Five Hints for Optimal SQL

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Who am I ?

Independent Consultant

32+ years in IT
27+ using Oracle

Strategy, Design, Review,
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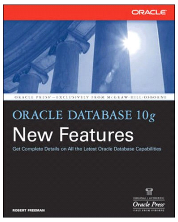
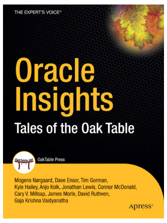
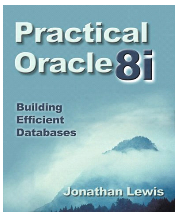
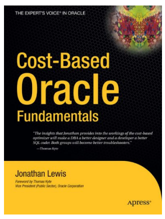
Trouble-shooting

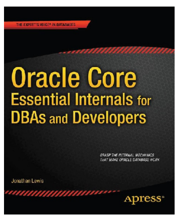
Oracle author of the year 2006
Select Editor's choice 2007
UKOUG Inspiring Presenter 2011
ODTUG 2012 Best Presenter (d/b)
UKOUG Inspiring Presenter 2012
UKOUG Lifetime Award (IPA) 2013
Member of the Oak Table Network
Oracle ACE Director
O1 visa for USA







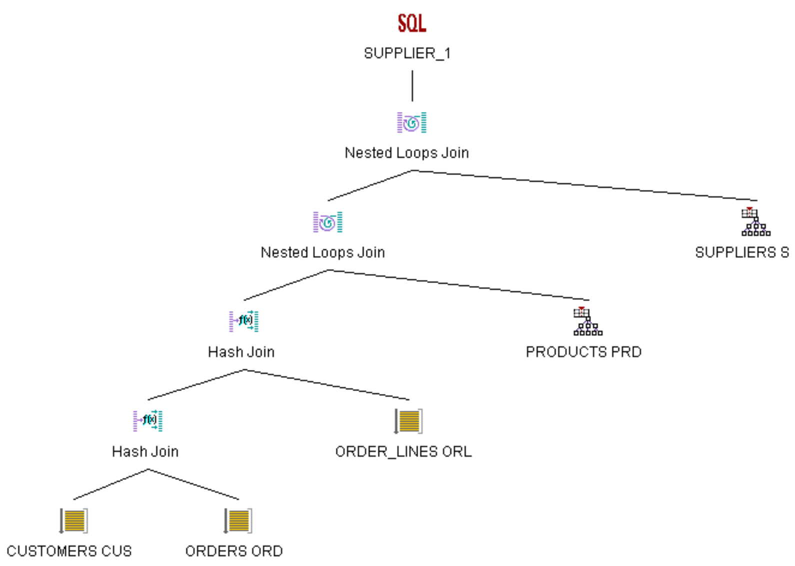




The Problem

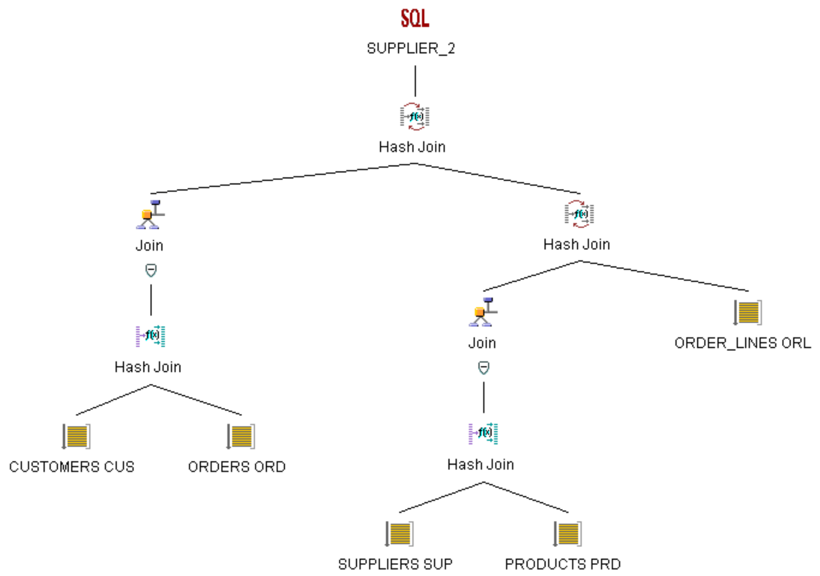
- "Left-deep"
- Bad choice of transformation
- Restrictions on transformations
- *Bad Estimates*
- *Bad join order*

Left-deep tree



The optimizer's strategy is always to work towards a 'left-deep' tree. We traverse the tree from the bottom left corner going across then up.

Bushy tree



But sometimes the left-deep tree cannot give a good path, and we have to push Oracle into a "bushy" tree – usually with ***/*+ no_merge */*** hints.

Example (a)

```
select ...
from   t1,
       (      select  ..., count(t3.v2)
              from    t2, t3
              where exists (
                     select ... where t2.v1 = ...
               )
              and    t3.n1 = t2.n1
              group by     ...
       ) v1,
       t4
where
       v1.n1 = t1.id
and    t4.id(+) = v1.n2
;
```


We may have a query that looks like this, which we have written with this layout because it shows (to the human eye) a good strategy for executing it.

Example (b)

- "Shaping" the query plan
- Your vision
  - ((t1, ((t2, subquery), t3)), t4)
- Oracle's plan
  - ((((t1, t2), t3), {unnested subquery}), t4)

We may have to tell the optimizer what our vision is because it will have a strong bias to get rid of the inline view and filter subquery if it can.

Example (c)

```
select /*+ push_pred(v1) */
from   t1,
       (      select /*+ no_merge */ ...
              from    t2, t3
              where exists (
                     select /*+ no_unnest push_subq */...
               )
              and    t3.n1 = t2.n1
              group by      ...
       ) v1,
       t4
where
       v1.n1 = t1.id
and    t4.(+d) = v1.n2
;
```


At the high level, this small number of ionline hints will describe our vision without trying to micro-manage the optimizer every step of the way

Example (d)

```
select /*+ qb_name(main) push_pred(v1@main)
           no_merge(@inline)
           no_unnest(@subq1) push_subq(@subq1)
       */
from   t1,
       (      select /*+ qb_name(inline) */ ...
              from    t2, t3
              where exists (
                     select /*+ qb_name(subq1) */ ...
               )
              and    t3.n1 = t2.n1
              group by      ...
       ) v1,
       t4
where  v1.n1 = t1.id and   t4.id(+) = v1.n2;
```


By adding ***query block names*** to the query we can put all the remaining hints at the start of the statement.

Example (e)

```
LEADING(@SEL$F0E3EC4B T2@INLINE T3@INLINE)
INDEX_RS_ASC(@SEL$F0E3EC4B T2@INLINE (T2.N1))
USE_NL(@SEL$F0E3EC4B T3@INLINE)
INDEX_RS_ASC(@SEL$F0E3EC4B T3@INLINE (T3.N1))
PUSH_SUBQ(@SUBQ1)
INDEX(@SUBQ1 T5@SUBQ1 (T5.ID))

LEADING(@MAIN T1@MAIN V1@MAIN T4@MAIN)
FULL(@MAIN T1@MAIN)
USE_NL(@MAIN V1@MAIN)
NO_ACCESS(@MAIN V1@MAIN)
PUSH_PRED(@MAIN V1@MAIN 1)
USE_HASH(@MAIN T4@MAIN)
FULL(@MAIN T4@MAIN)
```

```
OUTLINE(@MAIN)
OUTLINE(@INLINE)
OUTLINE(@SUBQ1)

OUTLINE_LEAF(@MAIN)
OUTLINE_LEAF(@SEL$F0E3EC4B)
OUTLINE_LEAF(@SUBQ1)

ALL_ROWS
DB_VERSION('12.1.0.2')
OPTIMIZER_FEATURES_ENABLE('12.1.0.2')

IGNORE_OPTIM_EMBEDDED_HINTS
```


The 13 hints on the left are the optimizer's micro-management. The ***outline_leaf*** hints on the right show it the final query blocks it optimizes.

The List

- (no_)merge
  - Three forms, easiest in-line, can be inside a with subquery
  - Naming the query block, in the inline view, naming the view
- (no_)push_pred
  - Push join predicate inside (non-mergeable) complex view - some limitations
- (no)_unnest
  - Two forms, easiest in the subquery
- (no_)push_subq
  - changed syntax in 10g, now two forms, easiest in the subquery
- driving_site()
  - Optimizer can choose driving site based on cost of network traffic

Complex View Merging

```
create or replace view avg_val_view as
select
        id_parent, avg(val) avg_val_t1
from    t2
group by
        id_parent;

select
        /*+ no_merge(avg_val_view) push_pred(avg_val_view) */
        t1.vc1, avg_val_t1
from
        t1, avg_val_view
where
        t1.vc2 = 'XYZ'
and     avg_val_view.id_parent = t1.id_parent
;
```

Unhinted

```
| Id  | Operation            | Name | Rows  | Bytes | Cost  |
|   0 | SELECT STATEMENT     |      |    23 |  2024 |    39 |
|   1 |  HASH GROUP BY       |      |    23 |  2024 |    39 |
|*  2 |   HASH JOIN          |      |    32 |  2816 |     8 |
|*  3 |    TABLE ACCESS FULL| T1   |     1 |    81 |     2 |
|   4 |    TABLE ACCESS FULL| T2   |  1024 |  7168 |     5 |

Predicate Information (identified by operation id):
   2 - access("ID_PARENT"="T1"."ID_PARENT")
   3 - filter("T1"."VC2"='XYZ')
```


The optimizer has joined then aggregated - which could be a disaster if it got the estimates wrong.

no_merge() hint only

```
| Id  | Operation              | Name         | Rows  | Bytes | Cost  |
|   0 | SELECT STATEMENT       |              |     1 |    95 |    40 |
|*  1 |  HASH JOIN             |              |     1 |    95 |    40 |
|   2 |   JOIN FILTER CREATE   | :BF0000      |     1 |    69 |     2 |
|*  3 |    TABLE ACCESS FULL   | T1           |     1 |    69 |     2 |
|   4 |   VIEW                 | AVG_VAL_VIEW |    32 |   832 |    37 |
|   5 |    HASH GROUP BY       |              |    32 |   224 |    37 |
|   6 |     JOIN FILTER USE    | :BF0000      |  1024 |  7168 |     5 |
|*  7 |      TABLE ACCESS FULL| T2           |  1024 |  7168 |     5 |

Predicate Information (identified by operation id):
   1 - access("AVG_VAL_VIEW"."ID_PARENT"="T1"."ID_PARENT")
   3 - filter("T1"."VC2"='XYZ')
   7 - filter(SYS_OP_BLOOM_FILTER(:BF0000,"ID_PARENT"))
```


The Bloom filter appeared for the first time in this example when I finally got to 11gR2

no_merge() + push_pred()

```
| Id  | Operation                 | Name         | Rows  | Bytes | Cost  |
|   0 | SELECT STATEMENT          |              |     1 |    82 |     7 |
|   1 |  NESTED LOOPS             |              |     1 |    82 |     7 |
|*  2 |   TABLE ACCESS FULL       | T1           |     1 |    69 |     2 |
|   3 |   VIEW PUSHED PREDICATE   | AVG_VAL_VIEW |     1 |    13 |     5 |
|*  4 |    FILTER                 |              |       |       |       |
|   5 |     SORT AGGREGATE        |              |     1 |     7 |       |
|*  6 |      TABLE ACCESS FULL    | T2           |    32 |   224 |     5 |

Predicate Information (identified by operation id):
   2 - filter("T1"."VC2"='XYZ')
   4 - filter(COUNT(*)>0)
   6 - filter("ID_PARENT"="T1"."ID_PARENT")
```


Forcing predicate pushdown in this example was actually a bad idea; but you can see the join predicate has moved inside the view.

Inline view

```
select
        t1.id, max_small
from
        t1,
        (
                select  /*+ no_merge push_pred */
                        id_p, max(small_num_c) max_small
                from    t2
                group by
                        id_p
        )       v2
where
        v2.id_p = t1.id
and     t1.small_num_p between 10 and 20
;
```


The mechanism applies equally well to in-line views, whether you write them in-line as above, or format them with subquery factoring.

Subquery Factoring

```
with max_view as (
        select  /*+ no_merge push_pred cardinality(NNN) */
                id_p, max(small_num_c) max_small
        from    t2
        group by
                id_p
)
select
        t1.id, max_small
from
        t1,
        max_view v2
where
        v2.id_p = t1.id
and     t1.small_num_p between 10 and 20
;
```


Generally (in modern versions of Oracle) when factored subquery is moved inline the plan you get matches the original inline plan.

Common plan

```
| Id  | Operation                       | Name  | Rows  | Bytes | Cost  |
|   0 | SELECT STATEMENT                |       |    60 |  1260 |   427 |
|   1 |  NESTED LOOPS                   |       |    60 |  1260 |   427 |
|*  2 |   TABLE ACCESS FULL             | T1    |    60 |   480 |     7 |
|   3 |   VIEW PUSHED PREDICATE         |       |     1 |    13 |     7 |
|*  4 |    FILTER                       |       |       |       |       |
|   5 |     SORT AGGREGATE              |       |     1 |     8 |       |
|   6 |      TABLE ACCESS BY INDEX ROWID| T2    |     5 |    40 |     7 |
|*  7 |       INDEX RANGE SCAN          | T2_PK |     5 |       |     2 |

Predicate Information (identified by operation id):
   2 - filter("T1"."SMALL_NUM_P">=10 AND "T1"."SMALL_NUM_P"<=20)
   4 - filter(COUNT(*)>0 AND 20>=10)
   7 - access("ID_P"="T1"."ID")
```


In this case the only difference between the plan from the stored view and the inline/CTE version is the absence of the stored view name at operation 3

No_merge limitation (a)

```
select
        round(sum(ceil(len/8100)) * 8/1024,0)    used_mb
from
        (
        select
                /*+ no_merge */
                dbms_lob.getlength(c1) len
        from
                tbl
        )
where
        len > &lob_limit
;
```


No_merge limitation (b)

Id	Operation	Name	Rows	Bytes	Cost
0	SELECT STATEMENT		1	13	2
1	SORT AGGREGATE		1	13	
2	VIEW		6	78	2
* 3	TABLE ACCESS FULL	TBL	6	522	2

```
Predicate Information (identified by operation id):
   3 - filter("DBMS_LOB"."GETLENGTH"("C1")>4000)
```

Workarounds

```
        select rownum rn, dbms_lob.get_length()…

        with subq as (select /*+ materialize */ …
```

'Trivial' no_merge (a)

```
SELECT …
FROM
        SIEBEL.S_ACT_EMP T1,            SIEBEL.S_EVT_ACT_X T2,
        SIEBEL.CX_CORR_DATE T3,         SIEBEL.S_EVT_ACT_SS T4,
        SIEBEL.S_CONTACT T5,            SIEBEL.S_ADDR_PER T6,
        SIEBEL.S_ASSET T7,              SIEBEL.S_ORG_EXT T8,
        SIEBEL.S_FN_APPR T9,            SIEBEL.S_PARTY T10,
        SIEBEL.S_CONTACT_X T11,         SIEBEL.S_PROJ T12,
        SIEBEL.S_PROJITEM T13,          SIEBEL.S_EVT_ACT_FNX T14,
        SIEBEL.S_USER T15,              SIEBEL.S_EVT_CAL T16,
        SIEBEL.S_ADDR_PER T17,          SIEBEL.CX_CMS_CONTRACT T18,
        SIEBEL.S_OPTY T19,              SIEBEL.S_EVT_ACT T20
WHERE …
ORDER BY
        T20.CREATED DESC
```

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A Siebel example (but it could be Oracle Financials, Peoplesoft, SAP etc. When a query has a lot of tables the optimizer can easily start badly.

'Trivial' no_merge (b)

```
SELECT …
FROM    (
        select /*+ no_merge */ …
        from    SIEBEL.S_EVT_ACT T20,
                SIEBEL.S_EVT_ACT_X T2, SIEBEL.S_EVT_ACT_SS T4,
                SIEBEL.S_EVT_ACT_FNX T14, SIEBEL.S_EVT_CAL T16
        ) v1,
        SIEBEL.S_ACT_EMP T1,            SIEBEL.CX_CORR_DATE T3,
        SIEBEL.S_CONTACT T5,            SIEBEL.S_ADDR_PER T6,
        SIEBEL.S_ASSET T7,              SIEBEL.S_ORG_EXT T8,
        SIEBEL.S_FN_APPR T9,            SIEBEL.S_PARTY T10,
        SIEBEL.S_CONTACT_X T11,         SIEBEL.S_PROJ T12,
        SIEBEL.S_PROJITEM T13,          SIEBEL.S_USER T15,
        SIEBEL.S_ADDR_PER T17,          SIEBEL.CX_CMS_CONTRACT T18,
        SIEBEL.S_OPTY T19,
WHERE …
ORDER BY
        v1.CREATED DESC
```

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This approach tends to double the length of the SQL (most of the select list appears twice). A simple ***leading(t20, t2, t4, t14, t16)*** might be sufficient.

"Unmerge" - everything changes (a)

```
select
        p.product_name,
        max(decode(s.year,2010, s.quantity)) quan_2010,
        max(decode(s.year,2011, s.quantity)) quan_2011,
        max(decode(s.year,2012, s.quantity)) quan_2012
from
        products        p,
        sales           s
where
        s.product_id = p.product_id
group by
        p.product_name
;
```


Interestingly a recent version of the optimizer added the capability to do the inverse of complex view merging for aggregates.

"Unmerge" - everything changes (b)

```
| Id  | Operation                          | Name     | Rows  | Bytes | Cost  |
|   0 | SELECT STATEMENT                   |          |     3 |   144 |    26 |
|   1 |  HASH GROUP BY                     |          |     3 |   144 |    26 |
|   2 |   NESTED LOOPS                     |          |     3 |   144 |    25 |
|   3 |    TABLE ACCESS FULL               | PRODUCTS |     4 |    36 |    17 |
|   4 |    VIEW PUSHED PREDICATE           | VW_GBC_1 |     1 |    39 |     2 |
|*  5 |     FILTER                         |          |       |       |       |
|   6 |      SORT AGGREGATE                |          |     1 |    10 |       |
|   7 |       TABLE ACCESS BY INDEX ROWID| SALES      |     3 |    30 |     2 |
|*  8 |        INDEX RANGE SCAN            | SAL_I1   |     3 |       |     1 |

Predicate Information (identified by operation id):
   5 - filter(COUNT(*)>0)
   8 - access("S"."PRODUCT_ID"="P"."PRODUCT_ID")
```


So you need to know about "group by placement" or the ***no_place_group_by*** hint or /*+ opt_params('_optimizer_group_by_placement',false) */

Unnesting (a)

```
select
        outer.*
from
        emp outer
where
        outer.sal > (
                select
                        avg(inner.sal)
                from    emp inner
                where inner.dept_no = outer.dept_no
        )
;
```


In this case we start with a subquery which is a correlated subquery with aggregation.

Unnesting (b)

```
select          -- notional unnesting transformation
        outer.*
from
        (
                select   dept_no,  avg(sal) av_sal
                from     emp
                group by dept_no
        )       inner,
        emp     outer
where
        outer.dept_no = inner.dept_no
and     outer.sal > inner.av_sal;
```

Unnesting (c)

```
select      -- possible view merge transformation
      outer.dept_no dept_no, outer.sal sal,
      outer.emp_no emp_no, outer.padding padding
from
      test_user.emp inner, test_user.emp outer
where
      inner.dept_no = outer.dept_no
group by
      inner.dept_no, outer.rowid,
      outer.padding, outer.emp_no,
      outer.sal, outer.dept_no
having
      outer.sal > avg(inner.sal)
```


Unnesting (d)

In the subquery

```
/*+ no_unnest */

/*+ unnest no_merge */

/*+ unnest merge */
```

In the containing query

```
/*+ no_unnest(@qb_name) */

/*+ unnest(@qb_name) no_merge(@qb_name) */

/*+ unnest(@qb_name) merge(@qb_name) */
```

Subquery pushdown (a)

```
select
       t1.v1
from   t1, t3
where  t1.n2 = 15
/*
and    exists (select --+ no_unnest
                      null
               from   t2
               where  t2.n1 = 15
               and    t2.id = t1.id
       )
*/
and    t3.n1 = t1.n1
and    t3.n2 = 15
;
```


If a subquery doesn't unnest it may run early or (as it generally does) it may run late in the execution of the query. (pushed down the tree).

Subquery pushdown (b)

Execution Plan 11.2.0.4 - **without** subquery .

Id	Operation	Name	Rows	Bytes	Cost
0	SELECT STATEMENT		173	3979	193
* 1	HASH JOIN		**173**	3979	193
* 2	TABLE ACCESS FULL	T1	**157**	2355	96
* 3	TABLE ACCESS FULL	T3	157	1256	96

Execution Plan 11.2.0.4 - ***with*** subquery .

Id	Operation	Name	Rows	Bytes	Cost
0	SELECT STATEMENT		**1**	28	**366**
* 1	FILTER				
* 2	HASH JOIN		173	4844	193
* 3	TABLE ACCESS FULL	T1	157	3140	96
* 4	TABLE ACCESS FULL	T3	157	1256	96
* 5	TABLE ACCESS BY INDEX ROWID	T2	1	8	2
* 6	INDEX UNIQUE SCAN	T2_PK	1		1

Subquery pushdown (c)

```
select
        t1.v1
from    t1, t3
where   t1.n2 = 15
and     exists (select --+ no_unnest push_subq
                        null
                from    t2
                where   t2.n1 = 15
                and     t2.id = t1.id
        )
and     t3.n1 = t1.n1
and     t3.n2 = 15
;
```


Warning: The syntax for push_subq() changed from 9i to 10g

Subquery pushdown (d)

```
Execution Plan 11.2.0.4 - subquery not pushed                             .
| Id  | Operation                    |  Name  | Rows   | Bytes | Cost |
|   0 | SELECT STATEMENT             |        |      1 |    28 |  366  |
|*  1 |  FILTER                      |        |        |       |       |
|*  2 |   HASH JOIN                  |        |    173 |  4844 |   193  |
|*  3 |    TABLE ACCESS FULL         | T1     |    157 |  3140 |    96  |
|*  4 |    TABLE ACCESS FULL         | T3     |    157 |  1256 |    96  |
|*  5 |   TABLE ACCESS BY INDEX ROWID| T2     |      1 |     8 |     2  |
|*  6 |    INDEX UNIQUE SCAN         | T2_PK  |      1 |       |     1  |
```

```
Execution Plan 11.2.0.4 - pushed subquery                                  .
| Id  | Operation                      | Name  | Rows  | Bytes | Cost  |
|   0 | SELECT STATEMENT               |       |     9 |   252 |   195 |
|*  1 |  HASH JOIN                     |       |     9 |   252 |   193 |
|*  2 |   TABLE ACCESS FULL            | T1    |     8 |   160 |    96 |
|*  3 |    TABLE ACCESS BY INDEX ROWID| T2    |     1 |     8 |     2 |
|*  4 |     INDEX UNIQUE SCAN          | T2_PK |     1 |       |     1 |
|*  5 |   TABLE ACCESS FULL            | T3    |   157 |  1256 |    96 |
```


Pushed subqueries break the *"first child first"* rule of thumb for reading plans. (A "missing" filter **operation** that distorts the shape of the plan.)

Distributed Effects (a)

```
create table dist_home {dist_away} as
select
       rownum              id,
       rpad(rownum,10)     small_vc,
       rpad(rownum,200)    large_vc
from   all_objects
where  rownum <= 2000;

alter table dist_home {dist_away}
       add constraint dh_pk {da_pk} primary key (id);

create public database link test@loopback using 'test';
```


Distributed Effects (a)

```
select
       /*+ driving_site (dh) */
       dh.small_vc,
       da.large_vc              -- note required columns
from
       dist_home                       dh,
       dist_away@test@loopback         da
where
       dh.small_vc like '12%'   -- small amount of data
and    da.id = dh.id
;
```

Distributed Effects (b)

```
| Id  | Operation           | Name      | Rows  | Inst    |IN-OUT|
|   0 | SELECT STATEMENT    |           |     2 |         |      |
|   1 |  NESTED LOOPS       |           |     2 |         |      |
|*  2 |   TABLE ACCESS FULL| DIST_HOME |     2 |         |      |
|   3 |   REMOTE            | DIST_AWAY |     1 |   TEST  | R->S |
```

```
Predicate Information (identified by operation id):
   2 - filter("DH"."SMALL_VC" LIKE '12%')

Remote SQL Information (identified by operation id):
   3 - SELECT "ID","LARGE_VC" FROM "DIST_AWAY" "DA" WHERE "ID"=:1
       (accessing 'TEST.LOCALDOMAIN@LOOPBACK' )
```


Distributed Effects (c)

Change the filter predicate to select more data:

```
dh.small_vc like '1%'
```

```
| Id  | Operation           | Name      | Rows  | Inst    |IN-OUT|
|   0 | SELECT STATEMENT    |           |   216 |         |      |
|*  1 |  HASH JOIN          |           |   216 |         |      |
|*  2 |   TABLE ACCESS FULL| DIST_HOME |   216 |         |      |
|   3 |   REMOTE            | DIST_AWAY |  2000 |   TEST  | R->S |
```

```
Predicate Information (identified by operation id):
   1 - access("DA"."ID"="DH"."ID")
   2 - filter("DH"."SMALL_VC" LIKE '1%')

Remote SQL Information (identified by operation id):
   3 - SELECT "ID","LARGE_VC" FROM "DIST_AWAY" "DA"
       (accessing 'TEST.LOCALDOMAIN@LOOPBACK' )
```

Distributed Effects (d)

"Tune" the hash join by changing the driving site to the away database

```
/*+ driving_site (da) */
```

```
| Id  | Operation                   | Name       | Rows  | Inst   |IN-OUT|
|   0 | SELECT STATEMENT REMOTE|               |   216 |        |      |
|*  1 |  HASH JOIN             |               |   216 |        |      |
|   2 |   REMOTE               | DIST_HOME |   216 |      ! | R->S |
|   3 |   TABLE ACCESS FULL    | DIST_AWAY |  2000 |   TEST |      |
```

```
Predicate Information (identified by operation id):
   1 - access("A1"."ID"="A2"."ID")

Remote SQL Information (identified by operation id):
   2 - SELECT "ID","SMALL_VC" FROM "DIST_HOME" "A2"
       WHERE "SMALL_VC" LIKE '1%' (accessing '!' )
```


Multi-table distributed join (a)

```
select
        sale_date,product, site, qty, profit
from
        sales@&m_target      sal,
        sites                sit,
        products@&m_target   prd
where
        sit.id = sal.site
and     prd.id = sal.product
and     prd.promoted > cast ('&m_test_date' as date)
;
```

Multi-table distributed join (b)

```
| Id  | Operation           | Name     | Rows  | Inst   |IN-OUT|
|   0 | SELECT STATEMENT    |          |  3632 |        |      |
|   1 |  NESTED LOOPS       |          |  3632 |        |      |
|   2 |   NESTED LOOPS      |          | 10000 |        |      |
|   3 |    REMOTE           | SALES    | 10000 |   TEST | R->S |
|*  4 |    INDEX UNIQUE SCAN| SI_PK    |     1 |        |      |
|   5 |   REMOTE            | PRODUCTS |     1 |   TEST | R->S |

Predicate Information (identified by operation id):
   4 - access("SIT"."ID"="SAL"."SITE")

Remote SQL Information (identified by operation id):
   3 - SELECT "SALE_DATE","SITE","PRODUCT","QTY","PROFIT" FROM
   "SALES" "SAL" (accessing 'TEST.LOCALDOMAIN@LOOPBACK' )

   5 - SELECT /*+ INDEX ("PRD") USE_NL ("PRD") */ "ID","PROMOTED"
   FROM "PRODUCTS" "PRD" WHERE "PROMOTED">:1 AND "ID"=:2 (accessing
   'TEST.LOCALDOMAIN@LOOPBACK' )
```


Multi-table distributed join (c)

```
| Id  | Operation           | Name  | Rows  | Inst   |IN-OUT|
|   0 | SELECT STATEMENT    |       |  3632 |        |      |
|   1 |  NESTED LOOPS       |       |  3632 |        |      |
|   2 |   REMOTE            |       |    45 |   TEST | R->S |
|*  3 |   INDEX UNIQUE SCAN| SI_PK |     1 |        |      |

Predicate Information (identified by operation id):
   3 - access("SIT"."ID"="SAL"."SITE")

Remote SQL Information (identified by operation id):
   2 - SELECT /*+ INDEX ("A1") */ "A1"."ID","A1"."PROMOTED",
   "A2"."SALE_DATE", "A2"."SITE","A2"."PRODUCT","A2"."QTY",
   "A2"."PROFIT" FROM "PRODUCTS" "A1","SALES" "A2" WHERE
   "A1"."ID"="A2"."PRODUCT" AND "A1"."PROMOTED"> CAST(TO_DATE(' 2013-
   06-07 00:00:00', 'syyyy-mm-dd hh24:mi:ss') AS date)
   (accessing 'TEST.LOCALDOMAIN@LOOPBACK' )
```

Summary

Hinting is not a desirable strategy

Always name your query blocks

There are a few fairly safe (structural) hints

- A few more than in the title, e.g: qb_name(), leading()
- no_merge() may be the most useful

If you have to hint it, document it

If you can hint it, baseline it -- and document it