

	I/O (DB Blocks)	Elapse Time
Tuning	132,395	7.046
Tuning	25,898	1.248
Tuning	00 %	00 %



Tuning

SQL Statement

```

SELECT --+ INDEX( m AM1TJPOD_IX05 )
  m.sht_mark ,
  d.ord ,
  m.acnt_date ,
  d.deb_acnt_name ,
  d.deb_acnt_item ,
  m.prp_psn_name ,
  m.apr_yn ,
  nvl(x.amt, 0) ,
  x.etc ,
  x.tax_chk ,
  x.tax_adj ,
  x.cbn_area_name ,
  x.cbn_area_busmark,
  x.cbn_area_org ,
  x.cbn_area_nm ,
  x.ent_par_name ,
  x.ent_name ,
  x.appr_name ,
  x.appr_busmark ,
  m.dep_code ,
  m.dep_name ,
  m.sht_type1 ,
  x.over_chk
FROM ktg.amltjpom m,
     ktg.amltjpod d,
     ktg.amltjtax x
WHERE m.acnt_par_code = '01'
      AND m.acnt_date between '20040101' and '20040531'
      AND m.dep_code like '%'
      AND '01' = '01'
      AND (decode(length('72600%'), 4, d.deb_acnt_item, 'zzzzzz') like '72600%'
           or (decode(length('72600%'), 6, d.deb_acnt_item, 'zzzzzz') in ('6211010',
                                   '6211020',
                                   '6211030',
                                   '7260001',
                                   '7260002',
                                   '7260003')))
      AND (substr(d.deb_acnt_item, length(d.deb_acnt_item) - 2, 3) in ('206',
                                   '217',
                                   '226',
                                   '230',
                                   '219',
                                   '301',
                                   '302')
           or substr(d.deb_acnt_item, 1, 7) in ('6211010',
                                   '6211020',
                                   '6211030',
                                   '7260001',
                                   '7260002',
                                   '7260003')))
      AND substr(d.deb_acnt_item, 1, 4) <> '1119'
      AND m.sht_type in ('1A',
                          '4A')

```

```

AND m.sht_mark||x.ord > '0' || '0'
AND m.sht_mark = d.sht_mark
AND m.sht_mark = x.sht_mark
AND d.sht_mark = x.sht_mark
AND d.ord = x.ord
UNION ALL
SELECT --+ INDEX( m AMITJPOD_IX06 )
  m.sht_mark ,
  d.ord ,
  m.acnt_date ,
  d.deb_acnt_name ,
  d.deb_acnt_item ,
  m.prp_psn_name ,
  m.apr_yn ,
  nvl(x.amt, 0) ,
  x.etc ,
  x.tax_chk ,
  x.tax_adj ,
  x.cbn_area_name ,
  x.cbn_area_busmark,
  x.cbn_area_org ,
  x.cbn_area_nm ,
  x.ent_par_name ,
  x.ent_name ,
  x.appr_name ,
  x.appr_busmark ,
  m.dep_code ,
  m.dep_name ,
  m.sht_type1 ,
  x.over_chk
FROM ktg.amltjpom m,
     ktg.amltjpod d,
     ktg.amltjtax x
WHERE m.acnt_par_code = '01'
      AND m.acnt_date between '20040101' and '20040531'
      AND m.dep_code like '%'
      AND '01' = '02'
      AND (decode(length('72600%'), 3, d.opp_acnt_item, 'xxxxxxxxxx') like '%'||
'72600%'
          or (decode(length('72600%'), 5, d.opp_acnt_item, 'xxxxxxxxxx') in (
'6211010',
          '6211020',
          '6211030',
          '7260001',
          '7260002',
          '7260003')))
      AND (substr(d.opp_acnt_item, length(d.opp_acnt_item) - 2, 3) in ('206',
          '217',
          '226',
          '230',
          '219',
          '301',
          '302')
          or substr(d.opp_acnt_item, 1, 7) in ('6211010',
          '6211020',
          '6211030',
          '7260001',
          '7260002',
          '7260003'))
      AND m.sht_type in ('1A',
          '4A')
      AND m.sht_mark||x.ord > '0' || '0'
      AND m.sht_mark = d.sht_mark
      AND m.sht_mark = x.sht_mark
      AND d.sht_mark = x.sht_mark
      AND d.ord = x.ord
ORDER BY 1, 2

```

Call	Count	CPU Time	Elapsed Time	Disk	Query	Current	Rows
Parse	1	0.020	0.019	0	0	0	0
Execute	1	0.000	0.000	0	0	0	0
Fetch	2	1.410	7.027	6053	132395	0	25
Total	4	1.430	7.046	6053	132395	0	25

Elapsed Time for Client(sec.): 7.036		
Misses in library cache during parse: 1		
Optimizer goal: CHOOSE		
Parsing user: KTG (ID=19)		
Rows	Row	Source Operation

	0	STATEMENT
	25	SORT ORDER BY (cr=132395 r=6053 w=0 time=7026094 us)
	25	UNION-ALL (cr=132395 r=6053 w=0 time=7025649 us)
	25	NESTED LOOPS (cr=132395 r=6053 w=0 time=7025390 us)
	3631	NESTED LOOPS (cr=121523 r=4624 w=0 time=4531809 us)
	52906	TABLE ACCESS BY INDEX ROWID AM1TJPOM (cr=13320 r=3958 w=0 time=2954381 us)
	52906	INDEX RANGE SCAN AM1TJPOM_IX01 (cr=227 r=226 w=0 time=279972 us)(Object ID 3379)
	3631	TABLE ACCESS BY INDEX ROWID AM1TJTAX (cr=108203 r=666 w=0 time=1412994 us)
	3631	INDEX RANGE SCAN AM1TJTAX_IX01 (cr=105922 r=26 w=0 time=621493 us)(Object ID 3387)
	25	TABLE ACCESS BY INDEX ROWID AM1TJPOD (cr=10872 r=1429 w=0 time=2483786 us)
	3608	INDEX UNIQUE SCAN AM1TJPOD_PK (cr=7264 r=120 w=0 time=147247 us)(Object ID 3987)
	0	FILTER (cr=0 r=0 w=0 time=2 us)
	0	NESTED LOOPS (cr=0 r=0 w=0 time=0 us)
	0	NESTED LOOPS (cr=0 r=0 w=0 time=0 us)
	0	TABLE ACCESS BY INDEX ROWID AM1TJPOM (cr=0 r=0 w=0 time=0 us)
	0	INDEX RANGE SCAN AM1TJPOM_IX01 (cr=0 r=0 w=0 time=0 us)(Object ID 3379)
	0	TABLE ACCESS BY INDEX ROWID AM1TJTAX (cr=0 r=0 w=0 time=0 us)
	0	INDEX RANGE SCAN AM1TJTAX_IX01 (cr=0 r=0 w=0 time=0 us)(Object ID 3387)
	0	TABLE ACCESS BY INDEX ROWID AM1TJPOD (cr=0 r=0 w=0 time=0 us)
	0	INDEX UNIQUE SCAN AM1TJPOD_PK (cr=0 r=0 w=0 time=0 us)(Object ID 3987)

✓	I/O	. AM1TJTAX Table	Table	Nested Loop Join
	Random I/O	Data	Data	Hash Join
✓	(MISDB)	hash Join	Disable	HASH Join
	Data	Hash Join	.	

& DBA Actions

- “`/*+ use_hash(x) swap_join_inputs(x) full(x) */`” Hint Query Block

Tuning /

☐ Tuning

```
SELECT /*+ use_hash(x) swap_join_inputs(x) full(x) */
       m.sht_mark ,
       d.ord ,
       m.acnt_date ,
```

```

d.deb_acnt_name ,
d.deb_acnt_item ,
m.prp_psn_name ,
m.apr_yn ,
nvl(x.amt, 0) ,
x.etc ,
x.tax_chk ,
x.tax_adj ,
x.cbn_area_name ,
x.cbn_area_busmark,
x.cbn_area_org ,
x.cbn_area_nm ,
x.ent_par_name ,
x.ent_name ,
x.appr_name ,
x.appr_busmark ,
m.dep_code ,
m.dep_name ,
m.sht_typed ,
x.over_chk
FROM ktg.amltjpom m,
ktg.amltjpod d,
ktg.amltjtax x
WHERE m.acnt_par_code = '01'
AND m.acnt_date between '20040101' and '20040531'
AND m.dep_code like '%'
AND '01' = '01'
AND (decode(length('72600%'), 4, d.deb_acnt_item, 'zzzzzz') like '72600%'
or (decode(length('72600%'), 6, d.deb_acnt_item, 'zzzzzz') in ('6211010',
'6211020',
'6211030',
'7260001',
'7260002',
'7260003')))
AND (substr(d.deb_acnt_item, length(d.deb_acnt_item) - 2, 3) in ('206',
'217',
'226',
'230',
'219',
'301',
'302')
or substr(d.deb_acnt_item, 1, 7) in ('6211010',
'6211020',
'6211030',
'7260001',
'7260002',
'7260003'))
AND substr(d.deb_acnt_item, 1, 4) <> '1119'
AND m.sht_type in ('1A',
'4A')
AND m.sht_mark||x.ord > '0' || '0'
AND m.sht_mark = d.sht_mark
AND m.sht_mark = x.sht_mark
AND d.sht_mark = x.sht_mark
AND d.ord = x.ord
UNION ALL
SELECT /*+ use_hash(x) swap_join_inputs(x) full(x) */
m.sht_mark ,
d.ord ,
m.acnt_date ,
d.deb_acnt_name ,
d.deb_acnt_item ,
m.prp_psn_name ,
m.apr_yn ,
nvl(x.amt, 0) ,
x.etc ,
x.tax_chk ,
x.tax_adj ,
x.cbn_area_name ,
x.cbn_area_busmark,
x.cbn_area_org ,
x.cbn_area_nm ,
x.ent_par_name ,
x.ent_name ,
x.appr_name ,
x.appr_busmark ,
m.dep_code ,
m.dep_name ,

```

```

m.sht_type1 ,
x.over_chk
FROM ktg.amltjpom m,
      ktg.amltjpod d,
      ktg.amltjtax x
WHERE m.acnt_par_code = '01'
      AND m.acnt_date between '20040101' and '20040531'
      AND m.dep_code like '%'
      AND '01' = '02'
      AND (decode(length('72600%'), 3, d.opp_acnt_item, 'xxxxxxxxxx') like '%'||
'72600%'
      or (decode(length('72600%'), 5, d.opp_acnt_item, 'xxxxxxxxxx') in (
'6211010',
      '6211020',
      '6211030',
      '7260001',
      '7260002',
      '7260003')))
      AND (substr(d.opp_acnt_item, length(d.opp_acnt_item) - 2, 3) in ('206',
      '217',
      '226',
      '230',
      '219',
      '301',
      '302')
      or substr(d.opp_acnt_item, 1, 7) in ('6211010',
      '6211020',
      '6211030',
      '7260001',
      '7260002',
      '7260003'))
      AND m.sht_type in ('1A',
      '4A')
      AND m.sht_mark||x.ord > '0' || '0'
      AND m.sht_mark = d.sht_mark
      AND m.sht_mark = x.sht_mark
      AND d.sht_mark = x.sht_mark
      AND d.ord = x.ord
ORDER BY 1, 2

```

Call	Count	CPU Time	Elapsed Time	Disk	Query	Current	Rows
Parse	1	0.000	0.000	0	0	0	0
Execute	1	0.000	0.000	0	0	0	0
Fetch	2	1.280	1.247	0	25898	0	25
Total	4	1.280	1.248	0	25898	0	25

Elapsed Time for Client(sec.): 1.254
Misses in library cache during parse: 0
Optimizer goal: CHOOSE
Parsing user: KTG (ID=19)

Rows	Row	Source Operation
0		STATEMENT
25		SORT ORDER BY (cr=25898 r=0 w=0 time=1246780 us)
25		UNION-ALL (cr=25898 r=0 w=0 time=1246438 us)
25		NESTED LOOPS (cr=25898 r=0 w=0 time=1246223 us)
3631		HASH JOIN (cr=15026 r=0 w=0 time=1184444 us)
131970		TABLE ACCESS FULL AM1TJTAX (cr=1708 r=0 w=0 time=182859 us)
52906		TABLE ACCESS BY INDEX ROWID AM1TJPOM (cr=13318 r=0 w=0 time=358888 us)
52906		INDEX RANGE SCAN AM1TJPOM_IX01 (cr=226 r=0 w=0 time=90282 us)(Object ID 3379)
25		TABLE ACCESS BY INDEX ROWID AM1TJPOD (cr=10872 r=0 w=0 time=52369 us)
3608		INDEX UNIQUE SCAN AM1TJPOD_PK (cr=7264 r=0 w=0 time=27717 us)(Object ID 3987)
0		FILTER (cr=0 r=0 w=0 time=1 us)
0		NESTED LOOPS (cr=0 r=0 w=0 time=0 us)
0		HASH JOIN (cr=0 r=0 w=0 time=0 us)
0		TABLE ACCESS FULL AM1TJTAX (cr=0 r=0 w=0 time=0 us)
0		TABLE ACCESS BY INDEX ROWID AM1TJPOM (cr=0 r=0 w=0 time=0 us)
0		INDEX RANGE SCAN AM1TJPOM_IX01 (cr=0 r=0 w=0 time=0 us)(Object ID 3379)
0		TABLE ACCESS BY INDEX ROWID AM1TJPOD (cr=0 r=0 w=0 time=0 us)
0		INDEX UNIQUE SCAN AM1TJPOD_PK (cr=0 r=0 w=0 time=0 us)(Object ID 3987)

	I/O (DB Blocks)	Elapse Time
Tuning		
Tuning		
Tuning	00 %	00 %



Tuning SQL Statement

```
select nvl(prod_code,' ') into :b0
from
ktg.sbbtbacd where bar_code=:b1
```

call	count	cpu	elapsed	disk	query	current	rows
Parse	1	0.00	0.00	0	0	0	0
Execute	154225	17.13	16.40	0	0	0	0
Fetch	154225	5.83	6.18	7	462675	0	154225
total	308451	23.96	22.58	7	462675	0	154225

Misses in library cache during parse
Optimizer goal: CHOOSE
Parsing user id: 19 (KTG)

Loop Query가 154,225 가 22

Rows Row Source Operation

```
154225 TABLE ACCESS BY INDEX ROWID OBJ#(5910) (cr=462675 r=7 w=0 time=1801907 us)
154225 INDEX UNIQUE SCAN OBJ#(5911) (cr=308450 r=3 w=0 time=891410 us)(object id 5911)
```

SBBTBACD

```
-----
Rows=425                               Blocks=4
Empty Blocks=383                       Avg Space=989
Chain Count=0                           Avg Row Length=64
Avg Space Freelist Blocks=0             Freelist Blocks=0
Sample Size=425                         Last Analyze=2004/08/27
Partitioned=NO
```

Column Name	Nullable	Column Type	Distinct	Buckets
BAR_CODE	NOT NULL	VARCHAR2(14)	425	1
PROD_CODE		VARCHAR2(11)	49	1
PROD_NAME	NOT NULL	VARCHAR2(40)	262	1
COM_CODE	NOT NULL	VARCHAR2(2)	7	1
MODIFIER	NOT NULL	VARCHAR2(8)	13	1
ALTDAT	NOT NULL	DATE	364	1
PROD_SCALE		VARCHAR2(2)	5	1
PROD_UNIT		NUMBER(5)	5	1
DESC_BAR_CODE		VARCHAR2(14)	287	1
TAR_TYPE		VARCHAR2(1)	5	1

INDEX

```
SBBTBACD__PK : BAR_CODE
Type=NORMAL, Uniq=YES, Distinct=425, Rows=425, Last Analyze=2004/08/27
```

✓ LOOP Query Loop SQL . loop Query DBMS latch
contention (library cache) .

) Source (SRD105C1.pc)

```

for( i = 0; i < array_size; i++ ){
    if ( fgets( cp_head, HEAD_LEN + 1, fp ) == NULL ) {
        fclose( fp );
        i_nomore = 1403;
        break;
    }
    else {
        STN2VCH( hv_ech_code      [i], cp_head + 0, 8 );
        STN2VCH( hv_center_code  [i], cp_head + 8, 3 );
        STN2VCH( hv_sel_date     [i], cp_head + 11, 8 );
        STN2VCH( hv_sel_area_code [i], cp_head + 24, 8 );
        STN2VCH( hv_bar_code     [i], cp_head + 32, 8 );
        STN2VCH( hv_sel_qty      [i], cp_head + 40, 9 );
        STN2VCH( hv_disc_amt     [i], cp_head + 49, 9 );
        STN2VCH( hv_sel_amt     [i], cp_head + 58, 9 );
        i_cnt++;
    }

    /*
    #ifdef DEBUG
        printf( "[SRD105C1]hv_bar_code = %s", hv_bar_code[i].arr );
        fflush( stdout );
    #endif
    */

    /*
    ( '00000000' )
    if ( strcmp( (char *)hv_sel_area_code[i].arr, "00000000" ) == 0 ){

        sprintf( JBMsg, "          (%s)          ('00000000')

(%ld) "

                !.", hv_ech_code[i].arr, i_for_cnt * array_size + i );

        return FAILURE;
    }

    */
EXEC SQL
SELECT nvl(prod code, ' ')
INTO :hv_prod_code [i]
FROM ktq.sbbtbacd
WHERE bar_code = :hv_bar_code [i];

switch( SQLCODE ) {
case SQL_OK :
    break;
default :
    sprintf( JBMsg, "          (%s)          (%s)          2(SQLCODE=%d)가 "
            "          .", hv_ech_code[i].arr, hv_bar_code[i].arr,
SQLCODE);

    /*
    sprintf( JBMsg, "          (%s)          2(SQLCODE=%d)가 "
            "          .(%s),(%s),(%s)", hv_bar_code[i].arr,
SQLCODE, hv_center_code[i].arr, hv_ech_code[i].arr, hv_sel_date[i].arr,
hv_sel_area_code[i].arr );

```

```

        */

        return FAILURE;
    }
}

#ifdef DEBUG
    printf("[SRD105C1]i_cnt = %d", i_cnt);
    fflush( stdout );
#endif

```

& DBA Actions

1. SQL Loop .

Actions

```

for( i = 0; i < array_size; i++ ){
    if ( fgets( cp_head, HEAD_LEN + 1, fp ) == NULL ) {
        fclose( fp );
        i_nomore = 1403;
        break;
    }
    else {
        STN2VCH( hv_ech_code      [i], cp_head + 0, 8 );
        STN2VCH( hv_center_code  [i], cp_head + 8, 3 );
        STN2VCH( hv_sel_date     [i], cp_head + 11, 8 );
        STN2VCH( hv_sel_area_code [i], cp_head + 24, 8 );
        STN2VCH( hv_bar_code     [i], cp_head + 32, 8 );
        STN2VCH( hv_sel_qty      [i], cp_head + 40, 9 );
        STN2VCH( hv_disc_amt     [i], cp_head + 49, 9 );
        STN2VCH( hv_sel_amt     [i], cp_head + 58, 9 );
        i_cnt++;
    }

    /*
#ifdef DEBUG
    printf("[SRD105C1]hv_bar_code = %s", hv_bar_code[i].arr);
    fflush( stdout );
#endif
*/

    /*
        ('00000000')
    */
    if ( strcmp( (char *)hv_sel_area_code[i].arr, "00000000" ) == 0 ){

        sprintf( JBMsg, "          (%s)          ('00000000')
(%ld)      "          !.", hv_ech_code[i].arr, i_for_cnt * array_size + i );

        return FAILURE;
    }

    /* LOOP      LOOP      */

}

/*
EXEC SQL
SELECT nvl(prod code, ' ')
INTO :hv_prod_code
FROM ktq.sbbtbacd
WHERE bar_code = :hv_bar_code;
*/

```



```

        switch( SQLCODE ) {
            case SQL_OK :
                break;
            default :
                sprintf( JBMsg, "          (%s)          (%s)          2(SQLCODE=%d)가 "
                    "          .", hv_ech_code[i].arr, hv_bar_code[i].arr,
SQLCODE);

                /*
                sprintf( JBMsg, "          (%s)          2(SQLCODE=%d)가 "
                    "          .(%s),(%s),(%s),(%s)", hv_bar_code[i].arr,
SQLCODE, hv_center_code[i].arr, hv_ech_code[i].arr, hv_sel_date[i].arr,
hv_sel_area_code[i].arr );
                */

                return FAILURE;
        }

#ifdef DEBUG
        printf("[SRD105C1]i_cnt = %d", i_cnt);
        fflush( stdout );
#endif

```

	I/O (DB Blocks)	Elapse Time
Tuning	31,437	4.755
Tuning	93,466	1.223
Tuning	00 %	00 %



Tuning SQL Statement

```

select '1' ,sum(j.apo_fmt_amt)
from
ktg.amltacit i ,ktg.byftmast j where (((j.fmt_year=:b0 and j.org_chk='OK')
and ((j.acnt_item like '53%' and i.item_code between '101' and '199') or
(j.acnt_item like '81%' and i.item_code like '84%')))) and j.item_code=
i.item_code) union all select '2' ,sum(j.apo_fmt_amt) from ktg.amltacit i ,
ktg.byftmast j where (((j.fmt_year=:b0 and j.org_chk='OK') and j.acnt_item
like '53%') and i.item_code between '201' and '299') and j.item_code=
i.item_code) union all select '3' ,sum(j.apo_fmt_amt) from ktg.amltacit i ,
ktg.byftmast j where (((j.fmt_year=:b0 and j.org_chk='OK') and j.acnt_item
like '53%') and i.item_code between '301' and '399') and j.item_code=
i.item_code) union all select '4' ,sum(j.apo_fmt_amt) from ktg.amltacit i ,
ktg.byftmast j where (((j.fmt_year=:b0 and j.org_chk='OK') and j.acnt_item
like '61%') and j.item_code=i.item_code) union all select '5' ,
sum(j.apo_fmt_amt) from ktg.amltacit i ,ktg.byftmast j where (((j.fmt_year=
:b0 and j.org_chk='OK') and j.acnt_item like '62%') and j.item_code=
i.item_code) union all select '6' ,sum(j.apo_fmt_amt) from ktg.amltacit i ,
ktg.byftmast j where (((j.fmt_year=:b0 and j.org_chk='OK') and j.acnt_item
like '67%') and j.item_code=i.item_code)

```

Call	Count	CPU Time	Elapsed Time	Disk	Query	Current	Rows
Parse	1	0.000	0.003	0	0	0	0
Execute	1	0.000	0.000	0	0	0	0
Fetch	2	2.700	4.752	31412	31437	0	6
Total	4	2.700	4.755	31412	31437	0	6

Elapsed Time for Client(sec.): 4.762
Misses in library cache during parse: 1
Optimizer goal: CHOOSE
Parsing user: KTG (ID=19)

Rows	Row	Source	Operation
0		STATEMENT	
6		UNION-ALL	(cr=31437 r=31412 w=0 time=4751594 us)
1		SORT AGGREGATE	(cr=5241 r=5237 w=0 time=1122277 us)
2454		NESTED LOOPS	(cr=5241 r=5237 w=0 time=1120566 us)
18142		TABLE ACCESS FULL BYFTMAST	(cr=5239 r=5237 w=0 time=1007715 us)
2454		INDEX UNIQUE SCAN AM1TACIT_PK	(cr=2 r=0 w=0 time=77959 us)(Object ID 3270)
1		SORT AGGREGATE	(cr=5240 r=5235 w=0 time=795351 us)
12472		NESTED LOOPS	(cr=5240 r=5235 w=0 time=786842 us)
12472		TABLE ACCESS FULL BYFTMAST	(cr=5238 r=5235 w=0 time=720758 us)
12472		INDEX UNIQUE SCAN AM1TACIT_PK	(cr=2 r=0 w=0 time=34021 us)(Object ID 3270)
1		SORT AGGREGATE	(cr=5240 r=5235 w=0 time=713643 us)
357		NESTED LOOPS	(cr=5240 r=5235 w=0 time=713395 us)
357		TABLE ACCESS FULL BYFTMAST	(cr=5238 r=5235 w=0 time=711468 us)
357		INDEX UNIQUE SCAN AM1TACIT_PK	(cr=2 r=0 w=0 time=982 us)(Object ID 3270)
1		SORT AGGREGATE	(cr=5238 r=5235 w=0 time=713767 us)
0		NESTED LOOPS	(cr=5238 r=5235 w=0 time=713763 us)
0		TABLE ACCESS FULL BYFTMAST	(cr=5238 r=5235 w=0 time=713760 us)
0		INDEX UNIQUE SCAN AM1TACIT_PK	(cr=0 r=0 w=0 time=0 us)(Object ID 3270)

1	SORT AGGREGATE	(cr=5240 r=5235 w=0 time=703591 us)
518	NESTED LOOPS	(cr=5240 r=5235 w=0 time=703231 us)
518	TABLE ACCESS FULL BYFTMAST	(cr=5238 r=5235 w=0 time=700892 us)
518	INDEX UNIQUE SCAN AM1TACIT_PK	(cr=2 r=0 w=0 time=989 us)(Object ID 3270)
1	SORT AGGREGATE	(cr=5238 r=5235 w=0 time=702705 us)
0	NESTED LOOPS	(cr=5238 r=5235 w=0 time=702701 us)
0	TABLE ACCESS FULL BYFTMAST	(cr=5238 r=5235 w=0 time=702699 us)
0	INDEX UNIQUE SCAN AM1TACIT_PK	(cr=0 r=0 w=0 time=0 us)(Object ID 3270)

- ✓

BYFTMAST Table

6

Full Table Scan

.
- ✓

Full Table Scan

I/O가

Disk

가

wio%

CPU

.
- I/O

Index Scan

.

& DBA Actions

1. Action
2. DBA parameter Plan .

DBA Actions

Parameter
optimizer_index_caching = 80 optimizer_index_cost_adj = 30
→
parameter
optimizer_index_caching = 50 optimizer_index_cost_adj = 20

Tuning /

☐ Tuning

```

select '1' ,sum(j.apo_fmt_amt)
from
ktg.amltacit i ,ktg.byftmast j where (((j.fmt_year=:b0 and j.org_chk='OK')
and ((j.acnt_item like '53%' and i.item_code between '101' and '199') or
(j.acnt_item like '81%' and i.item_code like '84%')))) and j.item_code=
i.item_code) union all select '2' ,sum(j.apo_fmt_amt) from ktg.amltacit i ,
ktg.byftmast j where (((j.fmt_year=:b0 and j.org_chk='OK') and j.acnt_item
like '53%') and i.item_code between '201' and '299') and j.item_code=
i.item_code) union all select '3' ,sum(j.apo_fmt_amt) from ktg.amltacit i ,
ktg.byftmast j where (((j.fmt_year=:b0 and j.org_chk='OK') and j.acnt_item
like '53%') and i.item_code between '301' and '399') and j.item_code=
i.item_code) union all select '4' ,sum(j.apo_fmt_amt) from ktg.amltacit i ,
ktg.byftmast j where ((j.fmt_year=:b0 and j.org_chk='OK') and j.acnt_item
like '61%') and j.item_code=i.item_code) union all select '5' ,
sum(j.apo_fmt_amt) from ktg.amltacit i ,ktg.byftmast j where (((j.fmt_year=
:b0 and j.org_chk='OK') and j.acnt_item like '62%') and j.item_code=
i.item_code) union all select '6' ,sum(j.apo_fmt_amt) from ktg.amltacit i ,
ktg.byftmast j where ((j.fmt_year=:b0 and j.org_chk='OK') and j.acnt_item
like '67%') and j.item_code=i.item_code)

```

Call	Count	CPU Time	Elapsed Time	Disk	Query	Current	Rows
Parse	1	0.000	0.003	0	0	0	0
Execute	1	0.000	0.000	0	0	0	0
Fetch	2	0.950	1.219	517	93466	0	6
Total	4	0.950	1.223	517	93466	0	6

Elapsed Time for Client(sec.): 1.230
 Misses in library cache during parse: 1
 Optimizer goal: CHOOSE
 Parsing user: KTG (ID=19)

Rows	Row	Source Operation
0	6	STATEMENT
	6	UNION-ALL (cr=93466 r=517 w=0 time=1219297 us)
1	1	SORT AGGREGATE (cr=15580 r=517 w=0 time=550625 us)
2454	1	NESTED LOOPS (cr=15580 r=517 w=0 time=548881 us)
18142	1	TABLE ACCESS BY INDEX ROWID BYFTMAST (cr=15578 r=517 w=0 time=435714 us)
18142	1	INDEX RANGE SCAN BYFTMAST_PK (cr=111 r=110 w=0 time=219302 us)(Object ID 4206)
2454	1	INDEX UNIQUE SCAN AM1TACIT_PK (cr=2 r=0 w=0 time=77819 us)(Object ID 3270)
1	1	SORT AGGREGATE (cr=15578 r=0 w=0 time=210165 us)
12472	1	NESTED LOOPS (cr=15578 r=0 w=0 time=201476 us)
12472	1	TABLE ACCESS BY INDEX ROWID BYFTMAST (cr=15576 r=0 w=0 time=134833 us)
18142	1	INDEX RANGE SCAN BYFTMAST_PK (cr=110 r=0 w=0 time=17553 us)(Object ID 4206)
12472	1	INDEX UNIQUE SCAN AM1TACIT_PK (cr=2 r=0 w=0 time=33909 us)(Object ID 3270)
1	1	SORT AGGREGATE (cr=15578 r=0 w=0 time=124901 us)
357	1	NESTED LOOPS (cr=15578 r=0 w=0 time=124638 us)
357	1	TABLE ACCESS BY INDEX ROWID BYFTMAST (cr=15576 r=0 w=0 time=122577 us)
18142	1	INDEX RANGE SCAN BYFTMAST_PK (cr=110 r=0 w=0 time=17558 us)(Object ID 4206)
357	1	INDEX UNIQUE SCAN AM1TACIT_PK (cr=2 r=0 w=0 time=1039 us)(Object ID 3270)
1	1	SORT AGGREGATE (cr=15576 r=0 w=0 time=109914 us)
0	1	NESTED LOOPS (cr=15576 r=0 w=0 time=109908 us)
0	1	TABLE ACCESS BY INDEX ROWID BYFTMAST (cr=15576 r=0 w=0 time=109905 us)
18142	1	INDEX RANGE SCAN BYFTMAST_PK (cr=110 r=0 w=0 time=17418 us)(Object ID 4206)
0	1	INDEX UNIQUE SCAN AM1TACIT_PK (cr=0 r=0 w=0 time=0 us)(Object ID 3270)
1	1	SORT AGGREGATE (cr=15578 r=0 w=0 time=113577 us)
518	1	NESTED LOOPS (cr=15578 r=0 w=0 time=113220 us)
518	1	TABLE ACCESS BY INDEX ROWID BYFTMAST (cr=15576 r=0 w=0 time=110772 us)
18142	1	INDEX RANGE SCAN BYFTMAST_PK (cr=110 r=0 w=0 time=17354 us)(Object ID 4206)
518	1	INDEX UNIQUE SCAN AM1TACIT_PK (cr=2 r=0 w=0 time=1041 us)(Object ID 3270)
1	1	SORT AGGREGATE (cr=15576 r=0 w=0 time=109819 us)
0	1	NESTED LOOPS (cr=15576 r=0 w=0 time=109815 us)
0	1	TABLE ACCESS BY INDEX ROWID BYFTMAST (cr=15576 r=0 w=0 time=109813 us)
18142	1	INDEX RANGE SCAN BYFTMAST_PK (cr=110 r=0 w=0 time=17421 us)(Object ID 4206)
0	1	INDEX UNIQUE SCAN AM1TACIT_PK (cr=0 r=0 w=0 time=0 us)(Object ID 3270)

	I/O (DB Blocks)	Elapse Time
Tuning	172,384	1.760
Tuning	3,356	0.457
Tuning	00 %	00 %

 Tuning SQL Statement

```

select acnt_item ,
       acnt_date ,
       exp_amt ,
       imp_amt ,
       ech_name ,
       etc
from (
  select c2.apo_acnt_item acnt_item ,
         c2.cau_do_date acnt_date ,
         0 exp_amt ,
         c2.amt imp_amt ,
         decode(om.ech_code, null , om.ech_name, re.ech_sname) ech_name ,
         om.outline etc
  from ktg.abatgere re ,
       ktg.aektjic2 c2 ,
       ktg.amltjpom om
  where (((c2.dep_code=:b0
           and om.acnt_par_code=substr(:b0, 1, 2))
          and om.acnt_date like (substr(:b2, 1, 6)||'%'))
         and om.apr_yn like (:b3||'%'))
         and c2.sht_mark=om.sht_mark)
         and om.ech_code=re.ech_code(+))
union all
select acnt_item ,
       app_date acnt_date ,
       sum(amt) exp_amt ,
       0 imp_amt ,
       '' ech_name ,
       ' ' etc
from ktg.aektbjod
where (((fmt_year= substr(:b2, 1, 4)
        and app_date is not null )
       and app_date like (substr(:b2, 1, 6)||'%'))
       and amt<>0)
       and bj_org_code like :b0)
group by app_date, acnt_item
union all (
  select apo_acnt_item acnt_item ,
         max(' ') acnt_date ,
         sum(exp_amt) exp_amt ,
         sum(imp_amt) imp_amt ,
         '' ech_name ,
         max(' ') etc
  from (
    select c2.apo_acnt_item ,
           0 exp_amt , sum(c2.amt) imp_amt
    from ktg.aektjic2 c2 , ktg.amltjpom om
    where (((c2.dep code=:b0
            and om.acnt par code= substr(:b0, 1, 2))
           and om.acnt date between (substr(:b2, 1, 4)||'0101')
           and (substr(:b2, 1, 6)||'00'))

```

```

        and om.apr_yn like (:b3||'%''))
        and c2.sht_mark= om.sht_mark)
    group by c2.apo_acnt_item
union all
select acnt_item ,
      sum(amt) exp_amt ,
      0 imp_amt
from ktg.aektbjod
where (((fmt_year=substr(:b2, 1, 4)
        and app_date is not null )
        and app_date<(substr(:b2, 1, 6)||'00'))
        and amt<>0)
        and bj_org_code like :b0)
    group by acnt_item)
  group by apo_acnt_item))
order by acnt_item, acnt_date, exp_amt desc

```

Call	Count	CPU Time	Elapsed Time	Disk	Query	Current	Rows
Parse	1	0.000	0.000	0	0	0	0
Execute	1	0.000	0.000	0	0	0	0
Fetch	2	1.800	1.760	0	172384	0	5
Total	4	1.800	1.760	0	172384	0	5

Elapsed Time for Client(sec.): 1.764
 Misses in library cache during parse: 0
 Optimizer goal: CHOOSE
 Parsing user: KTG (ID=19)

Rows	Row Source Operation
0	STATEMENT
5	SORT ORDER BY (cr=172384 r=0 w=0 time=1759995 us)
5	VIEW (cr=172384 r=0 w=0 time=1759922 us)
5	UNION-ALL (cr=172384 r=0 w=0 time=1759913 us)
0	NESTED LOOPS OUTER (cr=5127 r=0 w=0 time=174418 us)
0	HASH JOIN (cr=5127 r=0 w=0 time=174415 us)
118	TABLE ACCESS BY INDEX ROWID AEKTJIC2 (cr=93 r=0 w=0 time=948 us)
118	INDEX RANGE SCAN AEKTJIC2_IX01 (cr=4 r=0 w=0 time=207 us)(Object ID 3259)
15696	TABLE ACCESS BY INDEX ROWID AM1TJPOM (cr=5034 r=0 w=0 time=147478 us)
15705	INDEX RANGE SCAN AM1TJPOM_IX01 (cr=62 r=0 w=0 time=56879 us)(Object ID 3379)
0	TABLE ACCESS BY INDEX ROWID ABATGERE (cr=0 r=0 w=0 time=0 us)
0	INDEX UNIQUE SCAN ABATGERE_PK (cr=0 r=0 w=0 time=0 us)(Object ID 3400)
0	SORT GROUP BY (cr=1229 r=0 w=0 time=221712 us)
0	TABLE ACCESS FULL AEKTBJOD (cr=1229 r=0 w=0 time=221677 us)
5	SORT GROUP BY (cr=166028 r=0 w=0 time=1363594 us)
10	VIEW (cr=166028 r=0 w=0 time=1363496 us)
10	UNION-ALL (cr=166028 r=0 w=0 time=1363478 us)
5	SORT GROUP BY (cr=164799 r=0 w=0 time=1146137 us)
22	FILTER (cr=164799 r=0 w=0 time=1145987 us)
22	TABLE ACCESS BY INDEX ROWID AEKTJIC2 (cr=164799 r=0 w=0 time=1145938 us)
68826	NESTED LOOPS (cr=163910 r=0 w=0 time=1110098 us)
67720	TABLE ACCESS BY INDEX ROWID AM1TJPOM (cr=28464 r=0 w=0 time=462635 us)
67846	INDEX RANGE SCAN AM1TJPOM_IX01 (cr=256 r=0 w=0 time=71103 us)(Object ID 3379)
1105	INDEX RANGE SCAN AEKZJIC2_IX01 (cr=135446 r=0 w=0 time=467962 us)(Object ID 3262)
5	SORT GROUP BY (cr=1229 r=0 w=0 time=217251 us)
12	TABLE ACCESS FULL AEKTBJOD (cr=1229 r=0 w=0 time=217169 us)

I/O 95%

✓ Nested Loop Join AEKTJIC2 Table Access

Random I/O가

& DBA Actions

1. **Join** **. ORDERED Hint** **FROM**
USE_NL **.**

Apps DBA Actions

```

select acnt_item ,
       acnt_date ,
       exp_amt ,
       imp_amt ,
       ech_name ,
       etc
from (
  select /*+ ORDERED USE_NL(c2 om re) */ c2.apo_acnt_item acnt_item ,
       c2.cau_do_date acnt_date ,      0 exp_amt ,      c2.amt imp_amt ,
       decode(om.ech_code, null , om.ech_name, re.ech_sname) ech_name , om.outline etc
  from
    ktg.aektjic2 c2, ktg.amltjpom om, ktg.abatgere re
  where (((c2.dep_code=:b0
           and om.acnt_par_code=substr(:b0, 1, 2))
           and om.acnt_date like (substr(:b2, 1, 6)||'%')
           and om.apr_yn like (:b3||'%')
           and c2.sht_mark=om.sht_mark)
           and om.ech_code=re.ech_code(+))

  union all
  select acnt_item , app_date acnt_date , sum(amt) exp_amt ,
         0 imp_amt , '' ech_name , '' etc
  from ktg.aektbjod
  where (((fmt_year= substr(:b2, 1, 4)
           and app_date is not null )
           and app_date like (substr(:b2, 1, 6)||'%')
           and amt<>0) and bj_org_code like :b0)

  group by app_date, acnt_item
  union all
  (
    select apo_acnt_item acnt_item ,
           max(' ') acnt_date ,
           sum(exp_amt) exp_amt ,
           sum(imp_amt) imp_amt ,
           '' ech_name ,
           max(' ') etc
    from (
      select /*+ ORDERED USE_NL(c2 om) */ c2.apo_acnt_item ,
           0 exp_amt ,
           sum(c2.amt) imp_amt
      from ktg.aektjic2 c2 , ktg.amltjpom om
      where (((c2.dep_code=:b0
               and om.acnt_par_code= substr(:b0, 1, 2))
               and om.acnt_date between (substr(:b2, 1, 4)||'0101') and
      (substr(:b2, 1, 6)||'00'))
               and om.apr_yn like (:b3||'%')
               and c2.sht_mark= om.sht_mark)
      group by c2.apo_acnt_item
      union all
      select acnt_item ,
             sum(amt) exp_amt ,
             0 imp_amt
      from ktg.aektbjod
      where (((fmt_year=substr(:b2, 1, 4)
               and app_date is not null )
               and app_date<(substr(:b2, 1, 6)||'00'))
               and amt<>0)
               and bj_org_code like :b0)
      group by acnt_item)
    group by apo_acnt_item))

```



```
order by acnt_item, acnt_date, exp_amt desc
```

Tuning /

Tuning

```
select acnt_item ,
       acnt_date ,
       exp_amt ,
       imp_amt ,
       ech_name ,
       etc
from (
  select /*+ ORDERED USE_NL(c2 om re) */ c2.apo_acnt_item acnt_item ,
        c2.cau_do_date acnt_date ,
        0 exp_amt ,
        c2.amt imp_amt ,
        decode(om.ech_code, null , om.ech_name, re.ech_sname) ech_name ,
        om.outline etc
  from
    ktg.aektjic2 c2 ,
    ktg.amltjpom om,
    ktg.abatgere re
  where (((c2.dep_code=:b0
            and om.acnt_par_code=substr(:b0, 1, 2))
            and om.acnt_date like (substr(:b2, 1, 6)||'%')
            and om.apr_yn like (:b3||'%')
            and c2.sht_mark=om.sht_mark)
            and om.ech_code=re.ech_code(+))
  union all
  select acnt_item ,
        app_date acnt_date ,
        sum(amt) exp_amt ,
        0 imp_amt ,
        ' ' ech_name ,
        ' ' etc
  from ktg.aektbjod
  where (((fmt_year= substr(:b2, 1, 4)
            and app_date is not null )
            and app_date like (substr(:b2, 1, 6)||'%')
            and amt<>0)
            and bj_org_code like :b0)
  group by app_date, acnt_item
  union all (
    select apo_acnt_item acnt_item ,
          max(' ') acnt_date ,
          sum(exp_amt) exp_amt ,
          sum(imp_amt) imp_amt ,
          ' ' ech_name ,
          max(' ') etc
    from (
      select /*+ ORDERED USE_NL(c2 om) */ c2.apo_acnt_item ,
            0 exp_amt ,
            sum(c2.amt) imp_amt
      from ktg.aektjic2 c2 ,
            ktg.amltjpom om
      where (((c2.dep_code=:b0
                and om.acnt_par_code= substr(:b0, 1, 2))
                and om.acnt_date between (substr(:b2, 1, 4)||'0101')
                and (substr(:b2, 1, 6)||'00'))
                and om.apr_yn like (:b3||'%')
                and c2.sht_mark= om.sht_mark)
      group by c2.apo_acnt_item
```

```

union all
select acnt_item ,
      sum(amt) exp_amt ,
      0 imp_amt
from ktg.aektbjod
where (((fmt_year=substr(:b2, 1, 4)
        and app_date is not null )
        and app_date<(substr(:b2, 1, 6)||'00'))
        and amt<>0)
        and bj_org_code like :b0)
      group by acnt_item))
      group by apo_acnt_item))
order by acnt_item, acnt_date, exp_amt desc

```

Call	Count	CPU Time	Elapsed Time	Disk	Query	Current	Rows
Parse	1	0.010	0.005	0	0	0	0
Execute	1	0.000	0.000	0	0	0	0
Fetch	2	0.460	0.452	0	3356	0	5
Total	4	0.470	0.457	0	3356	0	5

Elapsed Time for Client(sec.): 0.462
 Misses in library cache during parse: 1
 Optimizer goal: CHOOSE
 Parsing user: KTG (ID=19)

Rows	Row	Source Operation
0	0	STATEMENT
5	5	SORT ORDER BY (cr=3356 r=0 w=0 time=451735 us)
5	5	VIEW (cr=3356 r=0 w=0 time=451644 us)
5	5	UNION-ALL (cr=3356 r=0 w=0 time=451635 us)
0	0	NESTED LOOPS OUTER (cr=449 r=0 w=0 time=3407 us)
0	0	NESTED LOOPS (cr=449 r=0 w=0 time=3405 us)
118	118	TABLE ACCESS BY INDEX ROWID AEKTJIC2 (cr=93 r=0 w=0 time=1054 us)
118	118	INDEX RANGE SCAN AEKTJIC2 IX01 (cr=4 r=0 w=0 time=197 us)(Object ID 3259)
0	0	TABLE ACCESS BY INDEX ROWID AM1TJPOM (cr=356 r=0 w=0 time=2072 us)
118	118	INDEX UNIQUE SCAN AM1TJPOM PK (cr=238 r=0 w=0 time=937 us)(Object ID 3384)
0	0	TABLE ACCESS BY INDEX ROWID ABATGERE (cr=0 r=0 w=0 time=0 us)
0	0	INDEX UNIQUE SCAN ABATGERE_PK (cr=0 r=0 w=0 time=0 us)(Object ID 3400)
0	0	SORT GROUP BY (cr=1229 r=0 w=0 time=223964 us)
0	0	TABLE ACCESS FULL AEKTBJOD (cr=1229 r=0 w=0 time=223916 us)
5	5	SORT GROUP BY (cr=1678 r=0 w=0 time=224115 us)
10	10	VIEW (cr=1678 r=0 w=0 time=224028 us)
10	10	UNION-ALL (cr=1678 r=0 w=0 time=224013 us)
5	5	SORT GROUP BY (cr=449 r=0 w=0 time=3363 us)
22	22	FILTER (cr=449 r=0 w=0 time=3231 us)
22	22	NESTED LOOPS (cr=449 r=0 w=0 time=3197 us)
118	118	TABLE ACCESS BY INDEX ROWID AEKTJIC2 (cr=93 r=0 w=0 time=895 us)
118	118	INDEX RANGE SCAN AEKTJIC2 IX01 (cr=4 r=0 w=0 time=170 us)(Object ID 3259)
22	22	TABLE ACCESS BY INDEX ROWID AM1TJPOM (cr=356 r=0 w=0 time=1993 us)
118	118	INDEX UNIQUE SCAN AM1TJPOM PK (cr=238 r=0 w=0 time=893 us)(Object ID 3384)
5	5	SORT GROUP BY (cr=1229 r=0 w=0 time=220571 us)
12	12	TABLE ACCESS FULL AEKTBJOD (cr=1229 r=0 w=0 time=220490 us)

	I/O (DB Blocks)	Elapse Time
Tuning	392,315	2.404
Tuning	591	1.614
Tuning	00 %	00 %



Tuning

SQL Statement

```

SELECT a.svr_gu_code,
       a.cnt_mark,
       nvl(max(b.name), ' '),
       a.prod_type_code,
       a.grw_type_code,
       sum(y.inv_mark),
       sum(y.plt_aqr),
       sum(x.leaf_1st_grd),
       sum(x.leaf_2nd_grd),
       sum(x.leaf_3rd_grd),
       sum(x.leaf_4th_grd),
       sum(x.ovrund_1st),
       sum(x.ovrund_2nd),
       sum(x.ovrund_3rd),
       sum(x.grd_exc),
       sum(x.pur_num),
       sum(x.pur_amt),
       max(a.bef_sup_amt)
FROM ktg.CTATCONT a,
     ktg.CTATHUMN b,
     (
       select year_make year_make,
              cgr_code cgr_code,
              cnt_mark cnt_mark,
              nvl(sum(pur_num), 0) - nvl(sum(decode(substr(code, 6, 3), 'X6X', pur_num, 0)), 0) -
              nvl(sum(decode(substr(code, 6, 3), 'X7X', pur_num, 0)), 0) pur_num,
              nvl(sum(decode(leaf_pot_code||grd_code, '51', pur_qty_kg, 0)), 0) +
              nvl(sum(decode(leaf_pot_code||grd_code, '41', pur_qty_kg, 0)), 0) leaf_1st_grd,
              nvl(sum(decode(leaf_pot_code||grd_code, '52', pur_qty_kg, 0)), 0) +
              nvl(sum(decode(leaf_pot_code||grd_code, '42', pur_qty_kg, 0)), 0) leaf_2nd_grd,
              nvl(sum(decode(leaf_pot_code||grd_code, '53', pur_qty_kg, 0)), 0) +
              nvl(sum(decode(leaf_pot_code||grd_code, '43', pur_qty_kg, 0)), 0) leaf_3rd_grd,
              nvl(sum(decode(leaf_pot_code||grd_code, '54', pur_qty_kg, 0)), 0) +
              nvl(sum(decode(leaf_pot_code||grd_code, '44', pur_qty_kg, 0)), 0) leaf_4th_grd,
              nvl(sum(decode(leaf_pot_code||grd_code, '31', pur_qty_kg, 0)), 0) +
              nvl(sum(decode(leaf_pot_code||grd_code, '61', pur_qty_kg, 0)), 0) ovrund_1st,
              nvl(sum(decode(leaf_pot_code||grd_code, '32', pur_qty_kg, 0)), 0) +
              nvl(sum(decode(leaf_pot_code||grd_code, '62', pur_qty_kg, 0)), 0) ovrund_2nd,
              nvl(sum(decode(leaf_pot_code||grd_code, '33', pur_qty_kg, 0)), 0) +
              nvl(sum(decode(leaf_pot_code||grd_code, '63', pur_qty_kg, 0)), 0) ovrund_3rd,
              nvl(sum(decode(grd_code, '9', pur_qty_kg, 0)), 0) grd_exc,
              nvl(sum(pur_amt), 0) pur_amt
       FROM ktg.CTATSSIL
       where year_make = '2004'
             and cgr_code = '2312'
       group by year_make, cgr_code, cnt_mark ) x,
     (
       select cnt_year cnt_year,
              cgr_code cgr_code,
              cnt_mark cnt_mark,
              nvl(count(inv_mark), 0) inv_mark,
              nvl(sum(plt_aqr), 0) plt_aqr
       from ktg.CTATPINV
       where cnt_year = '2004'
             and cgr_code = '2312'
       group by cnt_year, cgr_code, cnt_mark ) y
WHERE a.ech_code = b.ech_code

```

```

AND a.cnt_year = y.cnt_year
AND a.cgr_code = y.cgr_code
AND a.cnt_mark = y.cnt_mark
AND a.cnt_year = x.year_make
AND a.cgr_code = x.cgr_code
AND a.cnt_mark = x.cnt_mark
AND a.cnt_year = '2004'
AND a.cgr_code = '2312'
AND a.svr_gu_code like '%'
GROUP BY a.svr_gu_code, a.cnt_mark, a.prod_type_code, a.grw_type_code
ORDER BY a.cnt_mark

```

Call	Count	CPU Time	Elapsed Time	Disk	Query	Current	Rows
Parse	1	0.010	0.013	0	0	0	0
Execute	1	0.000	0.000	0	0	0	0
Fetch	2	2.390	2.390	10	392315	0	164
Total	4	2.400	2.404	10	392315	0	164

Elapsed Time for Client(sec.): 2.402
 Misses in library cache during parse: 1
 Optimizer goal: CHOOSE
 Parsing user: KTG (ID=19)

Rows	Row	Source	Operation
0		STATEMENT	
164		SORT GROUP BY (cr=392315 r=10 w=0 time=2387237 us)	
164		NESTED LOOPS (cr=392315 r=10 w=0 time=2385177 us)	
164		NESTED LOOPS (cr=391985 r=0 w=0 time=2315460 us)	
195816		MERGE JOIN CARTESIAN (cr=187 r=0 w=0 time=528847 us)	
1194		VIEW (cr=136 r=0 w=0 time=25052 us)	
1194		SORT GROUP BY (cr=136 r=0 w=0 time=23219 us)	
3604		TABLE ACCESS BY INDEX ROWID CTATPINV (cr=136 r=0 w=0 time=12085 us)	
3604		INDEX RANGE SCAN CTATPINV_PK (cr=17 r=0 w=0 time=5420 us)(Object ID 4019)	
195816		BUFFER SORT (cr=51 r=0 w=0 time=333065 us)	
164		VIEW (cr=51 r=0 w=0 time=29887 us)	
164		SORT GROUP BY (cr=51 r=0 w=0 time=28361 us)	
938		TABLE ACCESS BY INDEX ROWID CTATSSIL (cr=51 r=0 w=0 time=3422 us)	
938		INDEX RANGE SCAN CTATSSIL_PK (cr=11 r=0 w=0 time=1522 us)(Object ID 4054)	
164		TABLE ACCESS BY INDEX ROWID CTATCONT (cr=391798 r=0 w=0 time=1228807 us)	
164		INDEX UNIQUE SCAN CTATCONT_PK (cr=391634 r=0 w=0 time=1016622 us)(Object ID 4234)	
164		TABLE ACCESS BY INDEX ROWID CTATHUMN (cr=330 r=10 w=0 time=69194 us)	
164		INDEX UNIQUE SCAN CTATHUMN_PK (cr=166 r=10 w=0 time=68439 us)(Object ID 3713)	

CTATCONT

Rows=286,653	Blocks=3,720
Empty Blocks=3,192	Avg Space=854
Chain Count=0	Avg Row Length=91
Avg Space Freelist Blocks=0	Freelist Blocks=0
Sample Size=26,445	Last Analyze=2004/09/01
Partitioned=NO	

Column Name	Nullable	Column Type	Distinct	Buckets
CNT_YEAR	NOT NULL	VARCHAR2(4)	9	1
CGR_CODE	NOT NULL	VARCHAR2(4)	83	1
CNT_MARK	NOT NULL	NUMBER(4)	7,038	1
SVR_GU_CODE		VARCHAR2(2)	16	1
PROD_TYPE_CODE	NOT NULL	VARCHAR2(3)	9	1
GRW_TYPE_CODE		VARCHAR2(1)	2	1
FAH_CHK_CODE		VARCHAR2(1)	9	1
PUR_AREA_CODE	NOT NULL	VARCHAR2(6)	213	1
BEF_SUP_AMT		NUMBER(19,4)	6,107	1
FARM_YEAR_NUM	NOT NULL	NUMBER(2)	54	1
PLAN_QTY		NUMBER(19,4)	1,787	1
REQ_AQR		NUMBER(6,1)	88	1
TENA_PER_QTY		NUMBER(6,1)	334	1
REM_CGR_CODE		VARCHAR2(4)	0	1
REM_CNT_MARK		VARCHAR2(4)	0	1

REM_SVR_GUCODE		VARCHAR2(2)	0	1
REM_YN		VARCHAR2(1)	2	1
ECH_CODE	NOT NULL	VARCHAR2(8)	52,873	1
ETC		VARCHAR2(50)	4	1
IN_QTY		NUMBER(4,2)	311	1
IN_NITRO		NUMBER(4,2)	383	1
IN_NICO		NUMBER(4,2)	369	1
IN_SUGAR		NUMBER(4,2)	221	1
NICO_IN_SUGAR		NUMBER(4,2)	234	1
NICO_IN_QTY		NUMBER(4,2)	321	1
MODIFIER	NOT NULL	VARCHAR2(8)	47	1
ALTDATE	NOT NULL	DATE	1,028	1
HIRE_CHK		VARCHAR2(1)	3	1

INDEX

CTATCONT_IX01 : CNT_YEAR + ECH_CODE

Type=NORMAL, Uniq=No, Distinct=287,442, Rows=287,452, Last Analyze=2004/09/01

CTATCONT_PK : CNT_YEAR + CGR_CODE + CNT_MARK

Type=NORMAL, Uniq=YES, Distinct=287,194, Rows=287,194.5, Last Analyze=2004/09/01

CTATHUMN

Rows=76,797	Blocks=1,132
Empty Blocks=1,940	Avg Space=858
Chain Count=0	Avg Row Length=103
Avg Space Freelist Blocks=0	Freelist Blocks=0
Sample Size=7,134	Last Analyze=2004/09/01
Partitioned=NO	

Column Name	Nullable	Column Type	Distinct	Buckets
ECH_CODE	NOT NULL	VARCHAR2(8)	76,797	1
NAME	NOT NULL	VARCHAR2(10)	32,520	1
PSNID	NOT NULL	VARCHAR2(13)	68,371	1
GOV_AREA_CODE	NOT NULL	VARCHAR2(8)	744	1
SUB_ADDR		VARCHAR2(120)	12,976	1
TEL		VARCHAR2(20)	21,092	1
OPEN_DATE	NOT NULL	VARCHAR2(8)	56	1
POST		VARCHAR2(6)	1,322	1
MODIFIER	NOT NULL	VARCHAR2(8)	65	1
ALTDATE	NOT NULL	DATE	1,611	1

INDEX

CTATHUMN_PK : ECH_CODE

Type=NORMAL, Uniq=YES, Distinct=76,860, Rows=76,860, Last Analyze=2004/09/01

CTATPINV

Rows=620,553	Blocks=6,130
Empty Blocks=4,747	Avg Space=849
Chain Count=0	Avg Row Length=69
Avg Space Freelist Blocks=8,009	Freelist Blocks=5
Sample Size=58,264	Last Analyze=2004/09/01
Partitioned=NO	

Column Name	Nullable	Column Type	Distinct	Buckets
CNT_YEAR	NOT NULL	VARCHAR2(4)	9	1
CGR_CODE	NOT NULL	VARCHAR2(4)	83	1
CNT_MARK	NOT NULL	NUMBER(4)	8,578	1
INV_MARK	NOT NULL	NUMBER(2)	27	1
GOV_AREA_CODE	NOT NULL	VARCHAR2(8)	984	1
AREA_ADDR		VARCHAR2(30)	130,055	1
PLT_AQR		NUMBER(6,1)	1,923	1
PLT_ROOT_NUM		NUMBER(6)	9,631	1
PER_DIST		NUMBER(4,1)	1	1
ROOT_DIST		NUMBER(4,1)	1	1
CODE_ADDR		VARCHAR2(30)	73	1
MODIFIER	NOT NULL	VARCHAR2(8)	52	1
ALTDATE	NOT NULL	DATE	12,238	1

INDEX

CTATPINV_PK : CNT_YEAR + CGR_CODE + CNT_MARK + INV_MARK

Type=NORMAL, Uniq=YES, Distinct=621,484, Rows=621,484.185770751, Last Analyze=2004/09/01

CTATSSIL

Rows=2,563,523
Empty Blocks=22,644
Chain Count=0
Avg Space Freelist Blocks=7,233
Sample Size=242,145
Partitioned=NO

Blocks=32,138
Avg Space=852
Avg Row Length=88
Freelist Blocks=7
Last Analyze=2004/09/01

Column Name	Nullable	Column Type	Distinct	Buckets
YEAR_MAKE	NOT NULL	VARCHAR2(4)	9	1
CGR_CODE	NOT NULL	VARCHAR2(4)	83	1
CNT_MARK	NOT NULL	NUMBER(4)	9,651	1
CODE	NOT NULL	VARCHAR2(11)	1,136	1
PUR_DATE	NOT NULL	VARCHAR2(8)	670	1
QUA_GRD	NOT NULL	VARCHAR2(1)	6	1
PUR_AREA_CODE	NOT NULL	VARCHAR2(6)	187	1
PROD_TYPE_CODE	NOT NULL	VARCHAR2(3)	9	1
LEAF_POT_CODE	NOT NULL	VARCHAR2(1)	6	1
GRD_CODE	NOT NULL	VARCHAR2(1)	8	1
COLOR_TYPE_CODE	NOT NULL	VARCHAR2(1)	11	1
PUR_NUM	NOT NULL	NUMBER(19,4)	142	1
PUR_QTY_KG	NOT NULL	NUMBER(19,4)	14,675	1
PUR_AMT		NUMBER(19,4)	141,849	1
PUR_GRP_MARK	NOT NULL	VARCHAR2(4)	22	1
MODIFIER	NOT NULL	VARCHAR2(8)	4	1
ALTDTE	NOT NULL	DATE	25,110	1
RND_MARK		VARCHAR2(4)	39	1

INDEX

CTATSSIL_IX01 : PUR_AREA_CODE + PUR_DATE

Type=NORMAL, Uniq=No, Distinct=27,742, Rows=2,564,778, Last Analyze=2004/09/01

CTATSSIL_IX02 : PUR_DATE + CGR_CODE

Type=NORMAL, Uniq=No, Distinct=24,330, Rows=2,566,774, Last Analyze=2004/09/01

CTATSSIL_IX03 : CODE

Type=NORMAL, Uniq=No, Distinct=488, Rows=2,564,081.50790068, Last Analyze=2004/09/01

CTATSSIL_PK : YEAR_MAKE + CGR_CODE + CNT_MARK + CODE + PUR_DATE + QUA_GRD

Type=NORMAL, Uniq=YES, Distinct=2,563,948, Rows=2,563,948.67467859, Last Analyze=2004/09/01

✓ Random I/O I/O 가 . Index Scan Block Cache
CPU .

& DBA Actions

1. “/*+ **USE_HASH(a) USE_NL(b)** */” Hint .

Tuning /

☐ Tuning

```

SELECT /*+ USE_HASH(a) USE_NL(b) */ a.svr_gu_code,
a.cnt_mark,
nvl(max(b.name), ' '),
a.prod_type_code,
a.grw_type_code,
sum(y.inv_mark),
sum(y.plt_aqr),
sum(x.leaf_1st_grd),
sum(x.leaf_2nd_grd),
sum(x.leaf_3rd_grd),
sum(x.leaf_4th_grd),
sum(x.ovrund_1st),
sum(x.ovrund_2nd),
sum(x.ovrund_3rd),
sum(x.grd_exc),
sum(x.pur_num),
sum(x.pur_amt),
max(a.bef_sup_amt)
FROM ktg.CTATCONT a,
ktg.CTATHUMN b,
(
select year_make year_make,
cgr_code cgr_code,
cnt_mark cnt_mark,
nvl(sum(pur_num), 0) - nvl(sum(decode(substr(code, 6, 3), 'X6X', pur_num, 0)), 0) -
nvl(sum(decode(substr(code, 6, 3), 'X7X', pur_num, 0)), 0) pur_num,
nvl(sum(decode(leaf_pot_code||grd_code, '51', pur_qty_kg, 0)), 0) +
nvl(sum(decode(leaf_pot_code||grd_code, '41', pur_qty_kg, 0)), 0) leaf_1st_grd,
nvl(sum(decode(leaf_pot_code||grd_code, '52', pur_qty_kg, 0)), 0) +
nvl(sum(decode(leaf_pot_code||grd_code, '42', pur_qty_kg, 0)), 0) leaf_2nd_grd,
nvl(sum(decode(leaf_pot_code||grd_code, '53', pur_qty_kg, 0)), 0) +
nvl(sum(decode(leaf_pot_code||grd_code, '43', pur_qty_kg, 0)), 0) leaf_3rd_grd,
nvl(sum(decode(leaf_pot_code||grd_code, '54', pur_qty_kg, 0)), 0) +
nvl(sum(decode(leaf_pot_code||grd_code, '44', pur_qty_kg, 0)), 0) leaf_4th_grd,
nvl(sum(decode(leaf_pot_code||grd_code, '31', pur_qty_kg, 0)), 0) +
nvl(sum(decode(leaf_pot_code||grd_code, '61', pur_qty_kg, 0)), 0) ovrund_1st,
nvl(sum(decode(leaf_pot_code||grd_code, '32', pur_qty_kg, 0)), 0) +
nvl(sum(decode(leaf_pot_code||grd_code, '62', pur_qty_kg, 0)), 0) ovrund_2nd,
nvl(sum(decode(leaf_pot_code||grd_code, '33', pur_qty_kg, 0)), 0) +
nvl(sum(decode(leaf_pot_code||grd_code, '63', pur_qty_kg, 0)), 0) ovrund_3rd,
nvl(sum(decode(grd_code, '9', pur_qty_kg, 0)), 0) grd_exc,
nvl(sum(pur_amt), 0) pur_amt
FROM ktg.CTATSSIL
where year_make = '2004'
and cgr_code = '2312'
group by year_make, cgr_code, cnt_mark ) x,
(
select cnt_year cnt_year,
cgr_code cgr_code,
cnt_mark cnt_mark,
nvl(count(inv_mark), 0) inv_mark,
nvl(sum(plt_aqr), 0) plt_aqr
from ktg.CTATPINV
where cnt_year = '2004'
and cgr_code = '2312'
group by cnt_year, cgr_code, cnt_mark ) y
WHERE a.ech_code = b.ech_code
AND a.cnt_year = y.cnt_year
AND a.cgr_code = y.cgr_code
AND a.cnt_mark = y.cnt_mark
AND a.cnt_year = x.year_make
AND a.cgr_code = x.cgr_code
AND a.cnt_mark = x.cnt_mark
AND a.cnt_year = '2004'
AND a.cgr_code = '2312'
AND a.svr_gu_code like '%'
GROUP BY a.svr_gu_code, a.cnt_mark, a.prod_type_code, a.grw_type_code
ORDER BY a.cnt_mark

```

Call	Count	CPU Time	Elapsed Time	Disk	Query	Current	Rows
Parse	1	0.010	0.014	0	0	0	0
Execute	1	0.000	0.000	0	0	0	0
Fetch	2	1.640	1.600	0	591	0	164

Total	4	1.650	1.614	0	591	0	164
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Elapsed Time for Client(sec.): 1.605
 Misses in library cache during parse: 1
 Optimizer goal: CHOOSE
 Parsing user: KTG (ID=19)

Rows	Row Source Operation
0	STATEMENT
164	SORT GROUP BY (cr=591 r=0 w=0 time=1597186 us)
164	NESTED LOOPS (cr=591 r=0 w=0 time=1595360 us)
164	HASH JOIN (cr=261 r=0 w=0 time=1593272 us)
195816	MERGE JOIN CARTESIAN (cr=187 r=0 w=0 time=496898 us)
1194	VIEW (cr=136 r=0 w=0 time=25517 us)
1194	SORT GROUP BY (cr=136 r=0 w=0 time=23681 us)
3604	TABLE ACCESS BY INDEX ROWID CTATPINV (cr=136 r=0 w=0 time=12022 us)
3604	INDEX RANGE SCAN CTATPINV_PK (cr=17 r=0 w=0 time=5474 us)(Object ID 4019)
195816	BUFFER SORT (cr=51 r=0 w=0 time=321476 us)
164	VIEW (cr=51 r=0 w=0 time=29801 us)
164	SORT GROUP BY (cr=51 r=0 w=0 time=28278 us)
938	TABLE ACCESS BY INDEX ROWID CTATSSIL (cr=51 r=0 w=0 time=3447 us)
938	INDEX RANGE SCAN CTATSSIL PK (cr=11 r=0 w=0 time=1527 us)(Object ID 4054)
1194	TABLE ACCESS BY INDEX ROWID CTATCONT (cr=74 r=0 w=0 time=4970 us)
1194	INDEX RANGE SCAN CTATCONT_PK (cr=7 r=0 w=0 time=1201 us)(Object ID 4234)
164	TABLE ACCESS BY INDEX ROWID CTATHUMN (cr=330 r=0 w=0 time=1551 us)
164	INDEX UNIQUE SCAN CTATHUMN_PK (cr=166 r=0 w=0 time=784 us)(Object ID 3713)