- ----------  ----------
total        4      0.00       0.01         22         25          0           1

Misses in library cache during parse: 1
Optimizer mode: ALL_ROWS
Parsing user id: 90
Number of plan statistics captured: 1

Rows (1st) Rows (avg) Rows (max)  Row Source Operation
---------- ---------- ----------  ---------------------------------------------------
         1          1          1  SORT AGGREGATE (cr=25 pr=22 pw=0 time=11264 us)
     10000      10000      10000   INDEX FAST FULL SCAN PK_OBJECT_ID (cr=25 pr=22 pw=0 time=762 us cost=7
size=120000 card=10000)(object id 159543)

********************************************************************************
```

2.3.4 10053 事件

alter session set events '10053 trace name context forever, level 12';

alter session set events '10053 trace name context OFF';

```
alter system flush buffer_cache;
alter system flush shared_pool;
alter session set events '10053 trace name context forever, level 12';
SELECT COUNT(*) FROM T_COUNT_LHR;
alter system flush buffer_cache;
alter system flush shared_pool;
SELECT COUNT(1) FROM T_COUNT_LHR;
alter system flush buffer_cache;
alter system flush shared_pool;
SELECT COUNT(ROWID) FROM T_COUNT_LHR;
alter session set events '10053 trace name context OFF';
select value from v$diag_info where name like '%Default%';
```

orclasm_ora_2829.trc

搜索关键词“Final”、“Starting”：

```


Final query after transformations:******* UNPARSED QUERY IS *******
SELECT COUNT(*) "COUNT(*)" FROM "LHR"."T_COUNT_LHR" "T_COUNT_LHR"
kkoqbc: optimizing query block SEL$1 (#0)

       :
   call(in-use=1216, alloc=16344), compile(in-use=58000, alloc=58544), execution(in-use=2480, alloc=4032)

kkoqbc-subheap (create addr=0x7f9950a9fb58)
****************
QUERY BLOCK TEXT
****************
```

```
SELECT COUNT(*) FROM T_COUNT_LHR
---------------------
QUERY BLOCK SIGNATURE
---------------------
signature (optimizer): qb_name=SEL$1 nbfros=1 flg=0
  fro(0): flg=0 objn=159542 hint_alias="T_COUNT_LHR"@"SEL$1"

-----------------------------
SYSTEM STATISTICS INFORMATION
-----------------------------
  Using NOWORKLOAD Stats
  CPUSPEEDNW: 1752 millions instructions/sec (default is 100)
  IOTFRSPEED: 4096 bytes per millisecond (default is 4096)
  IOSEEKTIM:  10 milliseconds (default is 10)
  MBRC:      NO VALUE blocks (default is 8)

***************************************
BASE STATISTICAL INFORMATION
***********************
Table Stats::
  Table: T_COUNT_LHR  Alias: T_COUNT_LHR
    #Rows: 10000  #Blks:  75  AvgRowLen:  44.00  ChainCnt:  0.00
Index Stats::
  Index: IDX_DATA_OBJECT_ID  Col#: 4
    LVLS: 1  #LB: 5  #DK: 2318  LB/K: 1.00  DB/K: 1.00  CLUF: 86.00
  Index: IDX_DATA_OWNER  Col#: 3
    LVLS: 1  #LB: 23  #DK: 5  LB/K: 4.00  DB/K: 28.00  CLUF: 141.00
  Index: IDX_LDT  Col#: 6
    LVLS: 1  #LB: 26  #DK: 9999  LB/K: 1.00  DB/K: 1.00  CLUF: 377.00
  Index: PK_OBJECT_ID  Col#: 1
    LVLS: 1  #LB: 20  #DK: 10000  LB/K: 1.00  DB/K: 1.00  CLUF: 76.00
    Access path analysis for T_COUNT_LHR
***************************************
SINGLE TABLE ACCESS PATH
  Single Table Cardinality Estimation for T_COUNT_LHR[T_COUNT_LHR]
  Table: T_COUNT_LHR  Alias: T_COUNT_LHR
    Card: Original: 10000.000000  Rounded: 10000  Computed: 10000.00  Non Adjusted: 10000.00
  Access Path: TableScan
    Cost:  22.10  Resp: 22.10  Degree: 0
      Cost_io: 22.00  Cost_cpu: 2034108
      Resp_io: 22.00  Resp_cpu: 2034108
  Access Path: index (index (FFS))
    Index: IDX_DATA_OWNER
    resc_io: 8.00  resc_cpu: 1363793
    ix_sel: 0.000000  ix_sel_with_filters: 1.000000
  Access Path: index (FFS)
    Cost:  8.06  Resp: 8.06  Degree: 1
      Cost_io: 8.00  Cost_cpu: 1363793
      Resp_io: 8.00  Resp_cpu: 1363793
  Access Path: index (index (FFS))
    Index: PK_OBJECT_ID
    resc_io: 7.00  resc_cpu: 1342429
    ix_sel: 0.000000  ix_sel_with_filters: 1.000000
  Access Path: index (FFS)
    Cost:  7.06  Resp: 7.06  Degree: 1
      Cost_io: 7.00  Cost_cpu: 1342429
      Resp_io: 7.00  Resp_cpu: 1342429
  Access Path: index (FullScan)
    Index: IDX_DATA_OWNER
    resc_io: 24.00  resc_cpu: 2170915
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 24.10  Resp: 24.10  Degree: 1
  Access Path: index (FullScan)
    Index: PK_OBJECT_ID
    resc_io: 21.00  resc_cpu: 2149550
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 21.10  Resp: 21.10  Degree: 1
  ****** trying bitmap/domain indexes ******
  Access Path: index (FullScan)
    Index: IDX_DATA_OWNER
    resc_io: 24.00  resc_cpu: 2170915
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 24.10  Resp: 24.10  Degree: 0
  Access Path: index (FullScan)
    Index: PK_OBJECT_ID
    resc_io: 21.00  resc_cpu: 2149550
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 21.10  Resp: 21.10  Degree: 0
  ****** finished trying bitmap/domain indexes ******
******** Begin index join costing ********
  ****** trying bitmap/domain indexes ******
  Access Path: index (FullScan)
    Index: IDX_DATA_OWNER
    resc_io: 24.00  resc_cpu: 2170915
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 24.10  Resp: 24.10  Degree: 0
  Access Path: index (FullScan)
    Index: PK_OBJECT_ID
    resc_io: 21.00  resc_cpu: 2149550
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 21.10  Resp: 21.10  Degree: 0
  Access Path: index (FullScan)
    Index: PK_OBJECT_ID
    resc_io: 21.00  resc_cpu: 2149550
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 21.10  Resp: 21.10  Degree: 0
  Bitmap nodes:
    Used PK_OBJECT_ID
      Cost = 26.377821, sel = 1.000000
  ****** finished trying bitmap/domain indexes ******
******** End index join costing ********
  Best:: AccessPath: IndexFFS
  Index: PK_OBJECT_ID
         Cost: 7.06  Degree: 1  Resp: 7.06  Card: 10000.00  Bytes: 0

***************************************
。。。。。。。。。。。。。。

Starting SQL statement dump

user_id=90 user_name=LHR module=SQL*Plus action=
sql_id=g9rksvy7gkdmj plan_hash_value=1265209789 problem_type=3
----- Current SQL Statement for this session (sql_id=g9rksvy7gkdmj) -----
SELECT COUNT(*) FROM T_COUNT_LHR
sql_text_length=33
sql=SELECT COUNT(*) FROM T_COUNT_LHR
----- Explain Plan Dump -----
----- Plan Table -----

============
Plan Table
============
---------------------------------------------+-----------------------------------+
| Id  | Operation              | Name        | Rows  | Bytes | Cost  | Time      |
---------------------------------------------+-----------------------------------+
| 0   | SELECT STATEMENT       |             |       |       |     7 |           |
| 1   |  SORT AGGREGATE        |             |     1 |       |       |           |
| 2   |   INDEX FAST FULL SCAN | PK_OBJECT_ID|   10K |       |     7 |  00:00:01 |
---------------------------------------------+------------------------------------+
Predicate Information:
----------------------

Content of other_xml column
===========================
  db_version    : 11.2.0.3
  parse_schema   : LHR
  plan_hash     : 1265209789
  plan_hash_2    : 3881728982
  Outline Data:
  /*+
    BEGIN_OUTLINE_DATA
      IGNORE_OPTIM_EMBEDDED_HINTS
      OPTIMIZER_FEATURES_ENABLE('11.2.0.3')
      DB_VERSION('11.2.0.3')
      OPT_PARAM('star_transformation_enabled' 'true')
      ALL_ROWS
      OUTLINE_LEAF(@"SEL$1")
      INDEX_FFS(@"SEL$1" "T_COUNT_LHR"@"SEL$1" ("T_COUNT_LHR"."OBJECT_ID"))
    END_OUTLINE_DATA
  */

  。。。。。。。。。。。。。。。。
====================== END SQL Statement Dump ======================


Final query after transformations:******* UNPARSED QUERY IS *******
SELECT COUNT(*) "COUNT(1)" FROM "LHR"."T_COUNT_LHR" "T_COUNT_LHR"
kkoqbc: optimizing query block SEL$1 (#0)

        :
    call(in-use=1240, alloc=16344), compile(in-use=58312, alloc=58544), execution(in-use=2480, alloc=4032)

kkoqbc-subheap (create addr=0x7f9950a9fb58)
****************
QUERY BLOCK TEXT
****************
SELECT COUNT(1) FROM T_COUNT_LHR
---------------------
QUERY BLOCK SIGNATURE
---------------------
signature (optimizer): qb_name=SEL$1 nbfros=1 flg=0
  fro(0): flg=0 objn=159542 hint_alias="T_COUNT_LHR"@"SEL$1"

-----------------------------
SYSTEM STATISTICS INFORMATION
-----------------------------
  Using NOWORKLOAD Stats
  CPUSPEEDNW: 1752 millions instructions/sec (default is 100)
  IOTFRSPEED: 4096 bytes per millisecond (default is 4096)
  IOSEEKTIM:  10 milliseconds (default is 10)
  MBRC:      NO VALUE blocks (default is 8)

***************************************
BASE STATISTICAL INFORMATION
***********************
Table Stats::
  Table: T_COUNT_LHR  Alias: T_COUNT_LHR
    #Rows: 10000  #Blks:  75  AvgRowLen:  44.00  ChainCnt:  0.00
Index Stats::
  Index: IDX_DATA_OBJECT_ID  Col#: 4
    LVLS: 1  #LB: 5  #DK: 2318  LB/K: 1.00  DB/K: 1.00  CLUF: 86.00
  Index: IDX_DATA_OWNER  Col#: 3
```

```
    LVLS: 1  #LB: 23  #DK: 5  LB/K: 4.00  DB/K: 28.00  CLUF: 141.00
  Index: IDX_LDT  Col#: 6
    LVLS: 1  #LB: 26  #DK: 9999  LB/K: 1.00  DB/K: 1.00  CLUF: 377.00
  Index: PK_OBJECT_ID  Col#: 1
    LVLS: 1  #LB: 20  #DK: 10000  LB/K: 1.00  DB/K: 1.00  CLUF: 76.00
Access path analysis for T_COUNT_LHR
***************************************
SINGLE TABLE ACCESS PATH
  Single Table Cardinality Estimation for T_COUNT_LHR[T_COUNT_LHR]
  Table: T_COUNT_LHR  Alias: T_COUNT_LHR
    Card: Original: 10000.000000  Rounded: 10000  Computed: 10000.00  Non Adjusted: 10000.00
  Access Path: TableScan
    Cost:  22.10  Resp: 22.10  Degree: 0
      Cost_io: 22.00  Cost_cpu: 2034108
      Resp_io: 22.00  Resp_cpu: 2034108
  Access Path: index (index (FFS))
    Index: IDX_DATA_OWNER
    resc_io: 8.00  resc_cpu: 1363793
    ix_sel: 0.000000  ix_sel_with_filters: 1.000000
  Access Path: index (FFS)
    Cost:  8.06  Resp: 8.06  Degree: 1
      Cost_io: 8.00  Cost_cpu: 1363793
      Resp_io: 8.00  Resp_cpu: 1363793
  Access Path: index (index (FFS))
    Index: PK_OBJECT_ID
    resc_io: 7.00  resc_cpu: 1342429
    ix_sel: 0.000000  ix_sel_with_filters: 1.000000
  Access Path: index (FFS)
    Cost:  7.06  Resp: 7.06  Degree: 1
      Cost_io: 7.00  Cost_cpu: 1342429
      Resp_io: 7.00  Resp_cpu: 1342429
  Access Path: index (FullScan)
    Index: IDX_DATA_OWNER
    resc_io: 24.00  resc_cpu: 2170915
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 24.10  Resp: 24.10  Degree: 1
  Access Path: index (FullScan)
    Index: PK_OBJECT_ID
    resc_io: 21.00  resc_cpu: 2149550
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 21.10  Resp: 21.10  Degree: 1
  ****** trying bitmap/domain indexes ******
  Access Path: index (FullScan)
    Index: IDX_DATA_OWNER
    resc_io: 24.00  resc_cpu: 2170915
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 24.10  Resp: 24.10  Degree: 0
  Access Path: index (FullScan)
    Index: PK_OBJECT_ID
    resc_io: 21.00  resc_cpu: 2149550
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 21.10  Resp: 21.10  Degree: 0
  ****** finished trying bitmap/domain indexes ******
******** Begin index join costing ********
  ****** trying bitmap/domain indexes ******
  Access Path: index (FullScan)
    Index: IDX_DATA_OWNER
    resc_io: 24.00  resc_cpu: 2170915
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 24.10  Resp: 24.10  Degree: 0
  Access Path: index (FullScan)
    Index: PK_OBJECT_ID
    resc_io: 21.00  resc_cpu: 2149550
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 21.10  Resp: 21.10  Degree: 0
  Access Path: index (FullScan)
    Index: PK_OBJECT_ID
    resc_io: 21.00  resc_cpu: 2149550
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 21.10  Resp: 21.10  Degree: 0
  Bitmap nodes:
    Used PK_OBJECT_ID
      Cost = 26.377821, sel = 1.000000
  ****** finished trying bitmap/domain indexes ******
******** End index join costing ********
  Best:: AccessPath: IndexFFS
  Index: PK_OBJECT_ID
         Cost: 7.06  Degree: 1  Resp: 7.06  Card: 10000.00  Bytes: 0

***************************************
。 。 。 。 。 。 。 。 。 。 。 。 。 。 。 。 。
Starting SQL statement dump

user_id=90 user_name=LHR module=SQL*Plus action=
sql_id=4abkxq9x7uamj plan_hash_value=1265209789 problem_type=3
----- Current SQL Statement for this session (sql_id=4abkxq9x7uamj) -----
SELECT COUNT(1) FROM T_COUNT_LHR
sql_text_length=33
sql=SELECT COUNT(1) FROM T_COUNT_LHR
----- Explain Plan Dump -----
----- Plan Table -----

============
Plan Table
============
---------------------------------------------+-----------------------------------+
| Id  | Operation             | Name       | Rows  | Bytes | Cost  | Time      |
---------------------------------------------+-----------------------------------+
| 0   | SELECT STATEMENT      |            |       |       |     7 |           |
| 1   |  SORT AGGREGATE       |            |     1 |       |       |           |
| 2   |   INDEX FAST FULL SCAN | PK OBJECT ID|   10K |       |     7 |  00:00:01 |
---------------------------------------------+-----------------------------------+
Predicate Information:
----------------------

Content of other xml column
===========================
  db version     : 11.2.0.3
  parse schema   : LHR
  plan hash      : 1265209789
  plan hash 2    : 3881728982
  Outline Data:
  /*+
    BEGIN OUTLINE DATA
      IGNORE OPTIM EMBEDDED HINTS
      OPTIMIZER FEATURES ENABLE('11.2.0.3')
      DB VERSION('11.2.0.3')
      OPT PARAM('star transformation enabled' 'true')
      ALL ROWS
      OUTLINE LEAF(@"SEL$1")
      INDEX FFS(@"SEL$1" "T COUNT LHR"@"SEL$1" ("T COUNT LHR"."OBJECT ID"))
    END OUTLINE DATA
  */



====================== END SQL Statement Dump ======================
*******************************************
----- Current SQL Statement for this session (sql_id=4tm3jwzff8ub8) -----
SELECT COUNT(ROWID) FROM T_COUNT_LHR
********************************************
。。。。。。。。。
Final query after transformations:******* UNPARSED QUERY IS *******
SELECT COUNT("T_COUNT_LHR".ROWID) "COUNT(ROWID)" FROM "LHR"."T_COUNT_LHR" "T_COUNT_LHR"
kkoqbc: optimizing query block SEL$1 (#0)

       :
   call(in-use=1240, alloc=16344), compile(in-use=58224, alloc=62688), execution(in-use=2480, alloc=4032)

kkoqbc-subheap (create addr=0x7f9950a9fb58)
****************
QUERY BLOCK TEXT
****************
SELECT COUNT(ROWID) FROM T_COUNT_LHR
---------------------
QUERY BLOCK SIGNATURE
---------------------
signature (optimizer): qb_name=SEL$1 nbfros=1 flg=0
  fro(0): flg=0 objn=159542 hint_alias="T_COUNT_LHR"@"SEL$1"

-----------------------------
SYSTEM STATISTICS INFORMATION
-----------------------------
  Using NOWORKLOAD Stats
  CPUSPEEDNW: 1752 millions instructions/sec (default is 100)
  IOTFRSPEED: 4096 bytes per millisecond (default is 4096)
  IOSEEKTIM:  10 milliseconds (default is 10)
  MBRC:      NO VALUE blocks (default is 8)

***************************************
BASE STATISTICAL INFORMATION
***********************
Table Stats::
  Table: T COUNT LHR  Alias: T COUNT LHR
    #Rows: 10000  #Blks:  75  AvgRowLen:  44.00  ChainCnt:  0.00
Index Stats::
  Index: IDX DATA OBJECT ID  Col#: 4
    LVLS: 1  #LB: 5  #DK: 2318  LB/K: 1.00  DB/K: 1.00  CLUF: 86.00
  Index: IDX DATA OWNER  Col#: 3
    LVLS: 1  #LB: 23  #DK: 5  LB/K: 4.00  DB/K: 28.00  CLUF: 141.00
  Index: IDX LDT  Col#: 6
    LVLS: 1  #LB: 26  #DK: 9999  LB/K: 1.00  DB/K: 1.00  CLUF: 377.00
  Index: PK OBJECT ID  Col#: 1
    LVLS: 1  #LB: 20  #DK: 10000  LB/K: 1.00  DB/K: 1.00  CLUF: 76.00
Access path analysis for T COUNT LHR
***************************************
SINGLE TABLE ACCESS PATH
  Single Table Cardinality Estimation for T COUNT LHR[T COUNT LHR]
  Table: T COUNT LHR  Alias: T COUNT LHR
    Card: Original: 10000.000000  Rounded: 10000  Computed: 10000.00  Non Adjusted: 10000.00
  Access Path: TableScan
    Cost:  22.10  Resp: 22.10  Degree: 0
      Cost io: 22.00  Cost cpu: 2034108
      Resp io: 22.00  Resp cpu: 2034108
  Access Path: index (index (FFS))
    Index: IDX DATA OWNER
    resc io: 8.00  resc cpu: 1363793
    ix sel: 0.000000  ix sel with filters: 1.000000
  Access Path: index (FFS)
```

```
    Cost:  8.06  Resp: 8.06  Degree: 1
      Cost_io: 8.00  Cost_cpu: 1363793
      Resp_io: 8.00  Resp_cpu: 1363793
  Access Path: index (index (FFS))
    Index: PK_OBJECT_ID
    resc_io: 7.00  resc_cpu: 1342429
    ix_sel: 0.000000  ix_sel_with_filters: 1.000000
  Access Path: index (FFS)
    Cost:  7.06  Resp: 7.06  Degree: 1
      Cost_io: 7.00  Cost_cpu: 1342429
      Resp_io: 7.00  Resp_cpu: 1342429
  Access Path: index (FullScan)
    Index: IDX_DATA_OWNER
    resc_io: 24.00  resc_cpu: 2170915
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 24.10  Resp: 24.10  Degree: 1
  Access Path: index (FullScan)
    Index: PK_OBJECT_ID
    resc_io: 21.00  resc_cpu: 2149550
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 21.10  Resp: 21.10  Degree: 1
  ****** trying bitmap/domain indexes ******
  Access Path: index (FullScan)
    Index: IDX_DATA_OWNER
    resc_io: 24.00  resc_cpu: 2170915
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 24.10  Resp: 24.10  Degree: 0
  Access Path: index (FullScan)
    Index: PK_OBJECT_ID
    resc_io: 21.00  resc_cpu: 2149550
    ix_sel: 1.000000  ix_sel_with_filters: 1.000000
    Cost: 21.10  Resp: 21.10  Degree: 0
  ****** finished trying bitmap/domain indexes ******
  Best:: AccessPath: IndexFFS
  Index: PK_OBJECT_ID
         Cost: 7.06  Degree: 1  Resp: 7.06  Card: 10000.00  Bytes: 0

***************************************

。。。。。。。。。。。。。。。。。
Starting SQL statement dump

user_id=90 user_name=LHR module=SQL*Plus action=
sql_id=4tm3jwzff8ub8 plan_hash_value=1265209789 problem_type=3
----- Current SQL Statement for this session (sql_id=4tm3jwzff8ub8) -----
SELECT COUNT(ROWID) FROM T_COUNT_LHR
sql_text_length=37
sql=SELECT COUNT(ROWID) FROM T_COUNT_LHR
----- Explain Plan Dump -----
----- Plan Table -----

============
Plan Table
============
---------------------------------------------+-----------------------------------+
| Id  | Operation             | Name       | Rows  | Bytes | Cost  | Time      |
---------------------------------------------+-----------------------------------+
| 0   | SELECT STATEMENT      |            |       |       |     7 |           |
| 1   |  SORT AGGREGATE       |            |     1 |    12 |       |           |
| 2   |   INDEX FAST FULL SCAN | PK_OBJECT_ID|   10K |  117K |     7 |  00:00:01 |
---------------------------------------------+-----------------------------------+
Predicate Information:
----------------------
```

```
Content of other_xml column
===========================
  db_version     : 11.2.0.3
  parse_schema   : LHR
  plan_hash      : 1265209789
  plan_hash_2    : 3881728982
  Outline Data:
  /*+
    BEGIN_OUTLINE_DATA
      IGNORE_OPTIM_EMBEDDED_HINTS
      OPTIMIZER_FEATURES_ENABLE('11.2.0.3')
      DB_VERSION('11.2.0.3')
      OPT_PARAM('star_transformation_enabled' 'true')
      ALL_ROWS
      OUTLINE_LEAF(@"SEL$1")
      INDEX_FFS(@"SEL$1" "T_COUNT_LHR"@"SEL$1" ("T_COUNT_LHR"."OBJECT_ID"))
    END_OUTLINE_DATA
  */
。。。。。。。。。。。。
====================== END SQL Statement Dump ======================
```

2.3.5 COUNT(COL1)和 SELECT COL1 的区别

其实在 2014 年的时候，小麦苗发布过一篇博客（http://blog.itpub.net/26736162/viewspace-1329880/），里边对这个问题有详细的实验。今天就把这个实验搬过来吧。

```
drop table t  purge;
Create Table t  nologging As select *  from   dba_objects d ;
 create  index ind_objectname on  t(object_name);
 set autotrace traceonly;


 select t.object_name from t where t.object_name ='T';        --走索引
 select t.object_name from t where UPPER(t.object_name) ='T';      --不走索引
 select t.object_name from t where UPPER(t.object_name) ='T' and t.object_name IS NOT NULL ;         --
走索引  (INDEX FAST FULL SCAN)
 select t.object_name from t where UPPER(t.object_name) ||'AAA' ='T'||'AAA' and t.object_name IS NOT NULL ;
--走索引  (INDEX FAST FULL SCAN)
 select t.object_name,t.owner from t where UPPER(t.object_name) ||'AAA' ='T'||'AAA' and t.object_name IS
NOT NULL ;    --不走索引
```

```
C:\Users\xiaomaimiao>sqlplus lhr/lhr@orclasm

SQL*Plus: Release 11.2.0.1.0 Production on 星期三 11月 12 10:52:29 2014

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With the Partitioning, Automatic Storage Management, OLAP, Data Mining
and Real Application Testing options

SQL>
SQL>
SQL> drop table t  purge;

表已删除。

SQL> Create Table t  nologging As select *  from    dba_objects d ;

表已创建。

SQL>  create   index ind_objectname on  t(object_name);

索引已创建。
```

---- t 表所有列均可以为空

```
SQL> desc t
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 OWNER                                              VARCHAR2(30)
 OBJECT_NAME                                        VARCHAR2(128)
 SUBOBJECT_NAME                                     VARCHAR2(30)
 OBJECT_ID                                          NUMBER
 DATA_OBJECT_ID                                     NUMBER
 OBJECT_TYPE                                        VARCHAR2(19)
 CREATED                                           DATE
 LAST_DDL_TIME                                      DATE
 TIMESTAMP                                          VARCHAR2(19)
 STATUS                                            VARCHAR2(7)
 TEMPORARY                                          VARCHAR2(1)
 GENERATED                                          VARCHAR2(1)
 SECONDARY                                          VARCHAR2(1)
 NAMESPACE                                          NUMBER
 EDITION_NAME                                       VARCHAR2(30)

SQL>

SQL>  set autotrace traceonly;
SQL>  select t.object_name from t where t.object_name ='T';


执行计划
----------------------------------------------------------
Plan hash value: 4280870634

-----------------------------------------------------------------------------------
| Id  | Operation        | Name           | Rows  | Bytes | Cost (%CPU)| Time     |
-----------------------------------------------------------------------------------
|   0 | SELECT STATEMENT |                |     1 |    66 |     3   (0)| 00:00:01 |
|*  1 |  INDEX RANGE SCAN| IND_OBJECTNAME |     1 |    66 |     3   (0)| 00:00:01 |
-----------------------------------------------------------------------------------

Predicate Information (identified by operation id):
---------------------------------------------------

   1 - access("T"."OBJECT_NAME"='T')

Note
-----
   - dynamic sampling used for this statement (level=2)
   - SQL plan baseline "SQL_PLAN_503ygb00mbj6k165e82cd" used for this statement


统计信息
----------------------------------------------------------
         34  recursive calls
         43  db block gets
        127  consistent gets
        398  physical reads
      15476  redo size
```

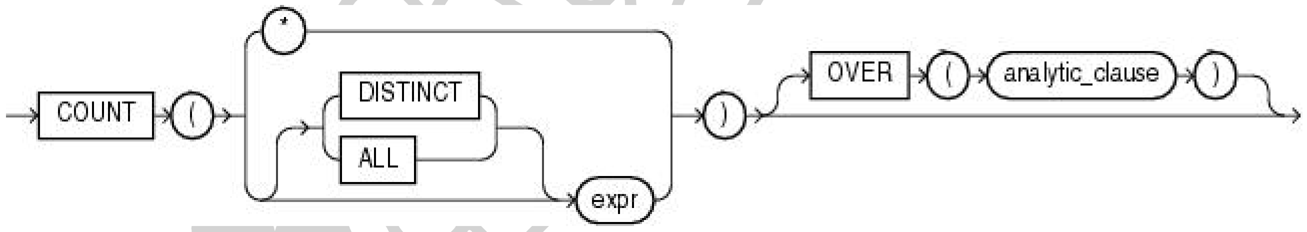
```
        349  bytes sent via SQL*Net to client
        359  bytes received via SQL*Net from client
          2  SQL*Net roundtrips to/from client
          0  sorts (memory)
          0  sorts (disk)
          1  rows processed

SQL>  select t.object_name from t where UPPER(t.object_name) ='T';


执行计划
----------------------------------------------------------
Plan hash value: 1601196873

--------------------------------------------------------------------------
| Id  | Operation         | Name | Rows  | Bytes | Cost (%CPU)| Time     |
--------------------------------------------------------------------------
|   0 | SELECT STATEMENT  |      |    12 |   792 |   305   (1)| 00:00:04 |
|*  1 |  TABLE ACCESS FULL| T    |    12 |   792 |   305   (1)| 00:00:04 |
--------------------------------------------------------------------------

Predicate Information (identified by operation id):
---------------------------------------------------

   1 - filter(UPPER("T"."OBJECT_NAME")='T')

Note
-----
   - dynamic sampling used for this statement (level=2)
   - SQL plan baseline "SQL_PLAN_9p76pys5gdb2b94ecae5c" used for this statement


统计信息
----------------------------------------------------------
         29  recursive calls
         43  db block gets
       1209  consistent gets
       1092  physical reads
      15484  redo size
        349  bytes sent via SQL*Net to client
        359  bytes received via SQL*Net from client
          2  SQL*Net roundtrips to/from client
          0  sorts (memory)
          0  sorts (disk)
          1  rows processed

SQL>  select t.object_name from t where UPPER(t.object_name) ='T' and t.object_name IS NOT NULL ;


执行计划
----------------------------------------------------------
Plan hash value: 3379870158

-------------------------------------------------------------------------------------
| Id  | Operation            | Name           | Rows  | Bytes | Cost (%CPU)| Time     |
-------------------------------------------------------------------------------------
|   0 | SELECT STATEMENT     |                |    51 |  3366 |   110   (1)| 00:00:02 |
|*  1 |  INDEX FAST FULL SCAN| IND_OBJECTNAME |    51 |  3366 |   110   (1)| 00:00:02 |
-------------------------------------------------------------------------------------

Predicate Information (identified by operation id):
---------------------------------------------------

   1 - filter("T"."OBJECT_NAME" IS NOT NULL AND UPPER("T"."OBJECT_NAME")='T')

Note
-----
   - dynamic sampling used for this statement (level=2)
   - SQL plan baseline "SQL_PLAN_czkarb71kthws18b0c28f" used for this statement
```

```
统计信息
----------------------------------------------------------
         29  recursive calls
         43  db block gets
        505  consistent gets
        384  physical reads
      15612  redo size
        349  bytes sent via SQL*Net to client
        359  bytes received via SQL*Net from client
          2  SQL*Net roundtrips to/from client
          0  sorts (memory)
          0  sorts (disk)
          1  rows processed

SQL>  select t.object_name,t.owner from t where UPPER(t.object_name) ||'AAA' ='T'||'AAA' and t.object_name IS NOT NULL ;


执行计划
----------------------------------------------------------
Plan hash value: 1601196873

--------------------------------------------------------------------------
| Id  | Operation         | Name | Rows  | Bytes | Cost (%CPU)| Time     |
--------------------------------------------------------------------------
|   0 | SELECT STATEMENT  |      |    51 |  4233 |   304   (1)| 00:00:04 |
|*  1 |  TABLE ACCESS FULL| T    |    51 |  4233 |   304   (1)| 00:00:04 |
--------------------------------------------------------------------------

Predicate Information (identified by operation id):
---------------------------------------------------

   1 - filter("T"."OBJECT_NAME" IS NOT NULL AND
              UPPER("T"."OBJECT_NAME")||'AAA'='TAAA')

Note
-----
   - dynamic sampling used for this statement (level=2)
   - SQL plan baseline "SQL_PLAN_au9a1c4hwdtb894ecae5c" used for this statement


统计信息
----------------------------------------------------------
         30  recursive calls
         44  db block gets
       1210  consistent gets
       1091  physical reads
      15748  redo size
        408  bytes sent via SQL*Net to client
        359  bytes received via SQL*Net from client
          2  SQL*Net roundtrips to/from client
          0  sorts (memory)
          0  sorts (disk)
          1  rows processed

SQL> select t.object_name from t where UPPER(t.object_name) ||'AAA' ='T'||'AAA' and t.object_name IS NOT NULL ;


执行计划
----------------------------------------------------------
Plan hash value: 3379870158

---------------------------------------------------------------------------------------
| Id  | Operation            | Name           | Rows  | Bytes | Cost (%CPU)| Time     |
---------------------------------------------------------------------------------------
|   0 | SELECT STATEMENT     |                |    51 |  3366 |   110   (1)| 00:00:02 |
|*  1 |  INDEX FAST FULL SCAN| IND_OBJECTNAME |    51 |  3366 |   110   (1)| 00:00:02 |
---------------------------------------------------------------------------------------

Predicate Information (identified by operation id):
```

```
---------------------------------------------------

   1 - filter("T"."OBJECT_NAME" IS NOT NULL AND
              UPPER("T"."OBJECT_NAME")||'AAA'='TAAA')

Note
-----
   - dynamic sampling used for this statement (level=2)
   - SQL plan baseline "SQL_PLAN_1gu36rnh3s2a318b0c28f" used for this statement


统计信息
----------------------------------------------------------
         28  recursive calls
         44  db block gets
        505  consistent gets
          6  physical reads
      15544  redo size
        349  bytes sent via SQL*Net to client
        359  bytes received via SQL*Net from client
          2  SQL*Net roundtrips to/from client
          0  sorts (memory)
          0  sorts (disk)
          1  rows processed

SQL>
```

2.4 实验结论

COUNT()函数是 Oracle 中的聚合函数，用于统计结果集的行数。其语法形式如下所示：



```
COUNT({ * | [ DISTINCT | ALL ] expr }) [ OVER (analytic_clause) ]
```

COUNT returns the number of rows returned by the query. You can use it as an aggregate or analytic function.

If you specify DISTINCT, then you can specify only the query_partition_clause of the analytic_clause. The order_by_clause and windowing_clause are not allowed.

If you specify expr, then COUNT returns the number of rows where expr is not null. You can count either all rows, or only distinct values of expr.

If you specify the asterisk (*), then this function returns all rows, including duplicates and nulls. COUNT never returns null.

我们把 COUNT 的使用情况分为以下 3 类：

① COUNT(1)、COUNT(*)、COUNT(常量)、COUNT(主键)、COUNT(ROWID)、COUNT(非空列)

② COUNT(允许为空列)

③ COUNT(DISTINCT 列名)

下面分别从查询结果和效率方面做个比较：

（一）结果区别

① COUNT(1)、COUNT(*)、COUNT(ROWID)、COUNT(常量)、COUNT(主键)、COUNT(非空列)这几种方式统计的行数是表中所有存在的行的总数，包括值为 NULL 的行和非空行。所以，这几种方式的执行结果相同。这里的常量可以为数字或字符串，例如，COUNT(2)、COUNT(333)、COUNT('x')、COUNT('xiaomaimiao')。需要注意的是：这里的 COUNT(1)中的“1”并不表示表中的第一列，它其实是一个表达式，可以换成任意数字或字符或表达式。

② COUNT(允许为空列) 这种方式统计的行数不会包括字段值为 NULL 的行。

③ COUNT(DISTINCT 列名) 得到的结果是除去值为 NULL 和重复数据后的结果。

④ “SELECT COUNT(''),COUNT(NULL) FROM T_COUNT_LHR;”返回 0 行。

（二）效率、索引

① 如果存在主键或非空列上的索引，那么 COUNT(1)、COUNT(*)、COUNT(ROWID)、COUNT(常量)、COUNT(主键)、COUNT(非空列)会首先选择主键上的索引快速全扫描（INDEX FAST FULL SCAN）。若主键不存在则会选择非空列上的索引。若非空列上没有索引则肯定走全表扫描（TABLE ACCESS FULL）。其中，COUNT(ROWID)在走索引的时候比其它几种方式要慢。通过 10053 事件可以看到这几种方式除了 COUNT(ROWID)之外，其它最终都会转换成 COUNT(*)的方式来执行。

② 对于 COUNT(COL1)来说，只要列字段上有索引则会选择索引快速全扫描（INDEX FAST FULL SCAN）。而对于“SELECT COL1”来说，除非列上有 NOT NULL 约束，否则执行计划会选择全表扫描。

③ COUNT(DISTINCT 列名) 若列上有索引，且有非空约束或在 WHERE 子句中使用 IS NOT NULL，则会选择索引快速全扫描。其余情况选择全表扫描。

2.5 关于 COUNT 的优化

统计记录条数，如何才能最快？xb_audit_ddl_lhr 表有 2303262 记录。

（一）全表扫描：

```
LHR@orclasm > set line 9999
LHR@orclasm > set autot on
LHR@orclasm > set timing on
LHR@orclasm > set time on
12:34:01 LHR@orclasm >
12:35:20 LHR@orclasm > SELECT /*+full(t)*/ COUNT(*) FROM xb_audit_ddl_lhr t;

  COUNT(*)
----------
   2303262

Elapsed: 00:01:16.53

Execution Plan
----------------------------------------------------------
Plan hash value: 3725780224

-------------------------------------------------------------------------------------------------
| Id  | Operation            | Name              | Rows  | Cost (%CPU)| Time     | Pstart| Pstop |
-------------------------------------------------------------------------------------------------
|   0 | SELECT STATEMENT     |                   |     1 | 26629   (1)| 00:05:20 |       |       |
|   1 |  SORT AGGREGATE      |                   |     1 |            |          |       |       |
|   2 |   PARTITION RANGE ALL|                   | 2247K| 26629   (1)| 00:05:20 |     1 |1048575|
|   3 |    PARTITION HASH ALL|                   | 2247K| 26629   (1)| 00:05:20 |     1 |     5 |
|   4 |     TABLE ACCESS FULL| XB_AUDIT_DDL_LHR | 2247K| 26629   (1)| 00:05:20 |     1 |1048575|
-------------------------------------------------------------------------------------------------
```

```


Statistics
----------------------------------------------------------
          1  recursive calls
         57  db block gets
      92274  consistent gets
      92012  physical reads
          0  redo size
        529  bytes sent via SQL*Net to client
        519  bytes received via SQL*Net from client
          2  SQL*Net roundtrips to/from client
          0  sorts (memory)
          0  sorts (disk)
          1  rows processed

12:36:47 LHR@orclasm >
```

（二）主键索引

```
12:38:31 LHR@orclasm > SELECT /*+index(SYS_C0011358)*/ COUNT(*) FROM xb_audit_ddl_lhr t;

  COUNT(*)
----------
   2303262

Elapsed: 00:00:00.24

Execution Plan
----------------------------------------------------------
Plan hash value: 2548021478

------------------------------------------------------------------------------
| Id  | Operation             | Name         | Rows  | Cost (%CPU)| Time     |
------------------------------------------------------------------------------
|   0 | SELECT STATEMENT      |              |     1 |  3114   (1)| 00:00:38 |
|   1 |  SORT AGGREGATE       |              |     1 |            |          |
|   2 |   INDEX FAST FULL SCAN| SYS_C0011358 |  2247K|  3114   (1)| 00:00:38 |
------------------------------------------------------------------------------


Statistics
----------------------------------------------------------
          0  recursive calls
          2  db block gets
      12283  consistent gets
      12220  physical reads
          0  redo size
        529  bytes sent via SQL*Net to client
        519  bytes received via SQL*Net from client
          2  SQL*Net roundtrips to/from client
          0  sorts (memory)
          0  sorts (disk)
          1  rows processed
```

（三）位图索引

```
CREATE BITMAP INDEX IND_xb_operation  ON xb_audit_ddl_lhr(operation) local;
12:41:44 LHR@orclasm > SELECT /*+index(IND_xb_operation)*/ COUNT(*) FROM xb_audit_ddl_lhr t;

  COUNT(*)
----------
   2303262

Elapsed: 00:00:00.00

Execution Plan
----------------------------------------------------------
Plan hash value: 1101410508

--------------------------------------------------------------------------------------------------------
-----
| Id  | Operation                    | Name             | Rows  | Cost (%CPU)| Time     | Pstart| Pstop |
--------------------------------------------------------------------------------------------------------
-----
|   0 | SELECT STATEMENT              |                  |     1 |   114   (0)| 00:00:02 |       |       |
|   1 |  SORT AGGREGATE              |                  |     1 |            |          |       |       |
|   2 |   PARTITION RANGE ALL         |                  |  2247K|   114   (0)| 00:00:02 |     1 |1048575|
|   3 |    PARTITION HASH ALL         |                  |  2247K|   114   (0)| 00:00:02 |     1 |     5 |
|   4 |     BITMAP CONVERSION COUNT     |                  |  2247K|   114   (0)| 00:00:02 |       |       |
|   5 |      BITMAP INDEX FAST FULL SCAN| IND_XB_OPERATION |       |            |          |     1 |1048575|
--------------------------------------------------------------------------------------------------------
-----


Statistics
----------------------------------------------------------
          0  recursive calls
          0  db block gets
        312  consistent gets
          0  physical reads
          0  redo size
        529  bytes sent via SQL*Net to client
        519  bytes received via SQL*Net from client
          2  SQL*Net roundtrips to/from client
          0  sorts (memory)
          0  sorts (disk)
          1  rows processed
```

在数据量超大的表上，还可以采用位图索引并行的方式。优化无止境，根据场景选择最适合的才是最好的。

第 3 章　参考文章

3.1 MOS

3.1.1 How the Oracle CBO Chooses a Path for the SELECT COUNT(*) Command (文档 ID 124717.1)

How the Oracle CBO Chooses a Path for the SELECT COUNT() Command (文档 ID 124717.1).mhtml

3.2 博客

3.2.1 asmtom

https://asktom.oracle.com/pls/asktom/f?p=100:11:0::::P11_QUESTION_ID:1156159920245

Ask TOM _difference between count(1) and count(_)_.mhtml

You Asked

```
What is the difference between count(1) and count(*) in a sql query
eg.
select count(1) from emp;
and
select count(*) from emp;
```

and we said...

nothing, they are the same, incur the same amount of work -- do the same thing, take the same amount of resources.

You can see this via:

```
ops$tkyte@ORA817.US.ORACLE.COM> alter session set sql_trace=true;

Session altered.

ops$tkyte@ORA817.US.ORACLE.COM> select count(*) from all_objects;

COUNT(*)
----------
27044

ops$tkyte@ORA817.US.ORACLE.COM> select count(1) from all_objects
2 /

COUNT(1)
----------
27044


and the tkprof will show:
```

```
select count(*)
from
all_objects


call count cpu elapsed disk query current rows
------- ------ -------- ---------- ---------- ---------- ---------- ----------
Parse 1 0.02 0.02 0 0 0 0
Execute 1 0.00 0.00 0 0 0 0
Fetch 2 5.56 5.56 0 234998 4 1
------- ------ -------- ---------- ---------- ---------- ---------- ----------
total 4 5.58 5.58 0 234998 4 1

select count(1)
from
all_objects


call count cpu elapsed disk query current rows
------- ------ -------- ---------- ---------- ---------- ---------- ----------
Parse 1 0.02 0.02 0 0 0 0
Execute 1 0.00 0.00 0 0 0 0
Fetch 2 5.46 5.47 0 234998 4 1
------- ------ -------- ---------- ---------- ---------- ---------- ----------
total 4 5.48 5.49 0 234998 4 1
```

Same number of blocks read/written/processed, same cpu times (basically) same elapsed times (basically).

they are identical.

Anyone who thinks different (and I know you are out there) will have to post a test case like the above or some scientific proof otherwise to be taken seriously....
