```
SQL> SELECT Deptno, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno;

DEPTNO   SUM(SAL)
------ ----------
    10       8750
    20      10875
    30       9400

SQL> SELECT SUM(Sal)
  2  FROM Emp;

  SUM(SAL)
----------
     29025

SQL> cl scr

SQL> SET AUTOTRACE ON EXPLAIN
SQL> SELECT Deptno, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno;

DEPTNO   SUM(SAL)
------ ----------
    10       8750
    20      10875
    30       9400


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=36
          4)

   1    0   SORT (GROUP BY) (Cost=4 Card=14 Bytes=364)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=364)



SQL> SELECT SUM(Sal) FROM Emp;

  SUM(SAL)
----------
     29025


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=1 Bytes=13)
   1    0   SORT (AGGREGATE)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=182)
```

```
SQL> SELECT Deptno, SUM(Sal), (SELECT SUM(Sal) FROM Emp) SalSum
  2  FROM Emp
  3  GROUP BY Deptno;

DEPTNO   SUM(SAL)     SALSUM
------ ---------- ----------
    10       8750      29025
    20      10875      29025
    30       9400      29025


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=36
          4)

   1    0   SORT (AGGREGATE)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=182)

   3    0   SORT (GROUP BY) (Cost=4 Card=14 Bytes=364)
   4    3     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=364)



SQL> SELECT Deptno, SUM(Sal), SalSum
  2  FROM Emp, (SELECT SUM(Sal) SalSum FROM Emp)
  3  GROUP BY Deptno, SalSum;

DEPTNO   SUM(SAL)     SALSUM
------ ---------- ----------
    10       8750      29025
    20      10875      29025
    30       9400      29025


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=7 Card=14 Bytes=54
          6)

   1    0   SORT (GROUP BY) (Cost=7 Card=14 Bytes=546)
   2    1     MERGE JOIN (CARTESIAN) (Cost=6 Card=14 Bytes=546)
   3    2       VIEW (Cost=3 Card=1 Bytes=13)
   4    3         SORT (AGGREGATE)
   5    4           TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=
          14 Bytes=182)

   6    2       TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 B
          ytes=364)
```

```
SQL> SELECT Deptno, SUM(Sal) SalSum
  2  FROM Emp
  3  GROUP BY Deptno
  4  UNION
  5  SELECT NULL, SUM(Sal)
  6  FROM Emp;

DEPTNO     SALSUM
------ ----------
    10       8750
    20      10875
    30       9400
            29025


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=9 Card=15 Bytes=37
          7)

   1    0   SORT (UNIQUE) (Cost=9 Card=15 Bytes=377)
   2    1     UNION-ALL
   3    2       SORT (GROUP BY) (Cost=5 Card=14 Bytes=364)
   4    3         TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14
           Bytes=364)

   5    2       SORT (AGGREGATE) (Cost=4 Card=1 Bytes=13)
   6    5         TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14
           Bytes=182)



SQL> SELECT Deptno, SUM(Sal)
  2  FROM Emp
  3  GROUP BY ROLLUP(Deptno);

DEPTNO   SUM(SAL)
------ ----------
    10       8750
    20      10875
    30       9400
            29025


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=36
          4)

   1    0   SORT (GROUP BY ROLLUP) (Cost=4 Card=14 Bytes=364)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=364)
```

```
SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno, SUM(Sal)
  2  FROM Emp
  3* GROUP BY ROLLUP(Deptno)
SQL> SPOOL OFF
SQL> cl scr

SQL> SELECT Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY ROLLUP(Job);

JOB         SUM(SAL)
--------- ----------
ANALYST         6000
CLERK           4150
MANAGER         8275
PRESIDENT       5000
SALESMAN        5600
               29025

6 rows selected.

SQL> SELECT Ename, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Ename;

ENAME        SUM(SAL)
---------- ----------
ADAMS            1100
ALLEN            1600
BLAKE            2850
CLARK            2450
FORD             3000
JAMES             950
JONES            2975
KING             5000
MARTIN           1250
MILLER           1300
SCOTT            3000

ENAME        SUM(SAL)
---------- ----------
SMITH             800
TURNER           1500
WARD             1250

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, SUM(Sal)
  2  FROM Emp
```

```
  3* GROUP BY ROLLUP(Ename)
SQL> /

ENAME        SUM(SAL)
---------- ----------
ADAMS            1100
ALLEN            1600
BLAKE            2850
CLARK            2450
FORD             3000
JAMES             950
JONES            2975
KING             5000
MARTIN           1250
MILLER           1300
SCOTT            3000

ENAME        SUM(SAL)
---------- ----------
SMITH             800
TURNER           1500
WARD             1250
                29025

15 rows selected.

SQL> cl scr

SQL> SELECT Deptno, SUM(Sal)
  2  FROM Emp
  3  GROUP BY ROLLUP(Deptno);

    DEPTNO   SUM(SAL)
---------- ----------
        10       8750
        20      10875
        30       9400
                29025

SQL> ED
Wrote file afiedt.buf

  1  SELECT Job, SUM(Sal)
  2  FROM Emp
  3* GROUP BY ROLLUP(JOb)
SQL> /

JOB         SUM(SAL)
--------- ----------
ANALYST         6000
CLERK           4150
MANAGER         8275
PRESIDENT       5000
SALESMAN        5600
               29025

6 rows selected.
```

```
SQL> cl scr

SQL> COLUMN Deptno FORMAT A15
SQL> SELECT
  2  NVL(TO_CHAR(Deptno), 'All Departments') Deptno,
  3  AVG(SAL) AVGSal
  4  FROM Emp
  5  GROUP BY ROLLUP(Deptno);

DEPTNO              AVGSAL
--------------- ----------
10              2916.66667
20                    2175
30              1566.66667
All Departments 2073.21429

SQL> cl scr

SQL> SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno, Job;

    DEPTNO JOB         SUM(SAL)
---------- --------- ----------
########## CLERK           1300
########## MANAGER         2450
########## PRESIDENT       5000
########## CLERK           1900
########## ANALYST         6000
########## MANAGER         2975
########## CLERK            950
########## MANAGER         2850
########## SALESMAN        5600

9 rows selected.

SQL> COLUMN Deptno  FORMAT 999
SQL> /

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    20 CLERK           1900
    20 ANALYST         6000
    20 MANAGER         2975
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600

9 rows selected.

SQL> ED
Wrote file afiedt.buf
```

```
  1  SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3* GROUP BY ROLLUP(Deptno, Job)
SQL> /

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    10                 8750
    20 CLERK           1900
    20 ANALYST         6000
    20 MANAGER         2975
    20                10875
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    30                 9400
                      29025

13 rows selected.

SQL> SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno, Job;

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    20 CLERK           1900
    20 ANALYST         6000
    20 MANAGER         2975
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600

9 rows selected.

SQL> SELECT Deptno, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno;

DEPTNO   SUM(SAL)
------ ----------
    10       8750
    20      10875
    30       9400

SQL> SELECT SUM(Sal)
  2  FROM Emp;
```

```
  SUM(SAL)
----------
     29025

SQL> SET AUTOTRACE ON EXPLAIN
SQL> SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno, Job;

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    20 CLERK           1900
    20 ANALYST         6000
    20 MANAGER         2975
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600

9 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=44
          8)

   1    0   SORT (GROUP BY) (Cost=4 Card=14 Bytes=448)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=448)



SQL> SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY ROLLUP(Deptno, Job);

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    10                 8750
    20 CLERK           1900
    20 ANALYST         6000
    20 MANAGER         2975
    20                10875
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    30                 9400
```

```
                    29025

13 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=44
          8)

   1    0   SORT (GROUP BY ROLLUP) (Cost=4 Card=14 Bytes=448)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=448)



SQL> cl scr

SQL> COLUMN Deptno FORMAT A15
SQL> SELECT
  2  NVL(TO_CHAR(Deptno), 'All Departments') Deptno,
  3  NVL(Job, 'All Jobs') Jobs,
  4  SUM(Sal) Salary
  5  FROM Emp
  6  GROUP BY ROLLUP(Deptno, Job);

DEPTNO          JOBS          SALARY
--------------- --------- ----------
10              CLERK           1300
10              MANAGER         2450
10              PRESIDENT       5000
10              All Jobs        8750
20              CLERK           1900
20              ANALYST         6000
20              MANAGER         2975
20              All Jobs       10875
30              CLERK            950
30              MANAGER         2850
30              SALESMAN        5600

DEPTNO          JOBS          SALARY
--------------- --------- ----------
30              All Jobs        9400
All Departments All Jobs       29025

13 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=44
          8)

   1    0   SORT (GROUP BY ROLLUP) (Cost=4 Card=14 Bytes=448)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=448)
```

```
SQL> cl scr

SQL> SELECT
  2   TO_CHAR(HireDate, 'YYYY') "Year",
  3   SUM(Sal) SumSal
  4  FROM Emp
  5  GROUP BY ROLLUP(TO_CHAR(HireDate, 'YYYY'));

Year     SUMSAL
---- ----------
1980        800
1981      22825
1982       4300
1983       1100
          29025


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=30
          8)

   1    0   SORT (GROUP BY ROLLUP) (Cost=4 Card=14 Bytes=308)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=308)



SQL> cl scr

SQL> SET AUTOTRACE OFF EXPLIAN
SP2-0158: unknown SET option "EXPLIAN"
SQL> SET AUTOTRACE OFF EXPLAIN
SQL> cl scr

SQL> SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY ROLLUP(Deptno, Job);

    DEPTNO JOB         SUM(SAL)
---------- --------- ----------
########## CLERK           1300
########## MANAGER         2450
########## PRESIDENT       5000
##########                 8750
########## CLERK           1900
########## ANALYST         6000
########## MANAGER         2975
##########                10875
########## CLERK            950
########## MANAGER         2850
########## SALESMAN        5600
```

```
    DEPTNO JOB         SUM(SAL)
---------- --------- ----------
##########                 9400
                          29025

13 rows selected.

SQL> COLUMN DEPTNO FORMAT 99
SQL> /

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    10                 8750
    20 CLERK           1900
    20 ANALYST         6000
    20 MANAGER         2975
    20                10875
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    30                 9400
                      29025

13 rows selected.

SQL> SELECT Deptno, Job,
  2  SUM(Sal) Salary
  3  FROM Emp
  4  GROUP BY CUBE(Deptno, Job)
  5  ORDER BY Deptno;

DEPTNO JOB           SALARY
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    10                 8750
    20 ANALYST         6000
    20 CLERK           1900
    20 MANAGER         2975
    20                10875
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600

DEPTNO JOB           SALARY
------ --------- ----------
    30                 9400
       ANALYST         6000
       CLERK           4150
```

```
       MANAGER         8275
       PRESIDENT       5000
       SALESMAN        5600
                      29025

18 rows selected.

SQL> SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno, Job;

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    20 CLERK           1900
    20 ANALYST         6000
    20 MANAGER         2975
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600

9 rows selected.

SQL> SELECT Deptno, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno;

DEPTNO   SUM(SAL)
------ ----------
    10       8750
    20      10875
    30       9400

SQL> SELECT Job,, SUM(Sal)
  2
SQL> SELECT Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Job;

JOB         SUM(SAL)
--------- ----------
ANALYST         6000
CLERK           4150
MANAGER         8275
PRESIDENT       5000
SALESMAN        5600

SQL> SELECT SUM(Sal)
  2  FROm Emp;

  SUM(SAL)
----------
     29025

SQL> cl scr
```

```
SQL> SELECT Deptno, SUM(Sal)
  2  FROM Emp
  3  GROUP BY ROLLUP(Deptno);

DEPTNO   SUM(SAL)
------ ----------
    10       8750
    20      10875
    30       9400
            29025

SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno, GROUPING(Deptno) GrpBIT, SUM(Sal)
  2  FROM Emp
  3* GROUP BY ROLLUP(Deptno)
SQL> /

DEPTNO     GRPBIT   SUM(SAL)
------ ---------- ----------
    10          0       8750
    20          0      10875
    30          0       9400
                1      29025

SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno, GROUPING(Deptno) GrpBIT, SUM(Sal)
  2  FROM Emp
  3  GROUP BY ROLLUP(Deptno)
  4* HAVING GROUPING(Deptno) IN(&GrpBit1, &GrpBit2)
SQL> /
Enter value for grpbit1: 0
Enter value for grpbit2: 0
old   4: HAVING GROUPING(Deptno) IN(&GrpBit1, &GrpBit2)
new   4: HAVING GROUPING(Deptno) IN(0, 0)

DEPTNO     GRPBIT   SUM(SAL)
------ ---------- ----------
    10          0       8750
    20          0      10875
    30          0       9400

SQL> /
Enter value for grpbit1: 0
Enter value for grpbit2: 1
old   4: HAVING GROUPING(Deptno) IN(&GrpBit1, &GrpBit2)
new   4: HAVING GROUPING(Deptno) IN(0, 1)

DEPTNO     GRPBIT   SUM(SAL)
------ ---------- ----------
    10          0       8750
    20          0      10875
    30          0       9400
```

```
                1      29025

SQL> /
Enter value for grpbit1: 1
Enter value for grpbit2: 1
old   4: HAVING GROUPING(Deptno) IN(&GrpBit1, &GrpBit2)
new   4: HAVING GROUPING(Deptno) IN(1, 1)

DEPTNO     GRPBIT   SUM(SAL)
------ ---------- ----------
                1      29025

SQL> cl scr

SQL> SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno, Job;

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    20 CLERK           1900
    20 ANALYST         6000
    20 MANAGER         2975
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600

9 rows selected.

SQL> SELECT Deptno, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno;

DEPTNO   SUM(SAL)
------ ----------
    10       8750
    20      10875
    30       9400

SQL> SELECT Job, SUm(Sal)
  2  FROM Emp
  3  GROUP BY Job;

JOB         SUM(SAL)
--------- ----------
ANALYST         6000
CLERK           4150
MANAGER         8275
PRESIDENT       5000
SALESMAN        5600

SQL> SELECT SUM(Sal)
  2  FROM Emp;
```

```
  SUM(SAL)
----------
     29025

SQL> SELECT Deptno, Job, SUM(Sal)
  2  FROM EMp
  3  GROUP BY CUBE(Deptno, Job)
  4  ORDER BY Deptno;

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    10                 8750
    20 ANALYST         6000
    20 CLERK           1900
    20 MANAGER         2975
    20                10875
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    30                 9400
       ANALYST         6000
       CLERK           4150
       MANAGER         8275
       PRESIDENT       5000
       SALESMAN        5600
                      29025

18 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno, Job, SUM(Sal)
  2  FROM EMp
  3  GROUP BY CUBE(Deptno, Job)
  4  HAVING GROUPING(&GColumn) IN(&GrpBIT1, &GrpBit2)
  5* ORDER BY Deptno
SQL> /
Enter value for gcolumn: Deptno
Enter value for grpbit1: 0
Enter value for grpbit2: 0
old   4: HAVING GROUPING(&GColumn) IN(&GrpBIT1, &GrpBit2)
new   4: HAVING GROUPING(Deptno) IN(0, 0)

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    10                 8750
    20 ANALYST         6000
```

```
    20 CLERK           1900
    20 MANAGER         2975
    20                10875
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    30                9400

12 rows selected.

SQL> /
Enter value for gcolumn: Deptno
Enter value for grpbit1: 1
Enter value for grpbit2: 1
old   4: HAVING GROUPING(&GColumn) IN(&GrpBIT1, &GrpBit2)
new   4: HAVING GROUPING(Deptno) IN(1, 1)

DEPTNO JOB         SUM(SAL)
------ --------- ----------
       ANALYST         6000
       CLERK           4150
       MANAGER         8275
       PRESIDENT       5000
       SALESMAN        5600
                      29025

6 rows selected.

SQL> /
Enter value for gcolumn: Deptno
Enter value for grpbit1: 0
Enter value for grpbit2: 1
old   4: HAVING GROUPING(&GColumn) IN(&GrpBIT1, &GrpBit2)
new   4: HAVING GROUPING(Deptno) IN(0, 1)

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    10                 8750
    20 ANALYST         6000
    20 CLERK           1900
    20 MANAGER         2975
    20                10875
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    30                9400
       ANALYST         6000
       CLERK           4150
```

```
       MANAGER         8275
       PRESIDENT       5000
       SALESMAN        5600
                      29025

18 rows selected.

SQL> /
Enter value for gcolumn: Job
Enter value for grpbit1: 0
Enter value for grpbit2: 0
old   4: HAVING GROUPING(&GColumn) IN(&GrpBIT1, &GrpBit2)
new   4: HAVING GROUPING(Job) IN(0, 0)

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    20 CLERK           1900
    20 ANALYST         6000
    20 MANAGER         2975
    30 CLERK            950
    30 SALESMAN        5600
    30 MANAGER         2850
       CLERK           4150
       SALESMAN        5600

DEPTNO JOB         SUM(SAL)
------ --------- ----------
       PRESIDENT       5000
       MANAGER         8275
       ANALYST         6000

14 rows selected.

SQL> /
Enter value for gcolumn: Job
Enter value for grpbit1: 1
Enter value for grpbit2: 1
old   4: HAVING GROUPING(&GColumn) IN(&GrpBIT1, &GrpBit2)
new   4: HAVING GROUPING(Job) IN(1, 1)

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10                8750
    20               10875
    30                9400
                     29025

SQL> /
Enter value for gcolumn: Job
Enter value for grpbit1: 1
Enter value for grpbit2: 0
old   4: HAVING GROUPING(&GColumn) IN(&GrpBIT1, &GrpBit2)
new   4: HAVING GROUPING(Job) IN(1, 0)
```

```
DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    10                 8750
    20 ANALYST         6000
    20 CLERK           1900
    20 MANAGER         2975
    20                10875
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    30                 9400
       ANALYST         6000
       CLERK           4150
       MANAGER         8275
       PRESIDENT       5000
       SALESMAN        5600
                      29025

18 rows selected.

SQL> cl scr

SQL> SELECT Ename, Job, Sal, Deptno,
  2  DECODE(Deptno,
  3         10, 'ACCOUNTING',
  4         20, 'RESEARCH',
  5         30 , 'SALES',
  6         40 , 'OPERATIONS',
  7         'OTHER')  Departments
  8  FROM Emp
  9  ORDER BY Departments;

ENAME      JOB              SAL DEPTNO DEPARTMENT
---------- --------- ---------- ------ ----------
KING       PRESIDENT       5000     10 ACCOUNTING
CLARK      MANAGER         2450     10 ACCOUNTING
MILLER     CLERK           1300     10 ACCOUNTING
JONES      MANAGER         2975     20 RESEARCH
SCOTT      ANALYST         3000     20 RESEARCH
ADAMS      CLERK           1100     20 RESEARCH
SMITH      CLERK            800     20 RESEARCH
FORD       ANALYST         3000     20 RESEARCH
BLAKE      MANAGER         2850     30 SALES
MARTIN     SALESMAN        1250     30 SALES
ALLEN      SALESMAN        1600     30 SALES

ENAME      JOB              SAL DEPTNO DEPARTMENT
---------- --------- ---------- ------ ----------
TURNER     SALESMAN        1500     30 SALES
JAMES      CLERK            950     30 SALES
WARD       SALESMAN        1250     30 SALES
```

```
14 rows selected.

SQL> SELECT INITCAP(Ename)||' Takes Care of '||
  2  DECODE(Job,
  3         'ANALYST', 'Analysis',
  4         'CLERK', 'Filing',
  5         'MANAGER', 'Managing',
  6         'PRESIDENT', 'Administration',
  7         'SALESMAN', 'Sales') Responsibilities
  8  FROM Emp;

RESPONSIBILITIES
-------------------------------------
King Takes Care of Administration
Blake Takes Care of Managing
Clark Takes Care of Managing
Jones Takes Care of Managing
Martin Takes Care of Sales
Allen Takes Care of Sales
Turner Takes Care of Sales
James Takes Care of Filing
Ward Takes Care of Sales
Ford Takes Care of Analysis
Smith Takes Care of Filing

RESPONSIBILITIES
-------------------------------------
Scott Takes Care of Analysis
Adams Takes Care of Filing
Miller Takes Care of Filing

14 rows selected.

SQL> SELECT
  2  ROWNUM, DECODE(ROWNUM,
  3             1, 'One',
  4             2, 'Two',
  5             3, 'Three') Spell
  6  FROM Emp
  7  WHERE ROWNUM <= 4;

    ROWNUM SPELL
---------- -----
         1 One
         2 Two
         3 Three
         4

SQL> ED
Wrote file afiedt.buf

  1  SELECT
  2  ROWNUM, DECODE(ROWNUM,
  3             1, 'One',
  4             2, 'Two',
  5             3, 'Three',
```

```
  6             'Donot Know') Spell
  7  FROM Emp
  8* WHERE ROWNUM <= &GiveVal
SQL> /
Enter value for giveval: 3
old   8: WHERE ROWNUM <= &GiveVal
new   8: WHERE ROWNUM <= 3

    ROWNUM SPELL
---------- ----------
         1 One
         2 Two
         3 Three

SQL> /
Enter value for giveval: 6
old   8: WHERE ROWNUM <= &GiveVal
new   8: WHERE ROWNUM <= 6

    ROWNUM SPELL
---------- ----------
         1 One
         2 Two
         3 Three
         4 Donot Know
         5 Donot Know
         6 Donot Know

6 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT
  2  ROWNUM "S.No", DECODE(ROWNUM,
  3             1, 'One',
  4             2, 'Two',
  5             3, 'Three',
  6             'Donot Know') Spell
  7  FROM Emp
  8* WHERE ROWNUM <= &GiveVal
SQL> /
Enter value for giveval: 4
old   8: WHERE ROWNUM <= &GiveVal
new   8: WHERE ROWNUM <= 4

      S.No SPELL
---------- ----------
         1 One
         2 Two
         3 Three
         4 Donot Know

SQL> cl scr

SQL> SELECT Ename, Job,
  2  DECODE(Job,
```

```
  3         'CLERK', 'E',
  4         'SALESMAN', 'D',
  5         'ANALYST', 'C',
  6         'MANAGER', 'B',
  7         'PRESIDENT', 'A',
  8         'O') Grades
  9  FROM EMP ORDER BY JOB;

ENAME      JOB       G
---------- --------- -
FORD       ANALYST   C
SCOTT      ANALYST   C
JAMES      CLERK     E
SMITH      CLERK     E
MILLER     CLERK     E
ADAMS      CLERK     E
BLAKE      MANAGER   B
CLARK      MANAGER   B
JONES      MANAGER   B
KING       PRESIDENT A
MARTIN     SALESMAN  D

ENAME      JOB       G
---------- --------- -
ALLEN      SALESMAN  D
WARD       SALESMAN  D
TURNER     SALESMAN  D

14 rows selected.

SQL> cl scr

SQL> SELECT Ename, Job,
  2  DECODE(Job,
  3    'CLERK', 'E',
  4    'SALESMAN', 'D',
  5    'ANALYST', 'C',
  6    'MANAGER', 'B',
  7    'PRESIDENT', 'A',
  8    'O') Grades, Deptno,
  9  DECODE(Deptno,
 10  10, 'ACCOUNTING',
 11  20, 'RESEARCH',
 12  30 , 'SALES',
 13  40 , 'OPERATIONS',
 14  'OTHER')  Departments,
 15  Sal, Grade
 16  FROM EMP E, Salgrade S
 17  WHERE Sal BETWEEN LoSal AND HiSal
 18  ORDER BY JOB;

ENAME      JOB       G DEPTNO DEPARTMENT         SAL      GRADE
---------- --------- - ------ ---------- ---------- ----------
FORD       ANALYST   C     20 RESEARCH         3000          4
SCOTT      ANALYST   C     20 RESEARCH         3000          4
SMITH      CLERK     E     20 RESEARCH          800          1
JAMES      CLERK     E     30 SALES             950          1
```

```
ADAMS      CLERK     E     20 RESEARCH         1100          1
MILLER     CLERK     E     10 ACCOUNTING       1300          2
CLARK      MANAGER   B     10 ACCOUNTING       2450          4
BLAKE      MANAGER   B     30 SALES            2850          4
JONES      MANAGER   B     20 RESEARCH         2975          4
KING       PRESIDENT A     10 ACCOUNTING       5000          5
MARTIN     SALESMAN  D     30 SALES            1250          2

ENAME      JOB       G DEPTNO DEPARTMENT         SAL      GRADE
---------- --------- - ------ ---------- ---------- ----------
WARD       SALESMAN  D     30 SALES            1250          2
TURNER     SALESMAN  D     30 SALES            1500          3
ALLEN      SALESMAN  D     30 SALES            1600          3

14 rows selected.

SQL> SET AUTOTRACE ON EXPLAIN
SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Job,
  2  DECODE(Job,
  3    'CLERK', 'E',
  4    'SALESMAN', 'D',
  5    'ANALYST', 'C',
  6    'MANAGER', 'B',
  7    'PRESIDENT', 'A',
  8    'O') Grades, D.Deptno,
  9  Dname,
 10  Sal, Grade
 11  FROM EMP E, Salgrade S, Dept D
 12  WHERE
 13  E.Deptno = D.Deptno AND
 14  Sal BETWEEN LoSal AND HiSal
 15* ORDER BY JOB
SQL> /

ENAME      JOB       G DEPTNO DNAME                SAL      GRADE
---------- --------- - ------ -------------- ---------- ----------
FORD       ANALYST   C     20 RESEARCH             3000          4
SCOTT      ANALYST   C     20 RESEARCH             3000          4
SMITH      CLERK     E     20 RESEARCH              800          1
JAMES      CLERK     E     30 SALES                 950          1
ADAMS      CLERK     E     20 RESEARCH             1100          1
MILLER     CLERK     E     10 ACCOUNTING           1300          2
CLARK      MANAGER   B     10 ACCOUNTING           2450          4
BLAKE      MANAGER   B     30 SALES                2850          4
JONES      MANAGER   B     20 RESEARCH             2975          4
KING       PRESIDENT A     10 ACCOUNTING           5000          5
MARTIN     SALESMAN  D     30 SALES                1250          2

ENAME      JOB       G DEPTNO DNAME                SAL      GRADE
---------- --------- - ------ -------------- ---------- ----------
WARD       SALESMAN  D     30 SALES                1250          2
TURNER     SALESMAN  D     30 SALES                1500          3
ALLEN      SALESMAN  D     30 SALES                1600          3
```

```
14 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=10 Card=1 Bytes=10
          0)

   1    0   SORT (ORDER BY) (Cost=10 Card=1 Bytes=100)
   2    1     NESTED LOOPS (Cost=9 Card=1 Bytes=100)
   3    2       MERGE JOIN (Cost=8 Card=1 Bytes=78)
   4    3         SORT (JOIN) (Cost=4 Card=5 Bytes=195)
   5    4           TABLE ACCESS (FULL) OF 'SALGRADE' (TABLE) (Cost=3
          Card=5 Bytes=195)

   6    3         FILTER
   7    6           SORT (JOIN) (Cost=4 Card=14 Bytes=546)
   8    7             TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Car
          d=14 Bytes=546)

   9    2       TABLE ACCESS (BY INDEX ROWID) OF 'DEPT' (TABLE) (Cost=
          1 Card=1 Bytes=22)

  10    9         INDEX (UNIQUE SCAN) OF 'DEPT_PRIMARY_KEY' (INDEX (UN
          IQUE)) (Cost=0 Card=1)



SQL> SELECT Ename, Job,
  2  DECODE(Job,
  3    'CLERK', 'E',
  4    'SALESMAN', 'D',
  5    'ANALYST', 'C',
  6    'MANAGER', 'B',
  7    'PRESIDENT', 'A',
  8    'O') Grades, Deptno,
  9  DECODE(Deptno,
 10  10, 'ACCOUNTING',
 11  20, 'RESEARCH',
 12  30 , 'SALES',
 13  40 , 'OPERATIONS',
 14  'OTHER')  Departments,
 15  Sal, Grade
 16  FROM EMP E, Salgrade S
 17  WHERE Sal BETWEEN LoSal AND HiSal
 18  ORDER BY JOB;

ENAME      JOB       G DEPTNO DEPARTMENT         SAL      GRADE
---------- --------- - ------ ---------- ---------- ----------
FORD       ANALYST   C     20 RESEARCH         3000          4
SCOTT      ANALYST   C     20 RESEARCH         3000          4
SMITH      CLERK     E     20 RESEARCH          800          1
JAMES      CLERK     E     30 SALES             950          1
ADAMS      CLERK     E     20 RESEARCH         1100          1
MILLER     CLERK     E     10 ACCOUNTING       1300          2
CLARK      MANAGER   B     10 ACCOUNTING       2450          4
```

```
BLAKE      MANAGER   B     30 SALES            2850          4
JONES      MANAGER   B     20 RESEARCH         2975          4
KING       PRESIDENT A     10 ACCOUNTING       5000          5
MARTIN     SALESMAN  D     30 SALES            1250          2

ENAME      JOB       G DEPTNO DEPARTMENT        SAL      GRADE
---------- --------- - ------ ---------- ---------- ----------
WARD       SALESMAN  D     30 SALES            1250          2
TURNER     SALESMAN  D     30 SALES            1500          3
ALLEN      SALESMAN  D     30 SALES            1600          3

14 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=9 Card=1 Bytes=78)
   1    0   SORT (ORDER BY) (Cost=9 Card=1 Bytes=78)
   2    1     MERGE JOIN (Cost=8 Card=1 Bytes=78)
   3    2       SORT (JOIN) (Cost=4 Card=5 Bytes=195)
   4    3         TABLE ACCESS (FULL) OF 'SALGRADE' (TABLE) (Cost=3 Ca
         rd=5 Bytes=195)

   5    2       FILTER
   6    5         SORT (JOIN) (Cost=4 Card=14 Bytes=546)
   7    6           TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=
         14 Bytes=546)



SQL> cl scr

SQL> SELECT Ename, Job,
  2  DECODE(MGR,
  3         7566, (SELECT Ename
  4                       FROM Emp
  5                       WHERE Empno = 7566),
  6         7698, (SELECT Ename
  7                       FROM Emp
  8                       WHERE Empno = 7698),
  9         7782, (SELECT Ename
 10                       FROM Emp
 11                       WHERE Empno = 7782),
 12         7788, (SELECT Ename
 13                       FROM Emp
 14                       WHERE Empno = 7788),
 15         7839, (SELECT Ename
 16                       FROM Emp
 17                       WHERE Empno = 7839),
 18         7902, (SELECT Ename
 19                       FROM Emp
 20                       WHERE Empno = 7902),
 21         'Do Not Know')  Manager,
 22  DECODE(Job,
 23         'CLERK', 'E',
 24         'SALESMAN', 'D',
```

```
 25         'ANALYST', 'C',
 26         'MANAGER', 'B',
 27         'PRESIDENT', 'A',
 28         'O') Grades, Deptno,
 29  DECODE(Deptno,
 30         10, 'ACCOUNTING',
 31         20, 'RESEARCH',
 32         30 , 'SALES',
 33         40 , 'OPERATIONS',
 34         'OTHER')  Departments,
 35  Sal, Grade
 36  FROM EMP E, Salgrade S
 37  WHERE Sal BETWEEN LoSal AND HiSal
 38  ORDER BY JOB;

ENAME      JOB       MANAGER     G DEPTNO DEPARTMENT         SAL      GRADE
---------- --------- ----------- - ------ ---------- ---------- ----------
FORD       ANALYST   JONES       C     20 RESEARCH         3000          4
SCOTT      ANALYST   JONES       C     20 RESEARCH         3000          4
SMITH      CLERK     FORD        E     20 RESEARCH          800          1
JAMES      CLERK     BLAKE       E     30 SALES             950          1
ADAMS      CLERK     SCOTT       E     20 RESEARCH         1100          1
MILLER     CLERK     CLARK       E     10 ACCOUNTING       1300          2
CLARK      MANAGER   KING        B     10 ACCOUNTING       2450          4
BLAKE      MANAGER   KING        B     30 SALES            2850          4
JONES      MANAGER   KING        B     20 RESEARCH         2975          4
KING       PRESIDENT Do Not Know A     10 ACCOUNTING       5000          5
MARTIN     SALESMAN  BLAKE       D     30 SALES            1250          2

ENAME      JOB       MANAGER     G DEPTNO DEPARTMENT         SAL      GRADE
---------- --------- ----------- - ------ ---------- ---------- ----------
WARD       SALESMAN  BLAKE       D     30 SALES            1250          2
TURNER     SALESMAN  BLAKE       D     30 SALES            1500          3
ALLEN      SALESMAN  BLAKE       D     30 SALES            1600          3

14 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=9 Card=1 Bytes=91)
   1    0   TABLE ACCESS (BY INDEX ROWID) OF 'EMP' (TABLE) (Cost=1 Car
          d=1 Bytes=20)

   2    1     INDEX (UNIQUE SCAN) OF 'EMP_PRIMARY_KEY' (INDEX (UNIQUE)
          ) (Cost=1 Card=1)

   3    0   TABLE ACCESS (BY INDEX ROWID) OF 'EMP' (TABLE) (Cost=1 Car
          d=1 Bytes=20)

   4    3     INDEX (UNIQUE SCAN) OF 'EMP_PRIMARY_KEY' (INDEX (UNIQUE)
          ) (Cost=1 Card=1)

   5    0   TABLE ACCESS (BY INDEX ROWID) OF 'EMP' (TABLE) (Cost=1 Car
          d=1 Bytes=20)

   6    5     INDEX (UNIQUE SCAN) OF 'EMP_PRIMARY_KEY' (INDEX (UNIQUE)
```

```
        ) (Cost=1 Card=1)

   7    0   TABLE ACCESS (BY INDEX ROWID) OF 'EMP' (TABLE) (Cost=1 Car
          d=1 Bytes=20)

   8    7     INDEX (UNIQUE SCAN) OF 'EMP_PRIMARY_KEY' (INDEX (UNIQUE)
          ) (Cost=1 Card=1)

   9    0   TABLE ACCESS (BY INDEX ROWID) OF 'EMP' (TABLE) (Cost=1 Car
          d=1 Bytes=20)

  10    9     INDEX (UNIQUE SCAN) OF 'EMP_PRIMARY_KEY' (INDEX (UNIQUE)
          ) (Cost=1 Card=1)

  11    0   TABLE ACCESS (BY INDEX ROWID) OF 'EMP' (TABLE) (Cost=1 Car
          d=1 Bytes=20)

  12   11     INDEX (UNIQUE SCAN) OF 'EMP_PRIMARY_KEY' (INDEX (UNIQUE)
          ) (Cost=1 Card=1)

  13    0   SORT (ORDER BY) (Cost=9 Card=1 Bytes=91)
  14   13     MERGE JOIN (Cost=8 Card=1 Bytes=91)
  15   14       SORT (JOIN) (Cost=4 Card=5 Bytes=195)
  16   15         TABLE ACCESS (FULL) OF 'SALGRADE' (TABLE) (Cost=3 Ca
          rd=5 Bytes=195)

  17   14       FILTER
  18   17         SORT (JOIN) (Cost=4 Card=14 Bytes=728)
  19   18           TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=
          14 Bytes=728)



SQL> cl scr

SQL> SELECT
  2  TO_CHAR(HireDate, 'YYYY') Year, COUNT(*) EmpCnt
  3  FROM Emp
  4  GROUP BY ROLLUP(TO_CHAR(HireDate, 'YYYY'));

YEAR     EMPCNT
---- ----------
1980          1
1981         10
1982          2
1983          1
             14


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=12
          6)

   1    0   SORT (GROUP BY ROLLUP) (Cost=4 Card=14 Bytes=126)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
```

```
          es=126)



SQL> SELECT
  2   SUM(DECODE(TO_CHAR(HireDate, 'YYYY'),
  3      1980, 1, 0))  "1980" ,
  4   SUM(DECODE(TO_CHAR(HireDate, 'YYYY'),
  5      1981, 1, 0))  "1981" ,
  6   SUM(DECODE(TO_CHAR(HireDate, 'YYYY'),
  7      1982, 1, 0))  "1982" ,
  8   SUM(DECODE(TO_CHAR(HireDate, 'YYYY'),
  9      1983, 1, 0))  "1983",
 10  COUNT(*) Total
 11  FROM Emp;

      1980       1981       1982       1983      TOTAL
---------- ---------- ---------- ---------- ----------
         1         10          2          1         14


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=1 Bytes=9)
   1    0   SORT (AGGREGATE)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=126)



SQL> ED
Wrote file afiedt.buf

  1  SELECT
  2   COUNT(DECODE(TO_CHAR(HireDate, 'YYYY'),
  3      1980, 1, 0))  "1980" ,
  4   COUNT(DECODE(TO_CHAR(HireDate, 'YYYY'),
  5      1981, 1, 0))  "1981" ,
  6   COUNT(DECODE(TO_CHAR(HireDate, 'YYYY'),
  7      1982, 1, 0))  "1982" ,
  8   COUNT(DECODE(TO_CHAR(HireDate, 'YYYY'),
  9      1983, 1, 0))  "1983",
 10  COUNT(*) Total
 11* FROM Emp
SQL> /

      1980       1981       1982       1983      TOTAL
---------- ---------- ---------- ---------- ----------
        14         14         14         14         14


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=1 Bytes=9)
   1    0   SORT (AGGREGATE)
```

```
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=126)



SQL> ED
Wrote file afiedt.buf

  1  SELECT
  2   COUNT(DECODE(TO_CHAR(HireDate, 'YYYY'),
  3      1980, 1, NULL))  "1980" ,
  4   COUNT(DECODE(TO_CHAR(HireDate, 'YYYY'),
  5      1981, 1, NULL))  "1981" ,
  6   COUNT(DECODE(TO_CHAR(HireDate, 'YYYY'),
  7      1982, 1, NULL))  "1982" ,
  8   COUNT(DECODE(TO_CHAR(HireDate, 'YYYY'),
  9      1983, 1, NULL))  "1983",
 10  COUNT(*) Total
 11* FROM Emp
SQL> /

      1980       1981       1982       1983      TOTAL
---------- ---------- ---------- ---------- ----------
         1         10          2          1         14


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=1 Bytes=9)
   1    0   SORT (AGGREGATE)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=126)



SQL> cl scr

SQL> SELECT Ename, Job, Sal,
  2  DECODE(Job,
  3         'ANALYST', Sal * 1.1,
  4         'CLERK', Sal * 1.15,
  5         'MANAGER', Sal * 1.2,
  6         Sal) "REVISED SALARY "
  7  FROM Emp;

ENAME      JOB              SAL REVISED SALARY
---------- --------- ---------- --------------
KING       PRESIDENT       5000           5000
BLAKE      MANAGER         2850           3420
CLARK      MANAGER         2450           2940
JONES      MANAGER         2975           3570
MARTIN     SALESMAN        1250           1250
ALLEN      SALESMAN        1600           1600
TURNER     SALESMAN        1500           1500
JAMES      CLERK            950         1092.5
```

```
WARD       SALESMAN        1250            1250
FORD       ANALYST         3000            3300
SMITH      CLERK            800             920

ENAME      JOB              SAL REVISED SALARY
---------- --------- ---------- --------------
SCOTT      ANALYST         3000            3300
ADAMS      CLERK           1100            1265
MILLER     CLERK           1300            1495

14 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=14 Bytes=36
          4)

   1    0   TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Bytes
          =364)



SQL> cl scr

SQL> SELECT Ename, Job, Sal,
  2  DECODE(Job, 'ANALYST', Sal * 1.1,
  3     'CLERK', Sal * 1.15,
  4     'MANAGER', Sal * 1.2,
  5     Sal) "REVISED SALARY",
  6  DECODE(Job, 'ANALYST', 'Revised',
  7     'CLERK', 'Revised',
  8     'MANAGER', 'Revised',
  9     'Sorry!') "Status"
 10  FROM Emp;

ENAME      JOB              SAL REVISED SALARY Status
---------- --------- ---------- -------------- -------
KING       PRESIDENT       5000           5000 Sorry!
BLAKE      MANAGER         2850           3420 Revised
CLARK      MANAGER         2450           2940 Revised
JONES      MANAGER         2975           3570 Revised
MARTIN     SALESMAN        1250           1250 Sorry!
ALLEN      SALESMAN        1600           1600 Sorry!
TURNER     SALESMAN        1500           1500 Sorry!
JAMES      CLERK            950         1092.5 Revised
WARD       SALESMAN        1250           1250 Sorry!
FORD       ANALYST         3000           3300 Revised
SMITH      CLERK            800            920 Revised

ENAME      JOB              SAL REVISED SALARY Status
---------- --------- ---------- -------------- -------
SCOTT      ANALYST         3000           3300 Revised
ADAMS      CLERK           1100           1265 Revised
MILLER     CLERK           1300           1495 Revised
```

```
14 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=14 Bytes=36
          4)

   1    0   TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Bytes
          =364)



SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Job, Sal,
  2  DECODE(
  3   Job,
  4   'ANALYST', (Sal * 1.1)||' Revised.',
  5         'CLERK', (Sal * 1.15)||' Revised.',
  6         'MANAGER', (Sal * 1.2)||' Revised.',
  7         Sal||' Sorry!') "REVISED SALARY"
  8* FROM Emp
SQL> /

ENAME      JOB              SAL
---------- --------- ----------
REVISED SALARY
-------------------------------------------------
KING       PRESIDENT       5000
5000 Sorry!

BLAKE      MANAGER         2850
3420 Revised.

CLARK      MANAGER         2450
2940 Revised.


ENAME      JOB              SAL
---------- --------- ----------
REVISED SALARY
-------------------------------------------------
JONES      MANAGER         2975
3570 Revised.

MARTIN     SALESMAN        1250
1250 Sorry!

ALLEN      SALESMAN        1600
1600 Sorry!


ENAME      JOB              SAL
---------- --------- ----------
```

```
REVISED SALARY
-----------------------------------------------
TURNER     SALESMAN        1500
1500 Sorry!

JAMES      CLERK            950
1092.5 Revised.

WARD       SALESMAN        1250
1250 Sorry!


ENAME      JOB              SAL
---------- --------- ----------
REVISED SALARY
-----------------------------------------------
FORD       ANALYST         3000
3300 Revised.

SMITH      CLERK            800
920 Revised.

SCOTT      ANALYST         3000
3300 Revised.


ENAME      JOB              SAL
---------- --------- ----------
REVISED SALARY
-----------------------------------------------
ADAMS      CLERK           1100
1265 Revised.

MILLER     CLERK           1300
1495 Revised.


14 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=14 Bytes=36
          4)

   1    0   TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Bytes
          =364)



SQL> COLUMN "REVISED SALARY" FORMAT A25
SQL> /

ENAME      JOB              SAL REVISED SALARY
---------- --------- ---------- -------------------------
KING       PRESIDENT       5000 5000 Sorry!
```

```
BLAKE      MANAGER         2850 3420 Revised.
CLARK      MANAGER         2450 2940 Revised.
JONES      MANAGER         2975 3570 Revised.
MARTIN     SALESMAN        1250 1250 Sorry!
ALLEN      SALESMAN        1600 1600 Sorry!
TURNER     SALESMAN        1500 1500 Sorry!
JAMES      CLERK            950 1092.5 Revised.
WARD       SALESMAN        1250 1250 Sorry!
FORD       ANALYST         3000 3300 Revised.
SMITH      CLERK            800 920 Revised.

ENAME      JOB              SAL REVISED SALARY
---------- --------- ---------- ----------------------
SCOTT      ANALYST         3000 3300 Revised.
ADAMS      CLERK           1100 1265 Revised.
MILLER     CLERK           1300 1495 Revised.

14 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=14 Bytes=36
          4)

   1    0   TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Bytes
          =364)



SQL> SELECT Ename, Job, Sal,
  2  DECODE(Job, 'ANALYST', Sal * 1.1,
  3     'CLERK', Sal * 1.15,
  4     'MANAGER', Sal * 1.2,
  5     Sal) "REVISED SALARY",
  6  DECODE(Job, 'ANALYST', Sal * 1.1,
  7     'CLERK', Sal * 1.15,
  8     'MANAGER', Sal * 1.2,
  9     Sal) - Sal "Extra Amount",
 10  DECODE(Job, 'ANALYST', 'Revised',
 11     'CLERK', 'Revised',
 12     'MANAGER', 'Revised',
 13     'Sorry!') "Status"
 14  FROM Emp;

ENAME      JOB              SAL REVISED SALARY Extra Amount Status
---------- --------- ---------- -------------- ------------ -------
KING       PRESIDENT       5000     ##########            0 Sorry!
BLAKE      MANAGER         2850     ##########          570 Revised
CLARK      MANAGER         2450     ##########          490 Revised
JONES      MANAGER         2975     ##########          595 Revised
MARTIN     SALESMAN        1250     ##########            0 Sorry!
ALLEN      SALESMAN        1600     ##########            0 Sorry!
TURNER     SALESMAN        1500     ##########            0 Sorry!
JAMES      CLERK            950     ##########        142.5 Revised
WARD       SALESMAN        1250     ##########            0 Sorry!
```

```
FORD       ANALYST         3000     ##########          300 Revised
SMITH      CLERK            800     ##########          120 Revised

ENAME      JOB              SAL REVISED SALARY Extra Amount Status
---------- --------- ---------- -------------- ------------ -------
SCOTT      ANALYST         3000     ##########          300 Revised
ADAMS      CLERK           1100     ##########          165 Revised
MILLER     CLERK           1300     ##########          195 Revised

14 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=14 Bytes=36
          4)

   1    0   TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Bytes
          =364)



SQL> COLUMN "REVISED SALARY"
COLUMN   REVISED SALARY ON
FORMAT   A25
SQL> COLUMN "REVISED SALARY" FORMAT 99999
SQL> /

ENAME      JOB              SAL REVISED SALARY Extra Amount Status
---------- --------- ---------- -------------- ------------ -------
KING       PRESIDENT       5000           5000            0 Sorry!
BLAKE      MANAGER         2850           3420          570 Revised
CLARK      MANAGER         2450           2940          490 Revised
JONES      MANAGER         2975           3570          595 Revised
MARTIN     SALESMAN        1250           1250            0 Sorry!
ALLEN      SALESMAN        1600           1600            0 Sorry!
TURNER     SALESMAN        1500           1500            0 Sorry!
JAMES      CLERK            950           1093        142.5 Revised
WARD       SALESMAN        1250           1250            0 Sorry!
FORD       ANALYST         3000           3300          300 Revised
SMITH      CLERK            800            920          120 Revised

ENAME      JOB              SAL REVISED SALARY Extra Amount Status
---------- --------- ---------- -------------- ------------ -------
SCOTT      ANALYST         3000           3300          300 Revised
ADAMS      CLERK           1100           1265          165 Revised
MILLER     CLERK           1300           1495          195 Revised

14 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=14 Bytes=36
          4)
```

```
   1    0   TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Bytes
          =364)



SQL> cl scr

SQL> R
  1  SELECT Ename, Job, Sal,
  2  DECODE(Job, 'ANALYST', Sal * 1.1,
  3     'CLERK', Sal * 1.15,
  4     'MANAGER', Sal * 1.2,
  5     Sal) "REVISED SALARY",
  6  DECODE(Job, 'ANALYST', Sal * 1.1,
  7     'CLERK', Sal * 1.15,
  8     'MANAGER', Sal * 1.2,
  9     Sal) - Sal "Extra Amount",
 10  DECODE(Job, 'ANALYST', 'Revised',
 11     'CLERK', 'Revised',
 12     'MANAGER', 'Revised',
 13     'Sorry!') "Status"
 14* FROM Emp

ENAME      JOB              SAL REVISED SALARY Extra Amount Status
---------- --------- ---------- -------------- ------------ -------
KING       PRESIDENT       5000           5000            0 Sorry!
BLAKE      MANAGER         2850           3420          570 Revised
CLARK      MANAGER         2450           2940          490 Revised
JONES      MANAGER         2975           3570          595 Revised
MARTIN     SALESMAN        1250           1250            0 Sorry!
ALLEN      SALESMAN        1600           1600            0 Sorry!
TURNER     SALESMAN        1500           1500            0 Sorry!
JAMES      CLERK            950           1093        142.5 Revised
WARD       SALESMAN        1250           1250            0 Sorry!
FORD       ANALYST         3000           3300          300 Revised
SMITH      CLERK            800            920          120 Revised

ENAME      JOB              SAL REVISED SALARY Extra Amount Status
---------- --------- ---------- -------------- ------------ -------
SCOTT      ANALYST         3000           3300          300 Revised
ADAMS      CLERK           1100           1265          165 Revised
MILLER     CLERK           1300           1495          195 Revised

14 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=14 Bytes=36
          4)

   1    0   TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Bytes
          =364)
```

```
SQL> cl scr

SQL> SELECT
  2  COUNT(DECODE(Deptno, 10, '*', NULL)) D10_COUNT,
  3  SUM(DECODE(Deptno, 10, Sal, NULL)) D10_Sal,
  4  COUNT(DECODE(Deptno, 20, '*', NULL)) D20_COUNT,
  5  SUM(DECODE(Deptno, 20, Sal, NULL)) D20_Sal,
  6  COUNT(DECODE(Deptno, 30, '*', NULL)) D30_COUNT,
  7  SUM(DECODE(Deptno, 30, Sal, NULL)) D30_Sal
  8  FROM Emp;

 D10_COUNT    D10_SAL  D20_COUNT    D20_SAL  D30_COUNT    D30_SAL
---------- ---------- ---------- ---------- ---------- ----------
         3       8750          5      10875          6       9400


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=1 Bytes=26)
   1    0   SORT (AGGREGATE)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=364)



SQL> SELECT Deptno, COUNT(*), SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno;

DEPTNO   COUNT(*)   SUM(SAL)
------ ---------- ----------
    10          3       8750
    20          5      10875
    30          6       9400


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=36
          4)

   1    0   SORT (GROUP BY) (Cost=4 Card=14 Bytes=364)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=364)



SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno, COUNT(*), SUM(Sal)
  2  FROM Emp
  3* GROUP BY ROLLUP(Deptno)
SQL> /
```

```
DEPTNO   COUNT(*)   SUM(SAL)
------ ---------- ----------
    10          3       8750
    20          5      10875
    30          6       9400
               14      29025


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=36
          4)

   1    0   SORT (GROUP BY ROLLUP) (Cost=4 Card=14 Bytes=364)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=364)



SQL> cl scr

SQL> COLUMN D10_COUNT FORMAT 99
SQL> COLUMN D10_SAL FORMAT 99999
SQL> COLUMN D20_COUNT FORMAT 99
SQL> COLUMN D20_SAL FORMAT 99999
SQL> COLUMN D30_COUNT FORMAT 99
SQL> COLUMN D30_SAL FORMAT 99999
SQL> COLUMN EMPCOUNT FORMAT 99
SQL> COLUMN SALSUM FORMAT 99999
SQL> SELECT
  2  COUNT(DECODE(Deptno, 10, '*', NULL)) D10_COUNT,
  3  SUM(DECODE(Deptno, 10, Sal, NULL)) D10_Sal,
  4  COUNT(DECODE(Deptno, 20, '*', NULL)) D20_COUNT,
  5  SUM(DECODE(Deptno, 20, Sal, NULL)) D20_Sal,
  6  COUNT(DECODE(Deptno, 30, '*', NULL)) D30_COUNT,
  7  SUM(DECODE(Deptno, 30, Sal, NULL)) D30_Sal,
  8  COUNT(*) EmpCount, SUM(Sal) SalSum
  9  FROM Emp;

D10_COUNT D10_SAL D20_COUNT D20_SAL D30_COUNT D30_SAL EMPCOUNT SALSUM
--------- ------- --------- ------- --------- ------- -------- ------
        3    8750         5   10875         6    9400       14  29025


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=1 Bytes=26)
   1    0   SORT (AGGREGATE)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=364)



SQL> cl scr
```

```
SQL> SELECT Job,
  2  SUM(DECODE(Deptno, 10, Sal)) "Deptno 10",
  3  SUM(DECODE(Deptno, 20, Sal)) "Deptno 20",
  4  SUM(DECODE(Deptno, 30, Sal)) "Deptno 30",
  5  SUM(Sal) "Total"
  6  FROM Emp
  7  GROUP BY Job;

JOB        Deptno 10  Deptno 20  Deptno 30      Total
--------- ---------- ---------- ---------- ----------
ANALYST                    6000                  6000
CLERK            1300       1900        950       4150
MANAGER          2450       2975       2850       8275
PRESIDENT        5000                             5000
SALESMAN                                5600       5600


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=44
          8)

   1    0   SORT (GROUP BY) (Cost=4 Card=14 Bytes=448)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=448)



SQL> ED
Wrote file afiedt.buf

  1  SELECT Job,
  2  SUM(DECODE(Deptno, 10, Sal)) "Deptno 10",
  3  SUM(DECODE(Deptno, 20, Sal)) "Deptno 20",
  4  SUM(DECODE(Deptno, 30, Sal)) "Deptno 30",
  5  SUM(Sal) "Total"
  6  FROM Emp
  7* GROUP BY ROLLUP(Job)
SQL> /

JOB        Deptno 10  Deptno 20  Deptno 30      Total
--------- ---------- ---------- ---------- ----------
ANALYST                    6000                  6000
CLERK            1300       1900        950       4150
MANAGER          2450       2975       2850       8275
PRESIDENT        5000                             5000
SALESMAN                                5600       5600
                 8750      10875       9400      29025

6 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=44
```

```
          8)

   1    0   SORT (GROUP BY ROLLUP) (Cost=4 Card=14 Bytes=448)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=448)



SQL> SELECT Deptno,
  2  SUM(DECODE(Job, 'PRESIDENT', Sal)) "President",
  3  SUM(DECODE(Job, 'ANALYST', Sal)) "Analyst",
  4  SUM(DECODE(Job, 'MANAGER', Sal)) "Manager",
  5  SUM(DECODE(Job, 'CLERK', Sal)) "Clerk",
  6  SUM(DECODE(Job, 'SALESMAN', Sal)) "Salesman",
  7  SUM(Sal) "Total"
  8  FROM Emp
  9  GROUP BY Deptno;

DEPTNO  President    Analyst    Manager      Clerk   Salesman      Total
------ ---------- ---------- ---------- ---------- ---------- ----------
    10       5000                  2450       1300                 8750
    20                  6000       2975       1900                10875
    30                             2850        950       5600       9400


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=44
          8)

   1    0   SORT (GROUP BY) (Cost=4 Card=14 Bytes=448)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=448)



SQL> cl scr

SQL> COLUMN President FORMAT A9
SQL> COLUMN Analyst FORMAT A9
SQL> COLUMN Manager FORMAT A9
SQL> COLUMN Clerk FORMAT A9
SQL> COLUMN Salesman FORMAT A9
SQL> SELECT Deptno,
  2  NVL(TO_CHAR(SUM(DECODE(Job, 'PRESIDENT', Sal))), '***') "President",
  3  NVL(TO_CHAR(SUM(DECODE(Job, 'ANALYST', Sal))), '***') "Analyst",
  4  NVL(TO_CHAR(SUM(DECODE(Job, 'MANAGER', Sal))), '***') "Manager",
  5  NVl(TO_CHAR(SUM(DECODE(Job, 'CLERK', Sal))), '***') "Clerk",
  6  NVL(TO_CHAR(SUM(DECODE(Job, 'SALESMAN', Sal))), '***') "Salesman",
  7  SUM(Sal) "Total"
  8  FROM Emp
  9  GROUP BY Deptno;

DEPTNO President Analyst   Manager   Clerk     Salesman       Total
------ --------- --------- --------- --------- --------- ----------
```

```
    10 5000       ***        2450       1300       ***              8750
    20 ***        6000       2975       1900       ***             10875
    30 ***        ***        2850       950        5600             9400


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=44
          8)

   1    0   SORT (GROUP BY) (Cost=4 Card=14 Bytes=448)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=448)



SQL> cl scr

SQL> SET PAGESIZE 200
SQL> BREAK ON Month SKIP 1
SQL> COLUMN Month FORMAT A18
SQL> COLUMN Sun FORMAT A5
SQL> COLUMN Mon FORMAT A5
SQL> COLUMN Tue FORMAT A5
SQL> COLUMN Wed FORMAT A5
SQL> COLUMN Thu FORMAT A5
SQL> COLUMN Fri FORMAT A5
SQL> COLUMN Sat FORMAT A5
SQL> SELECT
  2   LPAD(Month, 20 - (20 - LENGTH(Month)) / 2 ) Month,
  3   "Sun",
  4   "Mon",
  5   "Tue",
  6   "Wed",
  7   "Thu",
  8   "Fri",
  9   "Sat"
 10  FROM (
 11         SELECT
 12         TO_CHAR(DT,'FMMonth YYYY') Month,
 13         TO_CHAR(DT + 1,'IW') Week,
 14         MAX(DECODE(TO_CHAR(DT, 'D'), '1', LPAD(TO_CHAR(DT, 'FMDD'), 2)))
"Sun",
 15         MAX(DECODE(TO_CHAR(DT, 'D'), '2', LPAD(TO_CHAR(DT, 'FMDD'), 2)))
"Mon",
 16         MAX(DECODE(TO_CHAR(DT, 'D'), '3', LPAD(TO_CHAR(DT, 'FMDD'), 2)))
"Tue",
 17         MAX(DECODE(TO_CHAR(DT, 'D'), '4', LPAD(TO_CHAR(DT, 'FMDD'), 2)))
"Wed",
 18         MAX(DECODE(TO_CHAR(DT, 'D'), '5', LPAD(TO_CHAR(DT, 'FMDD'), 2)))
"Thu",
 19         MAX(DECODE(TO_CHAR(DT, 'D'), '6', LPAD(TO_CHAR(DT, 'FMDD'), 2)))
"Fri",
 20         MAX(DECODE(TO_CHAR(DT, 'D'), '7', LPAD(TO_CHAR(DT, 'FMDD'), 2)))
"Sat"
 21         FROM(
```

```
 22                     SELECT TRUNC(SYSDATE, 'Y') - 1 + ROWNUM DT
 23                     FROM ALL_OBJECTS
 24                     WHERE
 25                     ROWNUM <= ADD_MONTHS(TRUNC(SYSDATE, 'Year'), 12) -
TRUNC(SYSDATE, 'Year')
 26                     )
 27          GROUP BY TO_CHAR(DT, 'FMMonth YYYY'), TO_CHAR(DT + 1, 'IW')
 28   )
 29  ORDER BY TO_DATE(MONTH, 'Month YYYY' ), TO_NUMBER(Week)
 30  /

MONTH                Sun   Mon   Tue   Wed   Thu   Fri   Sat
-------------------- ----- ----- ----- ----- ----- ----- -----
    January 2010       3     4     5     6     7     8     9
                      10    11    12    13    14    15    16
                      17    18    19    20    21    22    23
                      24    25    26    27    28    29    30
                      31
                                                  1     2

   February 2010             1     2     3     4     5     6
                       7     8     9    10    11    12    13
                      14    15    16    17    18    19    20
                      21    22    23    24    25    26    27
                      28

     March 2010              1     2     3     4     5     6
                       7     8     9    10    11    12    13
                      14    15    16    17    18    19    20
                      21    22    23    24    25    26    27
                      28    29    30    31

     April 2010                                  1     2     3
                       4     5     6     7     8     9    10
                      11    12    13    14    15    16    17
                      18    19    20    21    22    23    24
                      25    26    27    28    29    30

      May 2010                                               1
                       2     3     4     5     6     7     8
                       9    10    11    12    13    14    15
                      16    17    18    19    20    21    22
                      23    24    25    26    27    28    29
                      30    31

     June 2010                 1     2     3     4     5
                       6     7     8     9    10    11    12
                      13    14    15    16    17    18    19
                      20    21    22    23    24    25    26
                      27    28    29    30

     July 2010                             1     2     3
                       4     5     6     7     8     9    10
                      11    12    13    14    15    16    17
                      18    19    20    21    22    23    24
                      25    26    27    28    29    30    31
```

```
 August 2010      1     2     3     4     5     6     7
                  8     9    10    11    12    13    14
                 15    16    17    18    19    20    21
                 22    23    24    25    26    27    28
                 29    30    31

September 2010                  1     2     3     4
                  5     6     7     8     9    10    11
                 12    13    14    15    16    17    18
                 19    20    21    22    23    24    25
                 26    27    28    29    30

 October 2010                                 1     2
                  3     4     5     6     7     8     9
                 10    11    12    13    14    15    16
                 17    18    19    20    21    22    23
                 24    25    26    27    28    29    30
                 31

November 2010          1     2     3     4     5     6
                  7     8     9    10    11    12    13
                 14    15    16    17    18    19    20
                 21    22    23    24    25    26    27
                 28    29    30

December 2010                   1     2     3     4
                  5     6     7     8     9    10    11
                 12    13    14    15    16    17    18
                 19    20    21    22    23    24    25
                 26    27    28    29    30    31

63 rows selected.


Execution Plan
----------------------------------------------------------
ERROR:
ORA-01039: insufficient privileges on underlying objects of the view


SP2-0612: Error generating AUTOTRACE EXPLAIN report
SQL> SPOOL OFF
SQL> cl scr

SQL> COLUMN DEPARTMENTS FORMAT A15
SQL> COLUMN SUM(Sal) FORMAT 99999
SQL> SELECT
  2  DECODE(GROUPING(Deptno),
  3         1, 'All Departments',
  4         Deptno) Departments,
  5         SUM(Sal)
  6  FROM Emp
  7  GROUP BY ROLLUP(Deptno);

DEPARTMENTS     SUM(SAL)
--------------- --------
```

```
10                  8750
20                 10875
30                  9400
All Departments    29025

SQL> ED
Wrote file afiedt.buf

  1  SELECT
  2  DECODE(GROUPING(Deptno),
  3   1, 'All Departments Investment : ',
  4   'Department '||Deptno||' Investments : ') Departments,
  5         SUM(Sal)
  6  FROM Emp
  7* GROUP BY ROLLUP(Deptno)
SQL> COLUMN DEPARTMENTS FORMAT A25
SQL> /

DEPARTMENTS               SUM(SAL)
------------------------- --------
Department 10 Investments     8750
 :

Department 20 Investments    10875
 :

Department 30 Investments     9400
 :

All Departments Investmen    29025
t :

DEPARTMENTS               SUM(SAL)
------------------------- --------


SQL> COLUMN DEPARTMENTS FORMAT A28
SQL> /

DEPARTMENTS                  SUM(SAL)
---------------------------- --------
Department 10 Investments :      8750
Department 20 Investments :     10875
Department 30 Investments :      9400
All Departments Investment :    29025



SQL> cl scr

SQL> R
  1  SELECT
  2  DECODE(GROUPING(Deptno),
  3   1, 'All Departments Investment : ',
  4   'Department '||Deptno||' Investments : ') Departments,
  5         SUM(Sal)
  6  FROM Emp
```

```
  7* GROUP BY ROLLUP(Deptno)

DEPARTMENTS                  SUM(SAL)
---------------------------- --------
Department 10 Investments :      8750
Department 20 Investments :     10875
Department 30 Investments :      9400
All Departments Investment :    29025



SQL> cl scr

SQL> SELECT
  2  DECODE(GROUPING(Job),
  3         1, 'All Designations',
  4         Job) Designations,
  5         SUM(Sal)
  6  FROM Emp
  7  GROUP BY ROLLUP(Job);

DESIGNATIONS     SUM(SAL)
--------------- --------
ANALYST              6000
CLERK                4150
MANAGER              8275
PRESIDENT            5000
SALESMAN             5600
All Designations    29025

6 rows selected.

SQL> cl scr

SQL> SELECT
  2  DECODE(GROUPING(Deptno),
  3    1 , 'All Departments',
  4    Deptno) Departments,
  5  DECODE(GROUPING(Job),
  6    1, 'All Designations',
  7    Job) Designations,
  8  SUM(Sal)
  9  FROM Emp
 10  GROUP BY CUBE(Deptno, Job)
 11  ORDER BY Deptno;

DEPARTMENTS                  DESIGNATIONS     SUM(SAL)
---------------------------- --------------- --------
10                           CLERK                1300
10                           MANAGER              2450
10                           PRESIDENT            5000
10                           All Designations     8750
20                           ANALYST              6000
20                           CLERK                1900
20                           MANAGER              2975
20                           All Designations    10875
30                           CLERK                 950
```

```
30                             MANAGER              2850
30                             SALESMAN             5600

DEPARTMENTS                    DESIGNATIONS     SUM(SAL)
------------------------------ --------------- --------
30                             All Designations     9400
All Departments                ANALYST              6000
All Departments                CLERK                4150
All Departments                MANAGER              8275
All Departments                PRESIDENT            5000
All Departments                SALESMAN             5600
All Departments                All Designations    29025

18 rows selected.

SQL> cl scr

SQL> SELECT Deptno, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno;

    DEPTNO SUM(SAL)
---------- --------
        10     8750
        20    10875
        30     9400

SQL> SELECT Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Job;

JOB       SUM(SAL)
--------- --------
ANALYST       6000
CLERK         4150
MANAGER       8275
PRESIDENT     5000
SALESMAN      5600

SQL> SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY
  4  (Deptno, Job);

    DEPTNO JOB       SUM(SAL)
---------- --------- --------
        10 CLERK         1300
        10 MANAGER       2450
        10 PRESIDENT     5000
        20 CLERK         1900
        20 ANALYST       6000
        20 MANAGER       2975
        30 CLERK          950
        30 MANAGER       2850
        30 SALESMAN      5600

9 rows selected.
```

```
SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY
  4* GROUPING SETS(Deptno, Job)
SQL> /

    DEPTNO JOB       SUM(SAL)
---------- --------- --------
        10               8750
        20              10875
        30               9400
           ANALYST       6000
           CLERK         4150
           MANAGER       8275
           PRESIDENT     5000
           SALESMAN      5600

8 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT
  2  Deptno,
  3  Job,
  4  MGR,
  5  TO_CHAR(HireDate, 'YYYY') Year,
  6  TO_CHAR(HireDate, 'Q') Quarter,
  7  TO_CHAR(HireDate, 'Month') Month,
  8  TO_CHAR(HireDate, 'Day') WeekDay
  9  SUM(Sal)
 10  FROM Emp
 11  GROUP BY
 12  GROUPING SETS
 13  (
 14   Deptno,
 15   Job,
 16   MGR,
 17   TO_CHAR(HireDate, 'YYYY'),
 18   TO_CHAR(HireDate, 'Q'),
 19   TO_CHAR(HireDate, 'Month'),
 20   TO_CHAR(HireDate, 'Day')
 21* )
SQL> /
SUM(Sal)
*
ERROR at line 9:
ORA-00923: FROM keyword not found where expected


SQL> ED
Wrote file afiedt.buf
```

```
  1  SELECT
  2  Deptno,
  3  Job,
  4  MGR,
  5  TO_CHAR(HireDate, 'YYYY') Year,
  6  TO_CHAR(HireDate, 'Q') Quarter,
  7  TO_CHAR(HireDate, 'Month') Month,
  8  TO_CHAR(HireDate, 'Day') WeekDay,
  9  SUM(Sal)
 10  FROM Emp
 11  GROUP BY
 12  GROUPING SETS
 13  (
 14   Deptno,
 15   Job,
 16   MGR,
 17   TO_CHAR(HireDate, 'YYYY'),
 18   TO_CHAR(HireDate, 'Q'),
 19   TO_CHAR(HireDate, 'Month'),
 20   TO_CHAR(HireDate, 'Day')
 21* )
SQL> /

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
        10                                                    8750
        20                                                   10875
        30                                                    9400
           ANALYST                                            6000
           CLERK                                              4150
           MANAGER                                            8275
           PRESIDENT                                          5000
           SALESMAN                                           5600
                          7566                                6000
                          7698                                6550
                          7782                                1300

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                          7788                                1100
                          7839                                8275
                          7902                                 800
                                                              5000
                               1980                            800
                               1981                          22825
                               1982                           4300
                               1983                           1100
                                    1                         5250
                                    2                         8275
                                    3                         2750

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                                    4                        12750
                                      April                   2975
                                      December                7750
                                      February                2850
```

```
                                        January                 2400
                                        June                    2450
                                        May                     2850
                                        November                5000
                                        September               2750
                                                  Friday        4450
                                                  Monday        1250

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                                                  Saturday      1300
                                                  Sunday        1250
                                                  Thursday      9925
                                                  Tuesday       8950
                                                  Wednesday     1900

38 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT
  2  Deptno,
  3  Job,
  4  MGR,
  5  TO_CHAR(HireDate, 'YYYY') Year,
  6  TO_CHAR(HireDate, 'Q') Quarter,
  7  TO_CHAR(HireDate, 'Month') Month,
  8  TO_CHAR(HireDate, 'Day') WeekDay,
  9  SUM(Sal)
 10  FROM Emp
 11  GROUP BY
 12  GROUPING SETS
 13  (
 14   Deptno,
 15   Job,
 16   MGR,
 17   TO_CHAR(HireDate, 'YYYY'),
 18   TO_CHAR(HireDate, 'Q'),
 19   TO_CHAR(HireDate, 'Month'),
 20   TO_CHAR(HireDate, 'Day')
 21  )
 22* HAVING GROUPING(&ColumnName) = 0
SQL> SET VERIFY OFF
SQL> /
Enter value for columnname: Deptno

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
        10                                                    8750
        20                                                   10875
        30                                                    9400

SQL> /
Enter value for columnname: Job

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
```

```
---------- --------- ---------- ---- - --------- --------- --------
           ANALYST                                           6000
           CLERK                                             4150
           MANAGER                                           8275
           PRESIDENT                                         5000
           SALESMAN                                          5600

SQL> /
Enter value for columnname: MGR

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                         7566                               6000
                         7698                               6550
                         7782                               1300
                         7788                               1100
                         7839                               8275
                         7902                                800
                                                            5000

7 rows selected.

SQL> /
Enter value for columnname: TO_CHAR(HireDate, 'YYYY')

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                             1980                            800
                             1981                          22825
                             1982                           4300
                             1983                           1100

SQL> SET AUTOTRACE ON EXPLAIN
SQL> /
Enter value for columnname: Deptno

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
        10                                                  8750
        20                                                 10875
        30                                                  9400


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=36
          4)

   1    0   FILTER
   2    1     SORT (GROUP BY) (Cost=4 Card=14 Bytes=364)
   3    2       TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 B
          ytes=364)



SQL> ED
```

```
Wrote file afiedt.buf

  1  SELECT
  2  Deptno,
  3  Job,
  4  MGR,
  5  TO_CHAR(HireDate, 'YYYY') Year,
  6  TO_CHAR(HireDate, 'Q') Quarter,
  7  TO_CHAR(HireDate, 'Month') Month,
  8  TO_CHAR(HireDate, 'Day') WeekDay,
  9  SUM(Sal)
 10  FROM Emp
 11  GROUP BY
 12  GROUPING SETS
 13  (
 14   Deptno,
 15   Job,
 16   MGR,
 17   TO_CHAR(HireDate, 'YYYY'),
 18   TO_CHAR(HireDate, 'Q'),
 19   TO_CHAR(HireDate, 'Month'),
 20   TO_CHAR(HireDate, 'Day')
 21* )
 22  /

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
        10                                                    8750
        20                                                   10875
        30                                                    9400
           ANALYST                                            6000
           CLERK                                              4150
           MANAGER                                            8275
           PRESIDENT                                          5000
           SALESMAN                                           5600
                          7566                                6000
                          7698                                6550
                          7782                                1300

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                          7788                                1100
                          7839                                8275
                          7902                                 800
                                                              5000
                               1980                            800
                               1981                          22825
                               1982                           4300
                               1983                           1100
                                    1                         5250
                                    2                         8275
                                    3                         2750

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                                    4                        12750
                                      April                   2975
```

```
                                        December                7750
                                        February                2850
                                        January                 2400
                                        June                    2450
                                        May                     2850
                                        November                5000
                                        September               2750
                                                  Friday        4450
                                                  Monday        1250

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                                                  Saturday      1300
                                                  Sunday        1250
                                                  Thursday      9925
                                                  Tuesday       8950
                                                  Wednesday     1900

38 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=26 Card=14 Bytes=8
          82)

   1    0   TEMP TABLE TRANSFORMATION
   2    1     LOAD AS SELECT
   3    2       TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 B
          ytes=756)

   4    1     LOAD AS SELECT
   5    4       SORT (GROUP BY) (Cost=3 Card=1 Bytes=26)
   6    5         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6604_14C83BF'
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=26)

   7    1     LOAD AS SELECT
   8    7       SORT (GROUP BY) (Cost=3 Card=1 Bytes=19)
   9    8         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6604_14C83BF'
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=19)

  10    1     LOAD AS SELECT
  11   10       SORT (GROUP BY) (Cost=3 Card=1 Bytes=26)
  12   11         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6604_14C83BF'
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=26)

  13    1     LOAD AS SELECT
  14   13       SORT (GROUP BY) (Cost=3 Card=1 Bytes=17)
  15   14         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6604_14C83BF'
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=17)

  16    1     LOAD AS SELECT
  17   16       SORT (GROUP BY) (Cost=3 Card=1 Bytes=15)
  18   17         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6604_14C83BF'
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=15)

  19    1     LOAD AS SELECT
```

```
  20   19       SORT (GROUP BY) (Cost=3 Card=1 Bytes=19)
  21   20         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6604_14C83BF'
         (TABLE (TEMP)) (Cost=2 Card=1 Bytes=19)

  22    1     LOAD AS SELECT
  23   22       SORT (GROUP BY) (Cost=3 Card=1 Bytes=19)
  24   23         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6604_14C83BF'
         (TABLE (TEMP)) (Cost=2 Card=1 Bytes=19)

  25    1     VIEW (Cost=2 Card=1 Bytes=63)
  26   25       TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6605_14C83BF' (T
         ABLE (TEMP)) (Cost=2 Card=1 Bytes=63)



SQL> cl scr

SQL> SET AUTOTRACE OFF EXPLAIN
SQL> cl scr

SQL> SELECT Ename, Deptno,
  2  CASE Deptno
  3   WHEN 10 THEN 'ACCOUNTING'
  4   WHEN 20 THEN 'RESEARCH'
  5   WHEN 30 THEN 'SALES'
  6   WHEN 40 THEN 'OPERATIONS'
  7   ELSE 'NOT FOUND'
  8  END
  9  FROM Emp;

ENAME          DEPTNO CASEDEPTNO
---------- ---------- ----------
KING               10 ACCOUNTING
BLAKE              30 SALES
CLARK              10 ACCOUNTING
JONES              20 RESEARCH
MARTIN             30 SALES
ALLEN              30 SALES
TURNER             30 SALES
JAMES              30 SALES
WARD               30 SALES
FORD               20 RESEARCH
SMITH              20 RESEARCH

ENAME          DEPTNO CASEDEPTNO
---------- ---------- ----------
SCOTT              20 RESEARCH
ADAMS              20 RESEARCH
MILLER             10 ACCOUNTING

14 rows selected.

SQL> SELECT Ename, Deptno,
  2  DECODE(Deptno
  3   , 10 , 'ACCOUNTING'
  4   , 20 , 'RESEARCH'
```

```
  5   , 30 , 'SALES'
  6   , 40 , 'OPERATIONS'
  7   , 'NOT FOUND') Dept
  8  FROM Emp;

ENAME          DEPTNO DEPT
---------- ---------- ----------
KING               10 ACCOUNTING
BLAKE              30 SALES
CLARK              10 ACCOUNTING
JONES              20 RESEARCH
MARTIN             30 SALES
ALLEN              30 SALES
TURNER             30 SALES
JAMES              30 SALES
WARD               30 SALES
FORD               20 RESEARCH
SMITH              20 RESEARCH

ENAME          DEPTNO DEPT
---------- ---------- ----------
SCOTT              20 RESEARCH
ADAMS              20 RESEARCH
MILLER             10 ACCOUNTING

14 rows selected.

SQL> SELECT Ename, Deptno,
  2  CASE
  3  WHEN Deptno = 10 THEN 'ACCOUNTING'
  4  WHEN Deptno = 20 THEN 'RESEARCH'
  5  WHEN Deptno = 30 THEN 'SALES'
  6  WHEN Deptno = 40 THEN 'OPERATIONS'
  7  ELSE 'Not Specified'
  8  END
  9  FROM Emp;

ENAME          DEPTNO CASEWHENDEPTN
---------- ---------- -------------
KING               10 ACCOUNTING
BLAKE              30 SALES
CLARK              10 ACCOUNTING
JONES              20 RESEARCH
MARTIN             30 SALES
ALLEN              30 SALES
TURNER             30 SALES
JAMES              30 SALES
WARD               30 SALES
FORD               20 RESEARCH
SMITH              20 RESEARCH

ENAME          DEPTNO CASEWHENDEPTN
---------- ---------- -------------
SCOTT              20 RESEARCH
ADAMS              20 RESEARCH
MILLER             10 ACCOUNTING
```

```
14 rows selected.

SQL> cl scr

SQL> SELECT Ename, Sal,
  2  CASE
  3  WHEN Sal >= 800 AND Sal <= 2000
  4  THEN 'LOWEST PAY'
  5  WHEN Sal >= 2001 AND Sal <= 4000
  6  THEN 'MODERATE PAY'
  7  ELSE 'HIGH PAY'  END
  8  FROM Emp;

ENAME             SAL CASEWHENSAL>
---------- ---------- ------------
KING             5000 HIGH PAY
BLAKE            2850 MODERATE PAY
CLARK            2450 MODERATE PAY
JONES            2975 MODERATE PAY
MARTIN           1250 LOWEST PAY
ALLEN            1600 LOWEST PAY
TURNER           1500 LOWEST PAY
JAMES             950 LOWEST PAY
WARD             1250 LOWEST PAY
FORD             3000 MODERATE PAY
SMITH             800 LOWEST PAY

ENAME             SAL CASEWHENSAL>
---------- ---------- ------------
SCOTT            3000 MODERATE PAY
ADAMS            1100 LOWEST PAY
MILLER           1300 LOWEST PAY

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Sal,
  2  CASE
  3  WHEN Sal BETWEEN 800 AND 2000
  4  THEN 'LOWEST PAY'
  5  WHEN Sal BETWEEN 2001 AND 4000
  6  THEN 'MODERATE PAY'
  7  ELSE 'HIGH PAY'  END
  8* FROM Emp
SQL> /

ENAME             SAL CASEWHENSALB
---------- ---------- ------------
KING             5000 HIGH PAY
BLAKE            2850 MODERATE PAY
CLARK            2450 MODERATE PAY
JONES            2975 MODERATE PAY
MARTIN           1250 LOWEST PAY
ALLEN            1600 LOWEST PAY
TURNER           1500 LOWEST PAY
```

```
JAMES             950 LOWEST PAY
WARD             1250 LOWEST PAY
FORD             3000 MODERATE PAY
SMITH             800 LOWEST PAY

ENAME             SAL CASEWHENSALB
---------- ---------- ------------
SCOTT            3000 MODERATE PAY
ADAMS            1100 LOWEST PAY
MILLER           1300 LOWEST PAY

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Sal,
  2  CASE
  3  WHEN Sal BETWEEN 800 AND 2000 AND Job IN('SALESMAN', 'ANALYST')
  4  THEN 'LOWEST PAY'
  5  WHEN Sal BETWEEN 2001 AND 4000
  6  THEN 'MODERATE PAY'
  7  ELSE 'HIGH PAY'  END
  8* FROM Emp
SQL> /

ENAME             SAL CASEWHENSALB
---------- ---------- ------------
KING             5000 HIGH PAY
BLAKE            2850 MODERATE PAY
CLARK            2450 MODERATE PAY
JONES            2975 MODERATE PAY
MARTIN           1250 LOWEST PAY
ALLEN            1600 LOWEST PAY
TURNER           1500 LOWEST PAY
JAMES             950 HIGH PAY
WARD             1250 LOWEST PAY
FORD             3000 MODERATE PAY
SMITH             800 HIGH PAY

ENAME             SAL CASEWHENSALB
---------- ---------- ------------
SCOTT            3000 MODERATE PAY
ADAMS            1100 HIGH PAY
MILLER           1300 HIGH PAY

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Sal, Job,
  2  CASE
  3  WHEN Sal BETWEEN 800 AND 2000 AND Job IN('SALESMAN', 'ANALYST')
  4  THEN 'LOWEST PAY'
  5  WHEN Sal BETWEEN 2001 AND 4000
  6  THEN 'MODERATE PAY'
```

```
  7  ELSE 'HIGH PAY'  END
  8* FROM Emp
SQL> /

ENAME             SAL JOB       CASEWHENSALB
---------- ---------- --------- ------------
KING             5000 PRESIDENT HIGH PAY
BLAKE            2850 MANAGER   MODERATE PAY
CLARK            2450 MANAGER   MODERATE PAY
JONES            2975 MANAGER   MODERATE PAY
MARTIN           1250 SALESMAN  LOWEST PAY
ALLEN            1600 SALESMAN  LOWEST PAY
TURNER           1500 SALESMAN  LOWEST PAY
JAMES             950 CLERK     HIGH PAY
WARD             1250 SALESMAN  LOWEST PAY
FORD             3000 ANALYST   MODERATE PAY
SMITH             800 CLERK     HIGH PAY

ENAME             SAL JOB       CASEWHENSALB
---------- ---------- --------- ------------
SCOTT            3000 ANALYST   MODERATE PAY
ADAMS            1100 CLERK     HIGH PAY
MILLER           1300 CLERK     HIGH PAY

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Sal, Job,
  2  CASE
  3  WHEN Sal BETWEEN 800 AND 2000 AND Job IN('SALESMAN', 'ANALYST')
  4  THEN 'LOWEST PAY'
  5  WHEN Sal BETWEEN 2001 AND 4000
  6  THEN 'MODERATE PAY'
  7  ELSE 'HIGH PAY'  END
  8* FROM Emp
SQL> cl scr

SQL> CONN SYSTEM
Connected.
SQL> GRANT QUERY REWRITE
  2  TO SCOTT;

Grant succeeded.

SQL> GRANT
  2  CREATE MATERIALIZED VIEW
  3  TO SCOTT;

Grant succeeded.

SQL> GRANT ALTER SESSION
  2  TO SCOTT;

Grant succeeded.
```

```
SQL> CONN SCOTT/TIGER
Connected.
SQL> ALTER SESSION
  2  SET QUERY_REWRITE_ENABLED = TRUE;

Session altered.

SQL> cl scr

SQL> SELECT Deptno , Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno, Job;

    DEPTNO JOB       SUM(SAL)
---------- --------- --------
        10 CLERK         1300
        10 MANAGER       2450
        10 PRESIDENT     5000
        20 CLERK         1900
        20 ANALYST       6000
        20 MANAGER       2975
        30 CLERK          950
        30 MANAGER       2850
        30 SALESMAN      5600

9 rows selected.

SQL> CREATE OR REPLACE VIEW DeptJobSalSum
  2  AS
  3  SELECT Deptno, Job, SUM(Sal) SalSum
  4  FROM Emp
  5  GROUP BY Deptno, Job;

View created.

SQL> SET AUTOTRACE ON EXPLAIN
SQL> SELECT Deptno, Job, SUM(Sal) SalSum
  2  FROM Emp
  3  GROUP BY Deptno, Job;

    DEPTNO JOB           SALSUM
---------- --------- ----------
        10 CLERK           1300
        10 MANAGER         2450
        10 PRESIDENT       5000
        20 CLERK           1900
        20 ANALYST         6000
        20 MANAGER         2975
        30 CLERK            950
        30 MANAGER         2850
        30 SALESMAN        5600

9 rows selected.


Execution Plan
----------------------------------------------------------
```

```
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=44
          8)

   1    0   SORT (GROUP BY) (Cost=4 Card=14 Bytes=448)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=448)



SQL> SELECT * FROM DeptJobSalSum;

    DEPTNO JOB           SALSUM
---------- --------- ----------
        10 CLERK           1300
        10 MANAGER         2450
        10 PRESIDENT       5000
        20 CLERK           1900
        20 ANALYST         6000
        20 MANAGER         2975
        30 CLERK            950
        30 MANAGER         2850
        30 SALESMAN        5600

9 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=44
          8)

   1    0   SORT (GROUP BY) (Cost=4 Card=14 Bytes=448)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=448)



SQL> SELECT Deptno, SUM(SALSUM)
  2  FROM DeptJobSalSum
  3  GROUP BY Deptno;

    DEPTNO SUM(SALSUM)
---------- -----------
        10        8750
        20       10875
        30        9400


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=36
          4)

   1    0   SORT (GROUP BY NOSORT) (Cost=4 Card=14 Bytes=364)
   2    1     VIEW OF 'DEPTJOBSALSUM' (VIEW) (Cost=4 Card=14 Bytes=364
```

```
          )

   3    2       SORT (GROUP BY) (Cost=4 Card=14 Bytes=448)
   4    3         TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14
           Bytes=448)



SQL> cl scr

SQL> CREATE MATERIALIZED VIEW
  2  EMP_SUM
  3  ENABLE QUERY REWRITE
  4  AS
  5  SELECT Deptno , Job, SUM(Sal)
  6  FROM Emp
  7  GROUP BY Deptno, Job;

Materialized view created.

SQL> SELECT Deptno , Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno, Job;

    DEPTNO JOB       SUM(SAL)
---------- --------- --------
        10 CLERK         1300
        10 MANAGER       2450
        10 PRESIDENT     5000
        20 CLERK         1900
        20 ANALYST       6000
        20 MANAGER       2975
        30 CLERK          950
        30 MANAGER       2850
        30 SALESMAN      5600

9 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=9 Bytes=288
          )

   1    0   MAT_VIEW REWRITE ACCESS (FULL) OF 'EMP_SUM' (MAT_VIEW REWR
          ITE) (Cost=3 Card=9 Bytes=288)



SQL> SELECT Deptno, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno;

    DEPTNO SUM(SAL)
---------- --------
```

```
        10     8750
        20    10875
        30     9400


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=9 Bytes=234
          )

   1    0   SORT (GROUP BY) (Cost=4 Card=9 Bytes=234)
   2    1     MAT_VIEW REWRITE ACCESS (FULL) OF 'EMP_SUM' (MAT_VIEW RE
          WRITE) (Cost=3 Card=9 Bytes=234)



SQL> SELECT Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno;
SELECT Job, SUM(Sal)
       *
ERROR at line 1:
ORA-00979: not a GROUP BY expression


SQL> ED
Wrote file afiedt.buf

  1  SELECT Job, SUM(Sal)
  2  FROM Emp
  3* GROUP BY Job
SQL> /

JOB       SUM(SAL)
--------- --------
ANALYST       6000
CLERK         4150
MANAGER       8275
PRESIDENT     5000
SALESMAN      5600


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=9 Bytes=171
          )

   1    0   SORT (GROUP BY) (Cost=4 Card=9 Bytes=171)
   2    1     MAT_VIEW REWRITE ACCESS (FULL) OF 'EMP_SUM' (MAT_VIEW RE
          WRITE) (Cost=3 Card=9 Bytes=171)



SQL> SELECT SUM(Sal)
  2  FROM Emp;
```

```
SUM(SAL)
--------
   29025


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=1 Bytes=13)
   1    0   SORT (AGGREGATE)
   2    1     MAT_VIEW REWRITE ACCESS (FULL) OF 'EMP_SUM' (MAT_VIEW RE
           WRITE) (Cost=3 Card=9 Bytes=117)



SQL> SELECT Deptno, SUM(Sal)
  2  FROM Emp
  3  GROUP BY ROLLUP(Deptno);

    DEPTNO SUM(SAL)
---------- --------
        10     8750
        20    10875
        30     9400
              29025


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=9 Bytes=234
          )

   1    0   SORT (GROUP BY ROLLUP) (Cost=4 Card=9 Bytes=234)
   2    1     MAT_VIEW REWRITE ACCESS (FULL) OF 'EMP_SUM' (MAT_VIEW RE
           WRITE) (Cost=3 Card=9 Bytes=234)



SQL> SELECT Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY ROLLUP(Job);

JOB       SUM(SAL)
--------- --------
ANALYST       6000
CLERK         4150
MANAGER       8275
PRESIDENT     5000
SALESMAN      5600
             29025

6 rows selected.


Execution Plan
```

```
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=9 Bytes=171
          )

   1    0   SORT (GROUP BY ROLLUP) (Cost=4 Card=9 Bytes=171)
   2    1     MAT_VIEW REWRITE ACCESS (FULL) OF 'EMP_SUM' (MAT_VIEW RE
          WRITE) (Cost=3 Card=9 Bytes=171)



SQL> SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY ROLLUP(Deptno, Job);

    DEPTNO JOB       SUM(SAL)
---------- --------- --------
        10 CLERK         1300
        10 MANAGER       2450
        10 PRESIDENT     5000
        10               8750
        20 CLERK         1900
        20 ANALYST       6000
        20 MANAGER       2975
        20              10875
        30 CLERK          950
        30 MANAGER       2850
        30 SALESMAN      5600

    DEPTNO JOB       SUM(SAL)
---------- --------- --------
        30                9400
                         29025

13 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=9 Bytes=288
          )

   1    0   SORT (GROUP BY ROLLUP) (Cost=4 Card=9 Bytes=288)
   2    1     MAT_VIEW REWRITE ACCESS (FULL) OF 'EMP_SUM' (MAT_VIEW RE
          WRITE) (Cost=3 Card=9 Bytes=288)



SQL> SELECT Deptno, Job, SUm(Sal)
  2  FROm Emp
  3  GROUP BY CUBE(Deptno, Job)
  4  ORDER BY Deptno;

    DEPTNO JOB       SUM(SAL)
---------- --------- --------
        10 CLERK         1300
```

```
        10 MANAGER       2450
        10 PRESIDENT     5000
        10               8750
        20 ANALYST       6000
        20 CLERK         1900
        20 MANAGER       2975
        20              10875
        30 CLERK          950
        30 MANAGER       2850
        30 SALESMAN      5600

    DEPTNO JOB       SUM(SAL)
---------- --------- --------
        30               9400
           ANALYST       6000
           CLERK         4150
           MANAGER       8275
           PRESIDENT     5000
           SALESMAN      5600
                        29025

18 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=9 Bytes=288
          )

   1    0   SORT (GROUP BY) (Cost=4 Card=9 Bytes=288)
   2    1     GENERATE (CUBE) (Cost=4 Card=9 Bytes=288)
   3    2       SORT (GROUP BY) (Cost=4 Card=9 Bytes=288)
   4    3         MAT_VIEW REWRITE ACCESS (FULL) OF 'EMP_SUM' (MAT_VIE
          W REWRITE) (Cost=3 Card=9 Bytes=288)



SQL> SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno, ROLLUP(Job);

    DEPTNO JOB       SUM(SAL)
---------- --------- --------
        10 CLERK         1300
        10 MANAGER       2450
        10 PRESIDENT     5000
        10               8750
        20 CLERK         1900
        20 ANALYST       6000
        20 MANAGER       2975
        20              10875
        30 CLERK          950
        30 MANAGER       2850
        30 SALESMAN      5600

    DEPTNO JOB       SUM(SAL)
```

```
---------- --------- --------
        30               9400

12 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=9 Bytes=288
          )

   1    0   SORT (GROUP BY ROLLUP) (Cost=4 Card=9 Bytes=288)
   2    1     MAT_VIEW REWRITE ACCESS (FULL) OF 'EMP_SUM' (MAT_VIEW RE
          WRITE) (Cost=3 Card=9 Bytes=288)




SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3* GROUP BY Job, ROLLUP(Deptno)
SQL> /

    DEPTNO JOB       SUM(SAL)
---------- --------- --------
        10 CLERK         1300
        20 CLERK         1900
        30 CLERK          950
           CLERK         4150
        20 ANALYST       6000
           ANALYST       6000
        10 MANAGER       2450
        20 MANAGER       2975
        30 MANAGER       2850
           MANAGER       8275
        30 SALESMAN      5600

    DEPTNO JOB       SUM(SAL)
---------- --------- --------
           SALESMAN      5600
        10 PRESIDENT     5000
           PRESIDENT     5000

14 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=9 Bytes=288
          )

   1    0   SORT (GROUP BY ROLLUP) (Cost=4 Card=9 Bytes=288)
   2    1     MAT_VIEW REWRITE ACCESS (FULL) OF 'EMP_SUM' (MAT_VIEW RE
          WRITE) (Cost=3 Card=9 Bytes=288)
```

```
SQL> SLECT Deptno, Job, SUM(Sal)
SP2-0734: unknown command beginning "SLECT Dept..." - rest of line ignored.
SQL> SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY
  4  GROUPING SETS(Deptno, Job);

    DEPTNO JOB       SUM(SAL)
---------- --------- --------
        10               8750
        20              10875
        30               9400
           ANALYST       6000
           CLERK         4150
           MANAGER       8275
           PRESIDENT     5000
           SALESMAN      5600

8 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=11 Card=9 Bytes=28
          8)

   1    0   TEMP TABLE TRANSFORMATION
   2    1     LOAD AS SELECT
   3    2       MAT_VIEW ACCESS (FULL) OF 'EMP_SUM' (MAT_VIEW) (Cost=3
           Card=9 Bytes=288)

   4    1     LOAD AS SELECT
   5    4       SORT (GROUP BY) (Cost=3 Card=1 Bytes=26)
   6    5         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D660A_14C83BF'
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=26)

   7    1     LOAD AS SELECT
   8    7       SORT (GROUP BY) (Cost=3 Card=1 Bytes=19)
   9    8         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D660A_14C83BF'
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=19)

  10    1     VIEW (Cost=2 Card=1 Bytes=32)
  11   10       TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D660B_14C83BF' (T
          ABLE (TEMP)) (Cost=2 Card=1 Bytes=32)



SQL> cl scr

SQL> ED
Wrote file afiedt.buf
```

```
  1  SELECT
  2  Deptno,
  3  Job,
  4  MGR,
  5  TO_CHAR(HireDate, 'YYYY') Year,
  6  TO_CHAR(HireDate, 'Q') Quarter,
  7  TO_CHAR(HireDate, 'Month') Month,
  8  TO_CHAR(HireDate, 'Day') WeekDay,
  9  SUM(Sal)
 10  FROM Emp
 11  GROUP BY
 12  GROUPING SETS
 13  (
 14   Deptno,
 15   Job,
 16   MGR,
 17   TO_CHAR(HireDate, 'YYYY'),
 18   TO_CHAR(HireDate, 'Q'),
 19   TO_CHAR(HireDate, 'Month'),
 20   TO_CHAR(HireDate, 'Day')
 21*  )
SQL> /

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
        10                                                    8750
        20                                                   10875
        30                                                    9400
           ANALYST                                            6000
           CLERK                                              4150
           MANAGER                                            8275
           PRESIDENT                                          5000
           SALESMAN                                           5600
                          7566                                6000
                          7698                                6550
                          7782                                1300

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                          7788                                1100
                          7839                                8275
                          7902                                 800
                                                              5000
                               1980                            800
                               1981                          22825
                               1982                           4300
                               1983                           1100
                                    1                         5250
                                    2                         8275
                                    3                         2750

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                                    4                        12750
                                      April                   2975
                                      December                7750
                                      February                2850
```

```
                                        January                2400
                                        June                   2450
                                        May                    2850
                                        November               5000
                                        September              2750
                                                  Friday       4450
                                                  Monday       1250

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                                                  Saturday     1300
                                                  Sunday       1250
                                                  Thursday     9925
                                                  Tuesday      8950
                                                  Wednesday    1900

38 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=26 Card=14 Bytes=8
          82)

   1    0   TEMP TABLE TRANSFORMATION
   2    1     LOAD AS SELECT
   3    2       TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 B
          ytes=756)

   4    1     LOAD AS SELECT
   5    4       SORT (GROUP BY) (Cost=3 Card=1 Bytes=26)
   6    5         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6610_14C83BF'
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=26)

   7    1     LOAD AS SELECT
   8    7       SORT (GROUP BY) (Cost=3 Card=1 Bytes=19)
   9    8         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6610_14C83BF'
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=19)

  10    1     LOAD AS SELECT
  11   10       SORT (GROUP BY) (Cost=3 Card=1 Bytes=26)
  12   11         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6610_14C83BF'
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=26)

  13    1     LOAD AS SELECT
  14   13       SORT (GROUP BY) (Cost=3 Card=1 Bytes=17)
  15   14         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6610_14C83BF'
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=17)

  16    1     LOAD AS SELECT
  17   16       SORT (GROUP BY) (Cost=3 Card=1 Bytes=15)
  18   17         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6610_14C83BF'
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=15)

  19    1     LOAD AS SELECT
  20   19       SORT (GROUP BY) (Cost=3 Card=1 Bytes=19)
  21   20         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6610_14C83BF'
```

```
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=19)

  22    1     LOAD AS SELECT
  23   22       SORT (GROUP BY) (Cost=3 Card=1 Bytes=19)
  24   23         TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6610_14C83BF'
          (TABLE (TEMP)) (Cost=2 Card=1 Bytes=19)

  25    1     VIEW (Cost=2 Card=1 Bytes=63)
  26   25       TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6611_14C83BF' (T
          ABLE (TEMP)) (Cost=2 Card=1 Bytes=63)



SQL> ED
Wrote file afiedt.buf

  1  CREATE MATERIALIZED VIEW SubTotals
  2  ENABLE QUERY REWRITE
  3  AS
  4  SELECT
  5  Deptno,
  6  Job,
  7  MGR,
  8  TO_CHAR(HireDate, 'YYYY') Year,
  9  TO_CHAR(HireDate, 'Q') Quarter,
 10  TO_CHAR(HireDate, 'Month') Month,
 11  TO_CHAR(HireDate, 'Day') WeekDay,
 12  SUM(Sal)
 13  FROM Emp
 14  GROUP BY
 15  GROUPING SETS
 16  (
 17   Deptno,
 18   Job,
 19   MGR,
 20   TO_CHAR(HireDate, 'YYYY'),
 21   TO_CHAR(HireDate, 'Q'),
 22   TO_CHAR(HireDate, 'Month'),
 23   TO_CHAR(HireDate, 'Day')
 24*  )
SQL> /

Materialized view created.

SQL> SELECT
  2  Deptno,
  3  Job,
  4  MGR,
  5  TO_CHAR(HireDate, 'YYYY') Year,
  6  TO_CHAR(HireDate, 'Q') Quarter,
  7  TO_CHAR(HireDate, 'Month') Month,
  8  TO_CHAR(HireDate, 'Day') WeekDay,
  9  SUM(Sal)
 10  FROM Emp
 11  GROUP BY
 12  GROUPING SETS
```

```
 13  (
 14   Deptno,
 15   Job,
 16   MGR,
 17   TO_CHAR(HireDate, 'YYYY'),
 18   TO_CHAR(HireDate, 'Q'),
 19   TO_CHAR(HireDate, 'Month'),
 20   TO_CHAR(HireDate, 'Day')
 21   )
 22  /

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
        10                                                    8750
        20                                                   10875
        30                                                    9400
           ANALYST                                            6000
           CLERK                                              4150
           MANAGER                                            8275
           PRESIDENT                                          5000
           SALESMAN                                           5600
                          7566                                6000
                          7698                                6550
                          7782                                1300

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                          7788                                1100
                          7839                                8275
                          7902                                 800
                                                              5000
                               1980                            800
                               1981                          22825
                               1982                           4300
                               1983                           1100
                                    1                         5250
                                    2                         8275
                                    3                         2750

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                                    4                        12750
                                      April                   2975
                                      December                7750
                                      February                2850
                                      January                 2400
                                      June                    2450
                                      May                     2850
                                      November                5000
                                      September               2750
                                                Friday        4450
                                                Monday        1250

    DEPTNO JOB              MGR YEAR Q MONTH     WEEKDAY   SUM(SAL)
---------- --------- ---------- ---- - --------- --------- --------
                                                Saturday      1300
                                                Sunday        1250
```

```
                                                  Thursday      9925
                                                  Tuesday       8950
                                                  Wednesday     1900

38 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=3 Card=38 Bytes=23
          94)

   1    0   MAT_VIEW REWRITE ACCESS (FULL) OF 'SUBTOTALS' (MAT_VIEW RE
          WRITE) (Cost=3 Card=38 Bytes=2394)



SQL> SPOOL OFF
SQL> cl scr

SQL> SELECT
  2  Deptno,
  3  GROUPING(Deptno) GrpDeptnoBit,
  4  Job,
  5  GROUPING(Job) GrpJobBit,
  6  SUM(Sal)
  7  FROM Emp
  8  GROUP BY ROLLUP(Deptno, Job);

    DEPTNO GRPDEPTNOBIT JOB        GRPJOBBIT   SUM(SAL)
---------- ------------ --------- ---------- ----------
        10            0 CLERK              0       1300
        10            0 MANAGER            0       2450
        10            0 PRESIDENT          0       5000
        10            0                    1       8750
        20            0 CLERK              0       1900
        20            0 ANALYST            0       6000
        20            0 MANAGER            0       2975
        20            0                    1      10875
        30            0 CLERK              0        950
        30            0 MANAGER            0       2850
        30            0 SALESMAN           0       5600

    DEPTNO GRPDEPTNOBIT JOB        GRPJOBBIT   SUM(SAL)
---------- ------------ --------- ---------- ----------
        30            0                    1       9400
                      1                    1      29025

13 rows selected.

SQL> COLUMN GRPDEPTNOBIT FORMAT 99
SQL> COLUMN GRPJobBIT FORMAT 99
SQL> COLUMN Deptno FORMAT 99
SQL> cl scr

SQL> R
```

```
  1  SELECT
  2  Deptno,
  3  GROUPING(Deptno) GrpDeptnoBit,
  4  Job,
  5  GROUPING(Job) GrpJobBit,
  6  SUM(Sal)
  7  FROM Emp
  8* GROUP BY ROLLUP(Deptno, Job)

DEPTNO GRPDEPTNOBIT JOB       GRPJOBBIT   SUM(SAL)
------ ------------ --------- --------- ----------
    10            0 CLERK             0       1300
    10            0 MANAGER           0       2450
    10            0 PRESIDENT         0       5000
    10            0                   1       8750
    20            0 CLERK             0       1900
    20            0 ANALYST           0       6000
    20            0 MANAGER           0       2975
    20            0                   1      10875
    30            0 CLERK             0        950
    30            0 MANAGER           0       2850
    30            0 SALESMAN          0       5600

DEPTNO GRPDEPTNOBIT JOB       GRPJOBBIT   SUM(SAL)
------ ------------ --------- --------- ----------
    30            0                   1       9400
                  1                   1      29025

13 rows selected.

SQL> ED
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  1  SELECT
  2  Deptno,
  3  GROUPING(Deptno) GrpDeptnoBit,
  4  Job,
  5  GROUPING(Job) GrpJobBit,
  6  GROUPIN_ID(Deptno, Job) GrpVal,
  7  SUM(Sal) SalSum
  8  FROM Emp
  9* GROUP BY ROLLUP(Deptno, Job)
SQL> COLUMN SalSum FORMAt 99999
SQL> COLUMN GrpVal FORMAt 99
SQL> /
GROUPIN_ID(Deptno, Job) GrpVal,
*
ERROR at line 6:
ORA-00904: "GROUPIN_ID": invalid identifier


SQL> ED
Wrote file afiedt.buf

  1  SELECT
  2  Deptno,
  3  GROUPING(Deptno) GrpDeptnoBit,
```

```
  4  Job,
  5  GROUPING(Job) GrpJobBit,
  6  GROUPING_ID(Deptno, Job) GrpVal,
  7  SUM(Sal) SalSum
  8  FROM Emp
  9* GROUP BY ROLLUP(Deptno, Job)
SQL> /

DEPTNO GRPDEPTNOBIT JOB       GRPJOBBIT GRPVAL SALSUM
------ ------------ --------- --------- ------ ------
    10            0 CLERK             0      0   1300
    10            0 MANAGER           0      0   2450
    10            0 PRESIDENT         0      0   5000
    10            0                   1      1   8750
    20            0 CLERK             0      0   1900
    20            0 ANALYST           0      0   6000
    20            0 MANAGER           0      0   2975
    20            0                   1      1  10875
    30            0 CLERK             0      0    950
    30            0 MANAGER           0      0   2850
    30            0 SALESMAN          0      0   5600

DEPTNO GRPDEPTNOBIT JOB       GRPJOBBIT GRPVAL SALSUM
------ ------------ --------- --------- ------ ------
    30            0                   1      1   9400
                  1                   1      3  29025

13 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT
  2  Deptno,
  3  Job,
  4  GROUPING_ID(Deptno, Job) GrpVal,
  5  SUM(Sal) SalSum
  6  FROM Emp
  7* GROUP BY ROLLUP(Deptno, Job)
SQL> /

DEPTNO JOB       GRPVAL SALSUM
------ --------- ------ ------
    10 CLERK          0   1300
    10 MANAGER        0   2450
    10 PRESIDENT      0   5000
    10                1   8750
    20 CLERK          0   1900
    20 ANALYST        0   6000
    20 MANAGER        0   2975
    20                1  10875
    30 CLERK          0    950
    30 MANAGER        0   2850
    30 SALESMAN       0   5600

DEPTNO JOB       GRPVAL SALSUM
------ --------- ------ ------
```

```
    30               1   9400
                     3  29025

13 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT
  2  Deptno,
  3  Job,
  4  SUM(Sal) SalSum
  5  FROM Emp
  6  GROUP BY ROLLUP(Deptno, Job)
  7  HAVING
  8* GROUPING_ID(Deptno, Job) IN(&GrpVal1, &GrpVal2, &GrpVal3)
SQL> /
Enter value for grpval1: 0
Enter value for grpval2: 0
Enter value for grpval3: 0
old   8: GROUPING_ID(Deptno, Job) IN(&GrpVal1, &GrpVal2, &GrpVal3)
new   8: GROUPING_ID(Deptno, Job) IN(0, 0, 0)

DEPTNO JOB       SALSUM
------ --------- ------
    10 CLERK       1300
    10 MANAGER     2450
    10 PRESIDENT   5000
    20 CLERK       1900
    20 ANALYST     6000
    20 MANAGER     2975
    30 CLERK        950
    30 MANAGER     2850
    30 SALESMAN    5600

9 rows selected.

SQL> /
Enter value for grpval1: 0
Enter value for grpval2: 1
Enter value for grpval3: 1
old   8: GROUPING_ID(Deptno, Job) IN(&GrpVal1, &GrpVal2, &GrpVal3)
new   8: GROUPING_ID(Deptno, Job) IN(0, 1, 1)

DEPTNO JOB       SALSUM
------ --------- ------
    10 CLERK       1300
    10 MANAGER     2450
    10 PRESIDENT   5000
    10             8750
    20 CLERK       1900
    20 ANALYST     6000
    20 MANAGER     2975
    20            10875
    30 CLERK        950
    30 MANAGER     2850
    30 SALESMAN    5600
```

```
DEPTNO JOB       SALSUM
------ --------- ------
    30             9400

12 rows selected.

SQL> /
Enter value for grpval1: 1
Enter value for grpval2: 1
Enter value for grpval3: 1
old   8: GROUPING_ID(Deptno, Job) IN(&GrpVal1, &GrpVal2, &GrpVal3)
new   8: GROUPING_ID(Deptno, Job) IN(1, 1, 1)

DEPTNO JOB       SALSUM
------ --------- ------
    10             8750
    20            10875
    30             9400

SQL> /
Enter value for grpval1: 1
Enter value for grpval2: 1
Enter value for grpval3: 3
old   8: GROUPING_ID(Deptno, Job) IN(&GrpVal1, &GrpVal2, &GrpVal3)
new   8: GROUPING_ID(Deptno, Job) IN(1, 1, 3)

DEPTNO JOB       SALSUM
------ --------- ------
    10             8750
    20            10875
    30             9400
                  29025

SQL> /
Enter value for grpval1: 3
Enter value for grpval2: 3
Enter value for grpval3: 3
old   8: GROUPING_ID(Deptno, Job) IN(&GrpVal1, &GrpVal2, &GrpVal3)
new   8: GROUPING_ID(Deptno, Job) IN(3, 3, 3)

DEPTNO JOB       SALSUM
------ --------- ------
                  29025

SQL> SET AUTOTRACE ON EXPLAIN
SQL> SELECT
  2  Deptno,
  3  Job,
  4  GROUPING_ID(Deptno, Job) GrpVal,
  5  SUM(Sal) SalSum
  6  FROM Emp
  7  GROUP BY ROLLUP(Deptno, Job);

DEPTNO JOB       GRPVAL SALSUM
------ --------- ------ ------
    10 CLERK          0   1300
```

```
    10 MANAGER        0   2450
    10 PRESIDENT      0   5000
    10                1   8750
    20 CLERK          0   1900
    20 ANALYST        0   6000
    20 MANAGER        0   2975
    20                1  10875
    30 CLERK          0    950
    30 MANAGER        0   2850
    30 SALESMAN       0   5600

DEPTNO JOB       GRPVAL SALSUM
------ --------- ------ ------
    30                1   9400
                      3  29025

13 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=44
          8)

   1    0   SORT (GROUP BY ROLLUP) (Cost=4 Card=14 Bytes=448)
   2    1     TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 Byt
          es=448)




SQL> SELECT
  2  Deptno,
  3  Job,
  4  SUM(Sal) SalSum
  5  FROM Emp
  6  GROUP BY ROLLUP(Deptno, Job)
  7  HAVING
  8  GROUPING_ID(Deptno, Job) IN(&GrpVal1, &GrpVal2, &GrpVal3)
  9  /
Enter value for grpval1: 1
Enter value for grpval2: 1
Enter value for grpval3: 3
old   8: GROUPING_ID(Deptno, Job) IN(&GrpVal1, &GrpVal2, &GrpVal3)
new   8: GROUPING_ID(Deptno, Job) IN(1, 1, 3)

DEPTNO JOB       SALSUM
------ --------- ------
    10             8750
    20            10875
    30             9400
                  29025


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=4 Card=14 Bytes=36
```

```
          4)

   1    0   FILTER
   2    1     SORT (GROUP BY ROLLUP) (Cost=4 Card=14 Bytes=364)
   3    2       TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=14 B
          ytes=364)



SQL> cl scr

SQL> SELECT Deptno, Job, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno, ROLLUP(Deptno, Job);

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    10 CLERK           1300
    10 MANAGER         2450
    10 PRESIDENT       5000
    20 CLERK           1900
    20 ANALYST         6000
    20 MANAGER         2975
    30 CLERK            950
    30 MANAGER         2850
    30 SALESMAN        5600
    10                 8750
    20                10875

DEPTNO JOB         SUM(SAL)
------ --------- ----------
    30                 9400
    10                 8750
    20                10875
    30                 9400

15 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=10 Card=14 Bytes=4
          48)

   1    0   TEMP TABLE TRANSFORMATION
   2    1     MULTI-TABLE INSERT
   3    2       DIRECT LOAD INTO OF 'SYS_TEMP_0FD9D6602_14E5DF5'
   4    2       DIRECT LOAD INTO OF 'SYS_TEMP_0FD9D6603_14E5DF5'
   5    4         SORT (GROUP BY ROLLUP) (Cost=4 Card=14 Bytes=448)
   6    5           TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=
          14 Bytes=448)

   7    1     VIEW (Cost=6 Card=3 Bytes=96)
   8    7       VIEW (Cost=6 Card=3 Bytes=96)
   9    8         UNION-ALL
  10    9           TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6603_14E5DF5
```

```
          ' (TABLE (TEMP)) (Cost=2 Card=1 Bytes=32)

  11    9           TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6602_14E5DF5
          ' (TABLE (TEMP)) (Cost=2 Card=1 Bytes=32)

  12    9           TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6602_14E5DF5
          ' (TABLE (TEMP)) (Cost=2 Card=1 Bytes=32)



SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno, Job, GROUP_ID() GrpID, SUM(Sal)
  2  FROM Emp
  3* GROUP BY Deptno, ROLLUP(Deptno, Job)
SQL> /

DEPTNO JOB            GRPID   SUM(SAL)
------ --------- ---------- ----------
    10 CLERK              0       1300
    10 MANAGER            0       2450
    10 PRESIDENT          0       5000
    20 CLERK              0       1900
    20 ANALYST            0       6000
    20 MANAGER            0       2975
    30 CLERK              0        950
    30 MANAGER            0       2850
    30 SALESMAN           0       5600
    10                    0       8750
    20                    0      10875

DEPTNO JOB            GRPID   SUM(SAL)
------ --------- ---------- ----------
    30                    0       9400
    10                    1       8750
    20                    1      10875
    30                    1       9400

15 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=10 Card=14 Bytes=4
          90)

   1    0   TEMP TABLE TRANSFORMATION
   2    1     MULTI-TABLE INSERT
   3    2       DIRECT LOAD INTO OF 'SYS_TEMP_0FD9D6606_14E5DF5'
   4    2       DIRECT LOAD INTO OF 'SYS_TEMP_0FD9D6607_14E5DF5'
   5    4         SORT (GROUP BY ROLLUP) (Cost=4 Card=14 Bytes=448)
   6    5           TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=
          14 Bytes=448)

   7    1     VIEW (Cost=6 Card=3 Bytes=105)
```

```
   8    7       VIEW (Cost=6 Card=3 Bytes=105)
   9    8         UNION-ALL
  10    9           TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6607_14E5DF5
          ' (TABLE (TEMP)) (Cost=2 Card=1 Bytes=32)

  11    9           TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6606_14E5DF5
          ' (TABLE (TEMP)) (Cost=2 Card=1 Bytes=32)

  12    9           TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D6606_14E5DF5
          ' (TABLE (TEMP)) (Cost=2 Card=1 Bytes=32)



SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno, Job, GROUP_ID() GrpID, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno, ROLLUP(Deptno, Job)
  4* HAVING GROUP_ID() = 0
SQL> /

DEPTNO JOB            GRPID   SUM(SAL)
------ --------- ---------- ----------
    10 CLERK              0       1300
    10 MANAGER            0       2450
    10 PRESIDENT          0       5000
    20 CLERK              0       1900
    20 ANALYST            0       6000
    20 MANAGER            0       2975
    30 CLERK              0        950
    30 MANAGER            0       2850
    30 SALESMAN           0       5600
    10                    0       8750
    20                    0      10875

DEPTNO JOB            GRPID   SUM(SAL)
------ --------- ---------- ----------
    30                    0       9400

12 rows selected.


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=10 Card=14 Bytes=4
          90)

   1    0   TEMP TABLE TRANSFORMATION
   2    1     MULTI-TABLE INSERT
   3    2       DIRECT LOAD INTO OF 'SYS_TEMP_0FD9D660A_14E5DF5'
   4    2       DIRECT LOAD INTO OF 'SYS_TEMP_0FD9D660B_14E5DF5'
   5    4         SORT (GROUP BY ROLLUP) (Cost=4 Card=14 Bytes=448)
   6    5           TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=
          14 Bytes=448)
```

```
   7    1     VIEW (Cost=6 Card=3 Bytes=105)
   8    7       VIEW (Cost=6 Card=3 Bytes=105)
   9    8         UNION-ALL
  10    9           TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D660B_14E5DF5
          ' (TABLE (TEMP)) (Cost=2 Card=1 Bytes=32)

  11    9           TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D660A_14E5DF5
          ' (TABLE (TEMP)) (Cost=2 Card=1 Bytes=32)

  12    9           FILTER
  13   12             TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D660A_14E5D
         F5' (TABLE (TEMP)) (Cost=2 Card=1 Bytes=32)



SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno, Job, GROUP_ID() GrpID, SUM(Sal)
  2  FROM Emp
  3  GROUP BY Deptno, ROLLUP(Deptno, Job)
  4* HAVING GROUP_ID() = 1
SQL> /

DEPTNO JOB            GRPID   SUM(SAL)
------ --------- ---------- ----------
    10                    1       8750
    20                    1      10875
    30                    1       9400


Execution Plan
----------------------------------------------------------
   0      SELECT STATEMENT Optimizer=ALL_ROWS (Cost=10 Card=14 Bytes=4
          90)

   1    0   TEMP TABLE TRANSFORMATION
   2    1     MULTI-TABLE INSERT
   3    2       DIRECT LOAD INTO OF 'SYS_TEMP_0FD9D660E_14E5DF5'
   4    2       DIRECT LOAD INTO OF 'SYS_TEMP_0FD9D660F_14E5DF5'
   5    4         SORT (GROUP BY ROLLUP) (Cost=4 Card=14 Bytes=448)
   6    5           TABLE ACCESS (FULL) OF 'EMP' (TABLE) (Cost=3 Card=
          14 Bytes=448)

   7    1     VIEW (Cost=6 Card=3 Bytes=105)
   8    7       VIEW (Cost=6 Card=3 Bytes=105)
   9    8         UNION-ALL
  10    9           FILTER
  11   10             TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D660F_14E5D
         F5' (TABLE (TEMP)) (Cost=2 Card=1 Bytes=32)

  12    9           FILTER
  13   12             TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D660E_14E5D
         F5' (TABLE (TEMP)) (Cost=2 Card=1 Bytes=32)

  14    9           TABLE ACCESS (FULL) OF 'SYS_TEMP_0FD9D660E_14E5DF5
```

```
          ' (TABLE (TEMP)) (Cost=2 Card=1 Bytes=32)



SQL> SET AUTOTRACE OFF EXPLAIN
SQL> cl scr

SQL> SPOOL OFF
SQL> cl scr

SQL> SELECT Ename, Sal
  2  FROM Emp
  3  ORDER BY Sal DESC;

ENAME             SAL
---------- ----------
KING             5000
FORD             3000
SCOTT            3000
JONES            2975
BLAKE            2850
CLARK            2450
ALLEN            1600
TURNER           1500
MILLER           1300
MARTIN           1250
WARD             1250

ENAME             SAL
---------- ----------
ADAMS            1100
JAMES             950
SMITH             800

14 rows selected.

SQL> SELECT EName, Deptno,  Sal,
  2  RANK()
  3  OVER(ORDER BY Sal) EmpRank
  4  FROM  Emp
  5  GROUP BY Deptno,  EName, Sal
  6  ORDER BY Emprank
  7
SQL> SELECT EName, Deptno,  Sal
  2  FROM  Emp;

ENAME          DEPTNO        SAL
---------- ---------- ----------
KING               10       5000
BLAKE              30       2850
CLARK              10       2450
JONES              20       2975
MARTIN             30       1250
ALLEN              30       1600
TURNER             30       1500
JAMES              30        950
```

```
WARD                30       1250
FORD                20       3000
SMITH               20        800

ENAME          DEPTNO        SAL
---------- ---------- ----------
SCOTT               20       3000
ADAMS               20       1100
MILLER              10       1300

14 rows selected.

SQL> SELECT EName, Deptno,  Sal,
  2  RANK()
  3  OVER(ORDER BY Sal) EmpRank
  4  FROM  Emp
  5  /

ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ----------
SMITH               20        800          1
JAMES               30        950          2
ADAMS               20       1100          3
MARTIN              30       1250          4
WARD                30       1250          4
MILLER              10       1300          6
TURNER              30       1500          7
ALLEN               30       1600          8
CLARK               10       2450          9
BLAKE               30       2850         10
JONES               20       2975         11

ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ----------
FORD                20       3000         12
SCOTT               20       3000         12
KING                10       5000         14

14 rows selected.

SQL> SELECT EName, Deptno,  Sal,
  2  RANK()
  3  OVER(ORDER BY Sal) EmpRank
  4  FROM  Emp
  5  GROUP BY Deptno,  EName, Sal
  6  ORDER BY Emprank;

ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ----------
SMITH               20        800          1
JAMES               30        950          2
ADAMS               20       1100          3
MARTIN              30       1250          4
WARD                30       1250          4
MILLER              10       1300          6
TURNER              30       1500          7
ALLEN               30       1600          8
```

```
CLARK              10       2450          9
BLAKE              30       2850         10
JONES              20       2975         11

ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ----------
FORD               20       3000         12
SCOTT              20       3000         12
KING               10       5000         14

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT EName, Deptno,  Sal,
  2  RANK()
  3  OVER(ORDER BY Sal) EmpRank
  4  FROM  Emp
  5  GROUP BY Deptno,  EName, Sal
  6* ORDER BY Emprank DESC
SQL> /

ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ----------
KING               10       5000         14
FORD               20       3000         12
SCOTT              20       3000         12
JONES              20       2975         11
BLAKE              30       2850         10
CLARK              10       2450          9
ALLEN              30       1600          8
TURNER             30       1500          7
MILLER             10       1300          6
MARTIN             30       1250          4
WARD               30       1250          4

ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ----------
ADAMS              20       1100          3
JAMES              30        950          2
SMITH              20        800          1

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT EName, Deptno,  Sal,
  2  RANK()
  3  OVER(ORDER BY Sal DESC) EmpRank
  4  FROM  Emp
  5  GROUP BY Deptno,  EName, Sal
  6* ORDER BY Emprank
SQL> /

ENAME          DEPTNO        SAL    EMPRANK
```

```
---------- ---------- ---------- ----------
KING               10       5000          1
FORD               20       3000          2
SCOTT              20       3000          2
JONES              20       2975          4
BLAKE              30       2850          5
CLARK              10       2450          6
ALLEN              30       1600          7
TURNER             30       1500          8
MILLER             10       1300          9
MARTIN             30       1250         10
WARD               30       1250         10

ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ----------
ADAMS              20       1100         12
JAMES              30        950         13
SMITH              20        800         14

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT EName, Deptno,  Sal,
  2  RANK()
  3  OVER(ORDER BY Sal DESC) EmpRank
  4  FROM  Emp
  5  GROUP BY Deptno,  EName, Sal
  6* ORDER BY Emprank DESC
SQL> /

ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ----------
SMITH              20        800         14
JAMES              30        950         13
ADAMS              20       1100         12
MARTIN             30       1250         10
WARD               30       1250         10
MILLER             10       1300          9
TURNER             30       1500          8
ALLEN              30       1600          7
CLARK              10       2450          6
BLAKE              30       2850          5
JONES              20       2975          4

ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ----------
FORD               20       3000          2
SCOTT              20       3000          2
KING               10       5000          1

14 rows selected.

SQL> ED
Wrote file afiedt.buf
```

```
  1  SELECT EName, Deptno,
  2  RANK()
  3  OVER(ORDER BY Sal DESC) EmpRank
  4  FROM  Emp
  5  GROUP BY Deptno,  EName, Sal
  6* ORDER BY Emprank DESC
SQL> /

ENAME          DEPTNO    EMPRANK
---------- ---------- ----------
SMITH              20         14
JAMES              30         13
ADAMS              20         12
MARTIN             30         10
WARD               30         10
MILLER             10          9
TURNER             30          8
ALLEN              30          7
CLARK              10          6
BLAKE              30          5
JONES              20          4

ENAME          DEPTNO    EMPRANK
---------- ---------- ----------
FORD               20          2
SCOTT              20          2
KING               10          1

14 rows selected.

SQL> cl scr

SQL> SELECT   EName, Deptno, Sal,
  2  DENSE_RANK()
  3  OVER(ORDER BY Sal DESC) EmpRank
  4  FROM  Emp
  5  GROUP BY Deptno,  EName, Sal
  6  ORDER BY EmpRank;

ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ----------
KING               10       5000          1
FORD               20       3000          2
SCOTT              20       3000          2
JONES              20       2975          3
BLAKE              30       2850          4
CLARK              10       2450          5
ALLEN              30       1600          6
TURNER             30       1500          7
MILLER             10       1300          8
MARTIN             30       1250          9
WARD               30       1250          9

ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ----------
ADAMS              20       1100         10
JAMES              30        950         11
```

```
SMITH              20        800         12

14 rows selected.

SQL> cl scr

SQL> SELECT ROWNUM, E1.*
  2  FROM (SELECT   EName, Deptno, Sal,
  3         DENSE_RANK()
  4         OVER(ORDER BY Sal DESC) EmpRank
  5         FROM  Emp
  6         GROUP BY Deptno,  EName, Sal
  7         ORDER BY EmpRank) E1
  8  ORDER BY ROWNUM;

    ROWNUM ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ---------- ----------
         1 KING               10       5000          1
         2 FORD               20       3000          2
         3 SCOTT              20       3000          2
         4 JONES              20       2975          3
         5 BLAKE              30       2850          4
         6 CLARK              10       2450          5
         7 ALLEN              30       1600          6
         8 TURNER             30       1500          7
         9 MILLER             10       1300          8
        10 MARTIN             30       1250          9
        11 WARD               30       1250          9

    ROWNUM ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ---------- ----------
        12 ADAMS              20       1100         10
        13 JAMES              30        950         11
        14 SMITH              20        800         12

14 rows selected.

SQL> cl scr

SQL> SELECT
  2  DENSE_RANK()
  3  OVER(ORDER BY Ename) RollNo,
  4  EName, Deptno, Sal
  5  FROM  Emp
  6  GROUP BY Deptno,  EName, Sal
  7  ORDER BY RollNo;

    ROLLNO ENAME          DEPTNO        SAL
---------- ---------- ---------- ----------
         1 ADAMS              20       1100
         2 ALLEN              30       1600
         3 BLAKE              30       2850
         4 CLARK              10       2450
         5 FORD               20       3000
         6 JAMES              30        950
         7 JONES              20       2975
         8 KING               10       5000
```

```
         9 MARTIN             30       1250
        10 MILLER             10       1300
        11 SCOTT              20       3000

    ROLLNO ENAME          DEPTNO        SAL
---------- ---------- ---------- ----------
        12 SMITH              20        800
        13 TURNER             30       1500
        14 WARD               30       1250

14 rows selected.

SQL> INSERT INTO Emp(Empno, Ename, Deptno)
  2  VALUES(1234, 'ALLEN', 30);

1 row created.

SQL> INSERT INTO Emp(Empno, Ename, Deptno)
  2  VALUES(1235, 'ALLEN', 30);

1 row created.

SQL> INSERT INTO Emp(Empno, Ename, Deptno)
  2  VALUES(1236, 'ALLEN', 30);

1 row created.

SQL> SELECT
  2  DENSE_RANK()
  3  OVER(ORDER BY Ename) RollNo,
  4  EName, Deptno, Sal
  5  FROM  Emp
  6  GROUP BY Deptno,  EName, Sal
  7  ORDER BY RollNo;

    ROLLNO ENAME          DEPTNO        SAL
---------- ---------- ---------- ----------
         1 ADAMS              20       1100
         2 ALLEN              30       1600
         2 ALLEN              30
         3 BLAKE              30       2850
         4 CLARK              10       2450
         5 FORD               20       3000
         6 JAMES              30        950
         7 JONES              20       2975
         8 KING               10       5000
         9 MARTIN             30       1250
        10 MILLER             10       1300

    ROLLNO ENAME          DEPTNO        SAL
---------- ---------- ---------- ----------
        11 SCOTT              20       3000
        12 SMITH              20        800
        13 TURNER             30       1500
        14 WARD               30       1250

15 rows selected.
```

```
SQL> ED
Wrote file afiedt.buf

  1  SELECT
  2  DENSE_RANK()
  3  OVER(ORDER BY Ename) RollNo,
  4  EName, Deptno, Sal
  5  FROM  Emp
  6* ORDER BY RollNo
SQL> /

    ROLLNO ENAME          DEPTNO        SAL
---------- ---------- ---------- ----------
         1 ADAMS              20       1100
         2 ALLEN              30       1600
         2 ALLEN              30
         2 ALLEN              30
         2 ALLEN              30
         3 BLAKE              30       2850
         4 CLARK              10       2450
         5 FORD               20       3000
         6 JAMES              30        950
         7 JONES              20       2975
         8 KING               10       5000

    ROLLNO ENAME          DEPTNO        SAL
---------- ---------- ---------- ----------
         9 MARTIN             30       1250
        10 MILLER             10       1300
        11 SCOTT              20       3000
        12 SMITH              20        800
        13 TURNER             30       1500
        14 WARD               30       1250

17 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT
  2  DENSE_RANK()
  3  OVER(ORDER BY Ename, Empno) RollNo,
  4  EName, Deptno, Sal
  5  FROM  Emp
  6* ORDER BY RollNo
SQL> /

    ROLLNO ENAME          DEPTNO        SAL
---------- ---------- ---------- ----------
         1 ADAMS              20       1100
         2 ALLEN              30
         3 ALLEN              30
         4 ALLEN              30
         5 ALLEN              30       1600
         6 BLAKE              30       2850
         7 CLARK              10       2450
```

```
         8 FORD                20       3000
         9 JAMES               30        950
        10 JONES               20       2975
        11 KING                10       5000

    ROLLNO ENAME           DEPTNO        SAL
---------- ---------- ---------- ----------
        12 MARTIN              30       1250
        13 MILLER              10       1300
        14 SCOTT               20       3000
        15 SMITH               20        800
        16 TURNER              30       1500
        17 WARD                30       1250

17 rows selected.

SQL> ROLLBACK;

Rollback complete.

SQL> cl scr

SQL> SELECT
  2  DENSE_RANK()
  3  OVER(ORDER BY Ename) RollNo,
  4  EName, Sal,
  5  DENSE_RANK()
  6  OVER(ORDER BY Sal DESC) RankSal,
  7  HireDate,
  8  DENSE_RANK()
  9  OVER(ORDER BY HireDate) SeniorRank,
 10  DENSE_RANK()
 11  OVER(ORDER BY HireDate DESC) JuniorRank
 12  FROM  Emp
 13  ORDER BY RollNo;

    ROLLNO ENAME              SAL    RANKSAL HIREDATE  SENIORRANK JUNIORRANK
---------- ---------- ---------- ---------- --------- ---------- ----------
         1 ADAMS            1100         10 12-JAN-83         13          1
         2 ALLEN            1600          6 20-FEB-81          2         12
         3 BLAKE            2850          4 01-MAY-81          5          9
         4 CLARK            2450          5 09-JUN-81          6          8
         5 FORD             3000          2 03-DEC-81         10          4
         6 JAMES             950         11 03-DEC-81         10          4
         7 JONES            2975          3 02-APR-81          4         10
         8 KING             5000          1 17-NOV-81          9          5
         9 MARTIN           1250          9 28-SEP-81          8          6
        10 MILLER           1300          8 23-JAN-82         11          3
        11 SCOTT            3000          2 09-DEC-82         12          2

    ROLLNO ENAME              SAL    RANKSAL HIREDATE  SENIORRANK JUNIORRANK
---------- ---------- ---------- ---------- --------- ---------- ----------
        12 SMITH             800         12 17-DEC-80          1         13
        13 TURNER           1500          7 08-SEP-81          7          7
        14 WARD             1250          9 22-FEB-81          3         11

14 rows selected.
```

```
SQL> SELECT * FROm Emp;cl scr
  2
SQL>
SQL> cl scr

SQL> SELECT  EName, Deptno, Sal,
  2  RANK()
  3  OVER(PARTITION BY DeptNo
  4   ORDER BY Sal DESC)    "TOP Sal"
  5  FROM   Emp
  6  ORDER BY Deptno, Sal DESC;

ENAME          DEPTNO        SAL    TOP Sal
---------- ---------- ---------- ----------
KING               10       5000          1
CLARK              10       2450          2
MILLER             10       1300          3
FORD               20       3000          1
SCOTT              20       3000          1
JONES              20       2975          3
ADAMS              20       1100          4
SMITH              20        800          5
BLAKE              30       2850          1
ALLEN              30       1600          2
TURNER             30       1500          3

ENAME          DEPTNO        SAL    TOP Sal
---------- ---------- ---------- ----------
MARTIN             30       1250          4
WARD               30       1250          4
JAMES              30        950          6

14 rows selected.

SQL> cl scr

SQL> SELECT   EName, Deptno, Sal,
  2         DENSE_RANK()
  3         OVER(ORDER BY Sal DESC) EmpRank
  4         FROM  Emp
  5         GROUP BY Deptno,  EName, Sal
  6         ORDER BY EmpRank;

ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ----------
KING               10       5000          1
FORD               20       3000          2
SCOTT              20       3000          2
JONES              20       2975          3
BLAKE              30       2850          4
CLARK              10       2450          5
ALLEN              30       1600          6
TURNER             30       1500          7
MILLER             10       1300          8
MARTIN             30       1250          9
WARD               30       1250          9
```

```
ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ----------
ADAMS              20       1100         10
JAMES              30        950         11
SMITH              20        800         12

14 rows selected.

SQL> SELECT ROWNUM, E1.*
  2  FROM (SELECT   EName, Deptno, Sal,
  3         DENSE_RANK()
  4         OVER(ORDER BY Sal DESC) EmpRank
  5         FROM  Emp
  6         GROUP BY Deptno,  EName, Sal
  7         ORDER BY EmpRank) E1
  8  WHERE E1.EmpRank <= 5
  9  ORDER BY ROWNUM;

    ROWNUM ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ---------- ----------
         1 KING               10       5000          1
         2 FORD               20       3000          2
         3 SCOTT              20       3000          2
         4 JONES              20       2975          3
         5 BLAKE              30       2850          4
         6 CLARK              10       2450          5

6 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT ROWNUM, E1.*
  2  FROM (SELECT   EName, Deptno, Sal,
  3   DENSE_RANK()
  4   OVER(ORDER BY Sal DESC) EmpRank
  5   FROM  Emp
  6   GROUP BY Deptno,  EName, Sal
  7   ORDER BY EmpRank) E1
  8  WHERE E1.EmpRank &GOperator &GValue
  9* ORDER BY ROWNUM
SQL> /
Enter value for goperator: =
Enter value for gvalue: 1

    ROWNUM ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ---------- ----------
         1 KING               10       5000          1

SQL> /
Enter value for goperator: 1
Enter value for gvalue:
WHERE E1.EmpRank 1
                 *
ERROR at line 8:
ORA-00920: invalid relational operator
```

```
SQL> /
Enter value for goperator: =
Enter value for gvalue: 6

    ROWNUM ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ---------- ----------
         1 ALLEN              30       1600          6

SQL> /
Enter value for goperator: =
Enter value for gvalue: 2

    ROWNUM ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ---------- ----------
         1 FORD               20       3000          2
         2 SCOTT              20       3000          2

SQL> /
Enter value for goperator: <
Enter value for gvalue: 5

    ROWNUM ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ---------- ----------
         1 KING               10       5000          1
         2 FORD               20       3000          2
         3 SCOTT              20       3000          2
         4 JONES              20       2975          3
         5 BLAKE              30       2850          4

SQL> /
Enter value for goperator: >
Enter value for gvalue: 5

    ROWNUM ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ---------- ----------
         1 ALLEN              30       1600          6
         2 TURNER             30       1500          7
         3 MILLER             10       1300          8
         4 MARTIN             30       1250          9
         5 WARD               30       1250          9
         6 ADAMS              20       1100         10
         7 JAMES              30        950         11
         8 SMITH              20        800         12

8 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT ROWNUM, E1.*
  2  FROM (SELECT   EName, Deptno, Sal,
  3   DENSE_RANK()
  4   OVER(ORDER BY Sal DESC) EmpRank
  5   FROM  Emp
  6   GROUP BY Deptno,  EName, Sal
```

```
  7   ORDER BY EmpRank) E1
  8  WHERE E1.EmpRank BETWEEN &GVal1 AND &GVal2
  9* ORDER BY ROWNUM
SQL> /
Enter value for gval1: 1
Enter value for gval2: 4

    ROWNUM ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ---------- ----------
         1 KING               10       5000          1
         2 FORD               20       3000          2
         3 SCOTT              20       3000          2
         4 JONES              20       2975          3
         5 BLAKE              30       2850          4

SQL> /
Enter value for gval1: 5
Enter value for gval2: 9

    ROWNUM ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ---------- ----------
         1 CLARK              10       2450          5
         2 ALLEN              30       1600          6
         3 TURNER             30       1500          7
         4 MILLER             10       1300          8
         5 MARTIN             30       1250          9
         6 WARD               30       1250          9

6 rows selected.

SQL> /
Enter value for gval1: 10
Enter value for gval2: 14

    ROWNUM ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ---------- ----------
         1 ADAMS              20       1100         10
         2 JAMES              30        950         11
         3 SMITH              20        800         12

SQL> ED
Wrote file afiedt.buf

  1  SELECT ROWNUM, E1.*
  2  FROM (SELECT   EName, Deptno, Sal,
  3   DENSE_RANK()
  4   OVER(ORDER BY Sal DESC) EmpRank
  5   FROM  Emp
  6   GROUP BY Deptno,  EName, Sal
  7   ORDER BY EmpRank) E1
  8  WHERE E1.EmpRank IN(&GVal1, &GVal2, &GVal3)
  9* ORDER BY ROWNUM
SQL> /
Enter value for gval1: 1
Enter value for gval2: 5
Enter value for gval3: 8
```

```
    ROWNUM ENAME          DEPTNO        SAL    EMPRANK
---------- ---------- ---------- ---------- ----------
         1 KING               10       5000          1
         2 CLARK              10       2450          5
         3 MILLER             10       1300          8

SQL> cl scr

SQL> SELECT
  2  TO_CHAR(HireDate, 'YYYY') "Year",
  3  SUM(Sal),
  4  DENSE_RANK()
  5  OVER(ORDER BY  SUM(Sal) DESC) YearRank
  6  FROM  Emp
  7  GROUP BY TO_CHAR(HireDate, 'YYYY')
  8  ORDER BY YearRank;

Year   SUM(SAL)   YEARRANK
---- ---------- ----------
1981      22825          1
1982       4300          2
1983       1100          3
1980        800          4

SQL> ED
Wrote file afiedt.buf

  1  SELECT
  2  TO_CHAR(HireDate, 'YYYY') "Year",
  3  SUM(Sal),
  4  DENSE_RANK()
  5  OVER(ORDER BY  SUM(Sal) DESC) YearRank
  6  FROM  Emp
  7  --GROUP BY TO_CHAR(HireDate, 'YYYY')
  8* ORDER BY YearRank
SQL> /
TO_CHAR(HireDate, 'YYYY') "Year",
        *
ERROR at line 2:
ORA-00937: not a single-group group function


SQL> cl scr

SQL> SELECT   Deptno, TO_CHAR(HireDate, 'YYYY') "Year", SUM(Sal),
  2  DENSE_RANK()
  3  OVER(ORDER BY  SUM(Sal) DESC) YearRank
  4  FROM  Emp
  5  GROUP BY Deptno, TO_CHAR(HireDate, 'YYYY')
  6  ORDER BY YearRank;

    DEPTNO Year   SUM(SAL)   YEARRANK
---------- ---- ---------- ----------
        30 1981       9400          1
        10 1981       7450          2
        20 1981       5975          3
        20 1982       3000          4
```

```
        10 1982       1300          5
        20 1983       1100          6
        20 1980        800          7

7 rows selected.

SQL> cl scr

SQL> SELECT Ename, Deptno, Sal,
  2  SUM(Sal)
  3  OVER(ORDER BY Sal DESC) "Run Sum"
  4  FROM Emp;

ENAME          DEPTNO        SAL    Run Sum
---------- ---------- ---------- ----------
KING               10       5000       5000
FORD               20       3000      11000
SCOTT              20       3000      11000
JONES              20       2975      13975
BLAKE              30       2850      16825
CLARK              10       2450      19275
ALLEN              30       1600      20875
TURNER             30       1500      22375
MILLER             10       1300      23675
MARTIN             30       1250      26175
WARD               30       1250      26175

ENAME          DEPTNO        SAL    Run Sum
---------- ---------- ---------- ----------
ADAMS              20       1100      27275
JAMES              30        950      28225
SMITH              20        800      29025

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  SUM(Sal)
  3  OVER(ORDER BY Sal DESC, Ename) "Run Sum"
  4* FROM Emp
SQL> /

ENAME          DEPTNO        SAL    Run Sum
---------- ---------- ---------- ----------
KING               10       5000       5000
FORD               20       3000       8000
SCOTT              20       3000      11000
JONES              20       2975      13975
BLAKE              30       2850      16825
CLARK              10       2450      19275
ALLEN              30       1600      20875
TURNER             30       1500      22375
MILLER             10       1300      23675
MARTIN             30       1250      24925
WARD               30       1250      26175
```

```
ENAME          DEPTNO        SAL    Run Sum
---------- ---------- ---------- ----------
ADAMS              20       1100      27275
JAMES              30        950      28225
SMITH              20        800      29025

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  AVG(Sal)
  3  OVER(ORDER BY Sal DESC, Ename) "Mov Avg"
  4* FROM Emp
SQL> /

ENAME          DEPTNO        SAL    Mov Avg
---------- ---------- ---------- ----------
KING               10       5000       5000
FORD               20       3000       4000
SCOTT              20       3000 3666.66667
JONES              20       2975    3493.75
BLAKE              30       2850       3365
CLARK              10       2450     3212.5
ALLEN              30       1600 2982.14286
TURNER             30       1500   2796.875
MILLER             10       1300 2630.55556
MARTIN             30       1250     2492.5
WARD               30       1250 2379.54545

ENAME          DEPTNO        SAL    Mov Avg
---------- ---------- ---------- ----------
ADAMS              20       1100 2272.91667
JAMES              30        950 2171.15385
SMITH              20        800 2073.21429

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno,
  2  TO_CHAR(Sal, '9G999D99') Sal,
  3  TO_CHAR(SUM(Sal)
  4  OVER(ORDER BY Sal DESC, Ename), '99G999D99') "Run Sum",
  5  TO_CHAR(AVG(Sal)
  6  OVER(ORDER BY Sal DESC, Ename), '99G999D99') "Mov Avg"
  7* FROM Emp
SQL> /

ENAME          DEPTNO SAL       Run Sum    Mov Avg
---------- ---------- --------- ---------- ----------
KING               10  5,000.00   5,000.00   5,000.00
FORD               20  3,000.00   8,000.00   4,000.00
SCOTT              20  3,000.00  11,000.00   3,666.67
```

```
JONES              20  2,975.00  13,975.00   3,493.75
BLAKE              30  2,850.00  16,825.00   3,365.00
CLARK              10  2,450.00  19,275.00   3,212.50
ALLEN              30  1,600.00  20,875.00   2,982.14
TURNER             30  1,500.00  22,375.00   2,796.88
MILLER             10  1,300.00  23,675.00   2,630.56
MARTIN             30  1,250.00  24,925.00   2,492.50
WARD               30  1,250.00  26,175.00   2,379.55

ENAME          DEPTNO SAL       Run Sum    Mov Avg
---------- ---------- --------- ---------- ----------
ADAMS              20  1,100.00  27,275.00   2,272.92
JAMES              30    950.00  28,225.00   2,171.15
SMITH              20    800.00  29,025.00   2,073.21

14 rows selected.

SQL> SPOOL OFF
SQL> cl scr

SQL> SET VERIFY OFF
SQL> cl scr

SQL> SELECT Ename, Deptno, Job, Sal,
  2  RANK()
  3  OVER(ORDER BY Sal DESC) Rank
  4  FROM Emp;

ENAME          DEPTNO JOB              SAL       RANK
---------- ---------- --------- ---------- ----------
KING               10 PRESIDENT       5000          1
FORD               20 ANALYST         3000          2
SCOTT              20 ANALYST         3000          2
JONES              20 MANAGER         2975          4
BLAKE              30 MANAGER         2850          5
CLARK              10 MANAGER         2450          6
ALLEN              30 SALESMAN        1600          7
TURNER             30 SALESMAN        1500          8
MILLER             10 CLERK           1300          9
MARTIN             30 SALESMAN        1250         10
WARD               30 SALESMAN        1250         10

ENAME          DEPTNO JOB              SAL       RANK
---------- ---------- --------- ---------- ----------
ADAMS              20 CLERK           1100         12
JAMES              30 CLERK            950         13
SMITH              20 CLERK            800         14

14 rows selected.

SQL> COLUMN Deptno FORMAT 99
SQL> COLUMN Sal FORMAT 99999
SQL> /

ENAME      DEPTNO JOB          SAL       RANK
---------- ------ --------- ------ ----------
KING           10 PRESIDENT   5000          1
```

```
FORD            20 ANALYST     3000           2
SCOTT           20 ANALYST     3000           2
JONES           20 MANAGER     2975           4
BLAKE           30 MANAGER     2850           5
CLARK           10 MANAGER     2450           6
ALLEN           30 SALESMAN    1600           7
TURNER          30 SALESMAN    1500           8
MILLER          10 CLERK       1300           9
MARTIN          30 SALESMAN    1250          10
WARD            30 SALESMAN    1250          10

ENAME      DEPTNO JOB          SAL       RANK
---------- ------ --------- ------ ----------
ADAMS           20 CLERK       1100          12
JAMES           30 CLERK        950          13
SMITH           20 CLERK        800          14

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Job, Sal,
  2  RANK()
  3  OVER(
  4   PARTITION BY Deptno
  5   ORDER BY Sal DESC) Rank
  6* FROM Emp
SQL> /

ENAME      DEPTNO JOB          SAL       RANK
---------- ------ --------- ------ ----------
KING            10 PRESIDENT   5000           1
CLARK           10 MANAGER     2450           2
MILLER          10 CLERK       1300           3
FORD            20 ANALYST     3000           1
SCOTT           20 ANALYST     3000           1
JONES           20 MANAGER     2975           3
ADAMS           20 CLERK       1100           4
SMITH           20 CLERK        800           5
BLAKE           30 MANAGER     2850           1
ALLEN           30 SALESMAN    1600           2
TURNER          30 SALESMAN    1500           3

ENAME      DEPTNO JOB          SAL       RANK
---------- ------ --------- ------ ----------
MARTIN          30 SALESMAN    1250           4
WARD            30 SALESMAN    1250           4
JAMES           30 CLERK        950           6

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Job, Sal,
  2  SUM(Sal)
```

```
  3  OVER(
  4   ORDER BY Sal DESC, Ename) "Run Sal"
  5* FROM Emp
SQL> /

ENAME      DEPTNO JOB          SAL    Run Sal
---------- ------ --------- ------ ----------
KING           10 PRESIDENT   5000       5000
FORD           20 ANALYST     3000       8000
SCOTT          20 ANALYST     3000      11000
JONES          20 MANAGER     2975      13975
BLAKE          30 MANAGER     2850      16825
CLARK          10 MANAGER     2450      19275
ALLEN          30 SALESMAN    1600      20875
TURNER         30 SALESMAN    1500      22375
MILLER         10 CLERK       1300      23675
MARTIN         30 SALESMAN    1250      24925
WARD           30 SALESMAN    1250      26175

ENAME      DEPTNO JOB          SAL    Run Sal
---------- ------ --------- ------ ----------
ADAMS          20 CLERK       1100      27275
JAMES          30 CLERK        950      28225
SMITH          20 CLERK        800      29025

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Job, Sal,
  2  SUM(Sal)
  3  OVER(
  4   PARTITION BY Deptno
  5   ORDER BY Sal DESC, Ename) "Run Sal"
  6* FROM Emp
SQL> /

ENAME      DEPTNO JOB          SAL    Run Sal
---------- ------ --------- ------ ----------
KING           10 PRESIDENT   5000       5000
CLARK          10 MANAGER     2450       7450
MILLER         10 CLERK       1300       8750
FORD           20 ANALYST     3000       3000
SCOTT          20 ANALYST     3000       6000
JONES          20 MANAGER     2975       8975
ADAMS          20 CLERK       1100      10075
SMITH          20 CLERK        800      10875
BLAKE          30 MANAGER     2850       2850
ALLEN          30 SALESMAN    1600       4450
TURNER         30 SALESMAN    1500       5950

ENAME      DEPTNO JOB          SAL    Run Sal
---------- ------ --------- ------ ----------
MARTIN         30 SALESMAN    1250       7200
WARD           30 SALESMAN    1250       8450
JAMES          30 CLERK        950       9400
```

```
14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Job, Sal,
  2  SUM(Sal)
  3  OVER(
  4   PARTITION BY Job
  5   ORDER BY Sal DESC, Ename) "Run Sal"
  6* FROM Emp
SQL> /

ENAME      DEPTNO JOB          SAL    Run Sal
---------- ------ --------- ------ ----------
FORD           20 ANALYST     3000       3000
SCOTT          20 ANALYST     3000       6000
MILLER         10 CLERK       1300       1300
ADAMS          20 CLERK       1100       2400
JAMES          30 CLERK        950       3350
SMITH          20 CLERK        800       4150
JONES          20 MANAGER     2975       2975
BLAKE          30 MANAGER     2850       5825
CLARK          10 MANAGER     2450       8275
KING           10 PRESIDENT   5000       5000
ALLEN          30 SALESMAN    1600       1600

ENAME      DEPTNO JOB          SAL    Run Sal
---------- ------ --------- ------ ----------
TURNER         30 SALESMAN    1500       3100
MARTIN         30 SALESMAN    1250       4350
WARD           30 SALESMAN    1250       5600

14 rows selected.

SQL> SELECT Deptno, SUM(Sal) SalSum
  2  FROM Emp
  3  GROUP BY ROLLUP(Deptno);

DEPTNO     SALSUM
------ ----------
    10       8750
    20      10875
    30       9400
            29025

SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno, SUM(Sal) SalSum
  2  FROM Emp
  3  WHERE Deptno = &GDeptno
  4* GROUP BY ROLLUP(Deptno)
SQL> /
Enter value for gdeptno: 10
```

```
DEPTNO     SALSUM
------ ----------
    10       8750
             8750

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Job, Sal,
  2  SUM(Sal)
  3  OVER(
  4     PARTITION BY Job
  5     ORDER BY Sal DESC, Ename) "Run Sal",
  6  AVG(Sal)
  7  OVER(
  8     PARTITION BY Job
  9     ORDER BY Sal DESC, Ename) "Mov Avg Sal"
 10* FROM Emp
SQL> /

ENAME      DEPTNO JOB          SAL    Run Sal Mov Avg Sal
---------- ------ --------- ------ ---------- -----------
FORD           20 ANALYST     3000       3000        3000
SCOTT          20 ANALYST     3000       6000        3000
MILLER         10 CLERK       1300       1300        1300
ADAMS          20 CLERK       1100       2400        1200
JAMES          30 CLERK        950       3350  1116.66667
SMITH          20 CLERK        800       4150      1037.5
JONES          20 MANAGER     2975       2975        2975
BLAKE          30 MANAGER     2850       5825      2912.5
CLARK          10 MANAGER     2450       8275  2758.33333
KING           10 PRESIDENT   5000       5000        5000
ALLEN          30 SALESMAN    1600       1600        1600

ENAME      DEPTNO JOB          SAL    Run Sal Mov Avg Sal
---------- ------ --------- ------ ---------- -----------
TURNER         30 SALESMAN    1500       3100        1550
MARTIN         30 SALESMAN    1250       4350        1450
WARD           30 SALESMAN    1250       5600        1400

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Job, Sal,
  2  SUM(Sal)
  3  OVER(
  4     PARTITION BY Deptno
  5     ORDER BY Sal DESC, Ename) "Run Sal",
  6  AVG(Sal)
  7  OVER(
  8     PARTITION BY Deptno
  9     ORDER BY Sal DESC, Ename) "Mov Avg Sal"
 10* FROM Emp
SQL> /
```

```
ENAME      DEPTNO JOB           SAL    Run Sal Mov Avg Sal
---------- ------ --------- ------ ---------- -----------
KING           10 PRESIDENT   5000       5000        5000
CLARK          10 MANAGER     2450       7450        3725
MILLER         10 CLERK       1300       8750  2916.66667
FORD           20 ANALYST     3000       3000        3000
SCOTT          20 ANALYST     3000       6000        3000
JONES          20 MANAGER     2975       8975  2991.66667
ADAMS          20 CLERK       1100      10075     2518.75
SMITH          20 CLERK        800      10875        2175
BLAKE          30 MANAGER     2850       2850        2850
ALLEN          30 SALESMAN    1600       4450        2225
TURNER         30 SALESMAN    1500       5950  1983.33333

ENAME      DEPTNO JOB           SAL    Run Sal Mov Avg Sal
---------- ------ --------- ------ ---------- -----------
MARTIN         30 SALESMAN    1250       7200        1800
WARD           30 SALESMAN    1250       8450        1690
JAMES          30 CLERK        950       9400  1566.66667

14 rows selected.

SQL> cl scr

SQL> SELECT *
  2  FROM(SELECT Ename, Deptno, Sal,
  3         DENSE_RANK()
  4         OVER(PARTITION BY DeptNo
  5         ORDER BY Sal DESC)  "TOP Sal"
  6         FROM Emp)
  7  WHERE "TOP Sal" <=3
  8  ORDER BY DeptNo, Sal DESC;

ENAME      DEPTNO    SAL    TOP Sal
---------- ------ ------ ----------
KING           10   5000          1
CLARK          10   2450          2
MILLER         10   1300          3
FORD           20   3000          1
SCOTT          20   3000          1
JONES          20   2975          2
ADAMS          20   1100          3
BLAKE          30   2850          1
ALLEN          30   1600          2
TURNER         30   1500          3

10 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT *
  2  FROM(SELECT Ename, Deptno, Sal,
  3   DENSE_RANK()
  4   OVER(PARTITION BY DeptNo
  5   ORDER BY Sal DESC)  "TOP Sal"
  6   FROM Emp)
```

```
  7  WHERE "TOP Sal" = 3
  8* ORDER BY DeptNo, Sal DESC
SQL> /

ENAME      DEPTNO    SAL    TOP Sal
---------- ------ ------ ----------
MILLER         10   1300          3
ADAMS          20   1100          3
TURNER         30   1500          3

SQL> cl scr

SQL> SELECT Ename, Deptno, Sal,
  2  SUM(Sal)
  3  OVER(ORDER BY Sal DESC) "Run Sal"
  4  FROM Emp;

ENAME      DEPTNO    SAL    Run Sal
---------- ------ ------ ----------
KING           10   5000       5000
FORD           20   3000      11000
SCOTT          20   3000      11000
JONES          20   2975      13975
BLAKE          30   2850      16825
CLARK          10   2450      19275
ALLEN          30   1600      20875
TURNER         30   1500      22375
MILLER         10   1300      23675
MARTIN         30   1250      26175
WARD           30   1250      26175

ENAME      DEPTNO    SAL    Run Sal
---------- ------ ------ ----------
ADAMS          20   1100      27275
JAMES          30    950      28225
SMITH          20    800      29025

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  SUM(Sal)
  3  OVER(ORDER BY Sal DESC, Ename) "Run Sal"
  4* FROM Emp
SQL> /

ENAME      DEPTNO    SAL    Run Sal
---------- ------ ------ ----------
KING           10   5000       5000
FORD           20   3000       8000
SCOTT          20   3000      11000
JONES          20   2975      13975
BLAKE          30   2850      16825
CLARK          10   2450      19275
ALLEN          30   1600      20875
```

```
TURNER         30   1500      22375
MILLER         10   1300      23675
MARTIN         30   1250      24925
WARD           30   1250      26175

ENAME      DEPTNO    SAL    Run Sal
---------- ------ ------ ----------
ADAMS          20   1100      27275
JAMES          30    950      28225
SMITH          20    800      29025

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  SUM(Sal)
  3  OVER(
  4   PARTITION BY Deptno
  5   ORDER BY Sal DESC, Ename) "Run Sal"
  6* FROM Emp
SQL> /

ENAME      DEPTNO    SAL    Run Sal
---------- ------ ------ ----------
KING           10   5000       5000
CLARK          10   2450       7450
MILLER         10   1300       8750
FORD           20   3000       3000
SCOTT          20   3000       6000
JONES          20   2975       8975
ADAMS          20   1100      10075
SMITH          20    800      10875
BLAKE          30   2850       2850
ALLEN          30   1600       4450
TURNER         30   1500       5950

ENAME      DEPTNO    SAL    Run Sal
---------- ------ ------ ----------
MARTIN         30   1250       7200
WARD           30   1250       8450
JAMES          30    950       9400

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  SUM(Sal)
  3  OVER(
  4   PARTITION BY Deptno
  5   ORDER BY Sal DESC, Ename) "Run Sal"
  6* FROM Emp
SQL> /
```

```
ENAME      DEPTNO    SAL    Run Sal
---------- ------ ------ ----------
KING           10   5000       5000
CLARK          10   2450       7450
MILLER         10   1300       8750
FORD           20   3000       3000
SCOTT          20   3000       6000
JONES          20   2975       8975
ADAMS          20   1100      10075
SMITH          20    800      10875
BLAKE          30   2850       2850
ALLEN          30   1600       4450
TURNER         30   1500       5950

ENAME      DEPTNO    SAL    Run Sal
---------- ------ ------ ----------
MARTIN         30   1250       7200
WARD           30   1250       8450
JAMES          30    950       9400

14 rows selected.

SQL> cl scr

SQL> SELECT DeptNo, Ename, Sal,
  2  SUM(SAL)
  3  OVER(
  4   PARTITION BY DeptNo
  5   ORDER BY EName
  6   ROWS 2 PRECEDING
  7   ) "Sliding Total"
  8  FROM Emp
  9  ORDER BY DeptNo, EName;

DEPTNO ENAME         SAL Sliding Total
------ ---------- ------ -------------
    10 CLARK        2450          2450
    10 KING         5000          7450
    10 MILLER       1300          8750
    20 ADAMS        1100          1100
    20 FORD         3000          4100
    20 JONES        2975          7075
    20 SCOTT        3000          8975
    20 SMITH         800          6775
    30 ALLEN        1600          1600
    30 BLAKE        2850          4450
    30 JAMES         950          5400

DEPTNO ENAME         SAL Sliding Total
------ ---------- ------ -------------
    30 MARTIN       1250          5050
    30 TURNER       1500          3700
    30 WARD         1250          4000

14 rows selected.

SQL> cl scr
```

```
SQL> SELECT Ename,
  2  HireDate,
  3  COUNT(*)
  4  OVER(ORDER BY HireDate ASC
  5         RANGE 100 PRECEDING) HireCnt
  6  FROM Emp
  7  ORDER BY HireDate ASC;

ENAME      HIREDATE     HIRECNT
---------- --------- ----------
SMITH      17-DEC-80          1
ALLEN      20-FEB-81          2
WARD       22-FEB-81          3
JONES      02-APR-81          3
BLAKE      01-MAY-81          4
CLARK      09-JUN-81          3
TURNER     08-SEP-81          2
MARTIN     28-SEP-81          2
KING       17-NOV-81          3
JAMES      03-DEC-81          5
FORD       03-DEC-81          5

ENAME      HIREDATE     HIRECNT
---------- --------- ----------
MILLER     23-JAN-82          4
SCOTT      09-DEC-82          1
ADAMS      12-JAN-83          2

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename,
  2  HireDate, HireDate - 100 "100Days",
  3  COUNT(*)
  4  OVER(ORDER BY HireDate ASC
  5         RANGE 100 PRECEDING) HireCnt
  6  FROM Emp
  7* ORDER BY HireDate ASC
SQL> /

ENAME      HIREDATE  100Days      HIRECNT
---------- --------- --------- ----------
SMITH      17-DEC-80 08-SEP-80          1
ALLEN      20-FEB-81 12-NOV-80          2
WARD       22-FEB-81 14-NOV-80          3
JONES      02-APR-81 23-DEC-80          3
BLAKE      01-MAY-81 21-JAN-81          4
CLARK      09-JUN-81 01-MAR-81          3
TURNER     08-SEP-81 31-MAY-81          2
MARTIN     28-SEP-81 20-JUN-81          2
KING       17-NOV-81 09-AUG-81          3
JAMES      03-DEC-81 25-AUG-81          5
FORD       03-DEC-81 25-AUG-81          5
```

```
ENAME      HIREDATE  100Days      HIRECNT
---------- --------- --------- ----------
MILLER     23-JAN-82 15-OCT-81          4
SCOTT      09-DEC-82 31-AUG-82          1
ADAMS      12-JAN-83 04-OCT-82          2

14 rows selected.

SQL> cl scr

SQL> SELECT Ename, HireDate, Sal,
  2  TO_CHAR(ROUND(AVG(Sal)
  3  OVER(ORDER BY HireDate ASC
  4    RANGE 100 PRECEDING) , 2), '99G999D99') AvgSal
  5  FROM Emp
  6  ORDER BY HireDate ASC;

ENAME      HIREDATE     SAL AVGSAL
---------- --------- ------ ----------
SMITH      17-DEC-80    800     800.00
ALLEN      20-FEB-81   1600   1,200.00
WARD       22-FEB-81   1250   1,216.67
JONES      02-APR-81   2975   1,941.67
BLAKE      01-MAY-81   2850   2,168.75
CLARK      09-JUN-81   2450   2,758.33
TURNER     08-SEP-81   1500   1,975.00
MARTIN     28-SEP-81   1250   1,375.00
KING       17-NOV-81   5000   2,583.33
JAMES      03-DEC-81    950   2,340.00
FORD       03-DEC-81   3000   2,340.00

ENAME      HIREDATE     SAL AVGSAL
---------- --------- ------ ----------
MILLER     23-JAN-82   1300   2,562.50
SCOTT      09-DEC-82   3000   3,000.00
ADAMS      12-JAN-83   1100   2,050.00

14 rows selected.

SQL> SPOOL OFF
SQL> cl scr

SQL> SELECT  Ename, HireDate, Sal,
  2  LAG(Sal, 1, 0)
  3  OVER(ORDER BY HireDate) PreSal
  4  FROM  Emp;

ENAME      HIREDATE         SAL     PRESAL
---------- --------- ---------- ----------
SMITH      17-DEC-80        800          0
ALLEN      20-FEB-81       1600        800
WARD       22-FEB-81       1250       1600
JONES      02-APR-81       2975       1250
BLAKE      01-MAY-81       2850       2975
CLARK      09-JUN-81       2450       2850
TURNER     08-SEP-81       1500       2450
MARTIN     28-SEP-81       1250       1500
```

```
KING       17-NOV-81       5000       1250
JAMES      03-DEC-81        950       5000
FORD       03-DEC-81       3000        950

ENAME      HIREDATE         SAL     PRESAL
---------- --------- ---------- ----------
MILLER     23-JAN-82       1300       3000
SCOTT      09-DEC-82       3000       1300
ADAMS      12-JAN-83       1100       3000

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT  Ename, HireDate, Sal,
  2  LAG(Sal, 1)
  3  OVER(ORDER BY HireDate) PreSal
  4* FROM  Emp
SQL> /

ENAME      HIREDATE         SAL     PRESAL
---------- --------- ---------- ----------
SMITH      17-DEC-80        800
ALLEN      20-FEB-81       1600        800
WARD       22-FEB-81       1250       1600
JONES      02-APR-81       2975       1250
BLAKE      01-MAY-81       2850       2975
CLARK      09-JUN-81       2450       2850
TURNER     08-SEP-81       1500       2450
MARTIN     28-SEP-81       1250       1500
KING       17-NOV-81       5000       1250
JAMES      03-DEC-81        950       5000
FORD       03-DEC-81       3000        950

ENAME      HIREDATE         SAL     PRESAL
---------- --------- ---------- ----------
MILLER     23-JAN-82       1300       3000
SCOTT      09-DEC-82       3000       1300
ADAMS      12-JAN-83       1100       3000

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT  Ename, HireDate, Sal,
  2  LAG(Sal, 1)
  3  OVER(ORDER BY HireDate) PreSal1,
  4  LAG(Sal, 2)
  5  OVER(ORDER BY HireDate) PreSal2,
  6  LAG(Sal, 3)
  7  OVER(ORDER BY HireDate) PreSal3,
  8  LAG(Sal, 4)
  9  OVER(ORDER BY HireDate) PreSal4,
 10  LAG(Sal, 5)
 11  OVER(ORDER BY HireDate) PreSal5
```

```
 12* FROM  Emp
SQL> /

ENAME      HIREDATE          SAL    PRESAL1    PRESAL2    PRESAL3    PRESAL4
---------- --------- ---------- ---------- ---------- ---------- ----------
   PRESAL5
----------
SMITH      17-DEC-80        800


ALLEN      20-FEB-81       1600        800


WARD       22-FEB-81       1250       1600        800


ENAME      HIREDATE          SAL    PRESAL1    PRESAL2    PRESAL3    PRESAL4
---------- --------- ---------- ---------- ---------- ---------- ----------
   PRESAL5
----------
JONES      02-APR-81       2975       1250       1600        800


BLAKE      01-MAY-81       2850       2975       1250       1600        800


CLARK      09-JUN-81       2450       2850       2975       1250       1600
       800


ENAME      HIREDATE          SAL    PRESAL1    PRESAL2    PRESAL3    PRESAL4
---------- --------- ---------- ---------- ---------- ---------- ----------
   PRESAL5
----------
TURNER     08-SEP-81       1500       2450       2850       2975       1250
      1600

MARTIN     28-SEP-81       1250       1500       2450       2850       2975
      1250

KING       17-NOV-81       5000       1250       1500       2450       2850
      2975


ENAME      HIREDATE          SAL    PRESAL1    PRESAL2    PRESAL3    PRESAL4
---------- --------- ---------- ---------- ---------- ---------- ----------
   PRESAL5
----------
JAMES      03-DEC-81        950       5000       1250       1500       2450
      2850

FORD       03-DEC-81       3000        950       5000       1250       1500
      2450

MILLER     23-JAN-82       1300       3000        950       5000       1250
      1500
```

```
ENAME      HIREDATE          SAL    PRESAL1    PRESAL2    PRESAL3    PRESAL4
---------- --------- ---------- ---------- ---------- ---------- ----------
   PRESAL5
----------
SCOTT      09-DEC-82       3000       1300       3000        950       5000
      1250

ADAMS      12-JAN-83       1100       3000       1300       3000        950
      5000


14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT  Ename, HireDate, Sal,
  2  LAG(Sal, 1)
  3  OVER(ORDER BY HireDate) PreSal1,
  4  LAG(Sal, 2)
  5  OVER(ORDER BY HireDate) PreSal2,
  6  LAG(Sal, 3)
  7  OVER(ORDER BY HireDate) PreSal3,
  8  LAG(Sal, 4)
  9  OVER(ORDER BY HireDate) PreSal4
 10* FROM  Emp
SQL> /

ENAME      HIREDATE          SAL    PRESAL1    PRESAL2    PRESAL3    PRESAL4
---------- --------- ---------- ---------- ---------- ---------- ----------
SMITH      17-DEC-80        800
ALLEN      20-FEB-81       1600        800
WARD       22-FEB-81       1250       1600        800
JONES      02-APR-81       2975       1250       1600        800
BLAKE      01-MAY-81       2850       2975       1250       1600        800
CLARK      09-JUN-81       2450       2850       2975       1250       1600
TURNER     08-SEP-81       1500       2450       2850       2975       1250
MARTIN     28-SEP-81       1250       1500       2450       2850       2975
KING       17-NOV-81       5000       1250       1500       2450       2850
JAMES      03-DEC-81        950       5000       1250       1500       2450
FORD       03-DEC-81       3000        950       5000       1250       1500

ENAME      HIREDATE          SAL    PRESAL1    PRESAL2    PRESAL3    PRESAL4
---------- --------- ---------- ---------- ---------- ---------- ----------
MILLER     23-JAN-82       1300       3000        950       5000       1250
SCOTT      09-DEC-82       3000       1300       3000        950       5000
ADAMS      12-JAN-83       1100       3000       1300       3000        950

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT  Ename, HireDate, Sal,
  2  LAG(Sal, &GOffset)
```

```
  3  OVER(ORDER BY HireDate) PreSal
  4* FROM  Emp
SQL> /
Enter value for goffset: 1
old   2: LAG(Sal, &GOffset)
new   2: LAG(Sal, 1)

ENAME      HIREDATE         SAL     PRESAL
---------- --------- ---------- ----------
SMITH      17-DEC-80         800
ALLEN      20-FEB-81        1600        800
WARD       22-FEB-81        1250       1600
JONES      02-APR-81        2975       1250
BLAKE      01-MAY-81        2850       2975
CLARK      09-JUN-81        2450       2850
TURNER     08-SEP-81        1500       2450
MARTIN     28-SEP-81        1250       1500
KING       17-NOV-81        5000       1250
JAMES      03-DEC-81         950       5000
FORD       03-DEC-81        3000        950

ENAME      HIREDATE         SAL     PRESAL
---------- --------- ---------- ----------
MILLER     23-JAN-82        1300       3000
SCOTT      09-DEC-82        3000       1300
ADAMS      12-JAN-83        1100       3000

14 rows selected.

SQL> /
Enter value for goffset: 2
old   2: LAG(Sal, &GOffset)
new   2: LAG(Sal, 2)

ENAME      HIREDATE         SAL     PRESAL
---------- --------- ---------- ----------
SMITH      17-DEC-80         800
ALLEN      20-FEB-81        1600
WARD       22-FEB-81        1250        800
JONES      02-APR-81        2975       1600
BLAKE      01-MAY-81        2850       1250
CLARK      09-JUN-81        2450       2975
TURNER     08-SEP-81        1500       2850
MARTIN     28-SEP-81        1250       2450
KING       17-NOV-81        5000       1500
JAMES      03-DEC-81         950       1250
FORD       03-DEC-81        3000       5000

ENAME      HIREDATE         SAL     PRESAL
---------- --------- ---------- ----------
MILLER     23-JAN-82        1300        950
SCOTT      09-DEC-82        3000       3000
ADAMS      12-JAN-83        1100       1300

14 rows selected.

SQL> ED
```

```
Wrote file afiedt.buf

  1  SELECT  Ename, HireDate, Sal,
  2  LAG(Sal, &GOffset)
  3  OVER(ORDER BY HireDate) PreSal
  4  FROM  Emp
  5* WHERE Ename = &GEname
SQL> SET VERIFY OFF
SQL> /
Enter value for goffset: 1
Enter value for gename: KING
WHERE Ename = KING
              *
ERROR at line 5:
ORA-00904: "KING": invalid identifier


SQL> ED
Wrote file afiedt.buf

  1  SELECT  Ename, HireDate, Sal,
  2  LAG(Sal, &GOffset)
  3  OVER(ORDER BY HireDate) PreSal
  4  FROM  Emp
  5* WHERE Ename = UPPER('&GEname')
SQL> /
Enter value for goffset: 1
Enter value for gename: king

ENAME      HIREDATE         SAL     PRESAL
---------- --------- ---------- ----------
KING       17-NOV-81       5000

SQL> ED
Wrote file afiedt.buf

  1  SELECT  Ename, HireDate, Sal,
  2  LAG(Sal, &GOffset)
  3  OVER(ORDER BY HireDate) PreSal
  4  FROM  Emp
  5* WHERE Deptno = 10
SQL> /
Enter value for goffset: 1

ENAME      HIREDATE         SAL     PRESAL
---------- --------- ---------- ----------
CLARK      09-JUN-81       2450
KING       17-NOV-81       5000       2450
MILLER     23-JAN-82       1300       5000

SQL> cl scr

SQL> SELECT  Ename, HireDate, Sal,
  2  LEAD(Sal, 1, 0)
  3  OVER(ORDER BY HireDate) NextSal
  4  FROM  Emp;
```

```
ENAME      HIREDATE          SAL    NEXTSAL
---------- --------- ---------- ----------
SMITH      17-DEC-80         800       1600
ALLEN      20-FEB-81        1600       1250
WARD       22-FEB-81        1250       2975
JONES      02-APR-81        2975       2850
BLAKE      01-MAY-81        2850       2450
CLARK      09-JUN-81        2450       1500
TURNER     08-SEP-81        1500       1250
MARTIN     28-SEP-81        1250       5000
KING       17-NOV-81        5000        950
JAMES      03-DEC-81         950       3000
FORD       03-DEC-81        3000       1300

ENAME      HIREDATE          SAL    NEXTSAL
---------- --------- ---------- ----------
MILLER     23-JAN-82        1300       3000
SCOTT      09-DEC-82        3000       1100
ADAMS      12-JAN-83        1100          0

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT  Ename, HireDate,
  2  LAG(Sal, 1, 0)
  3  OVER(ORDER BY HireDate) PreSal,
  4  Sal CurrSal,
  5  LEAD(Sal, 1, 0)
  6  OVER(ORDER BY HireDate) NextSal
  7* FROM  Emp
SQL> /

ENAME      HIREDATE      PRESAL    CURRSAL    NEXTSAL
---------- --------- ---------- ---------- ----------
SMITH      17-DEC-80          0        800       1600
ALLEN      20-FEB-81        800       1600       1250
WARD       22-FEB-81       1600       1250       2975
JONES      02-APR-81       1250       2975       2850
BLAKE      01-MAY-81       2975       2850       2450
CLARK      09-JUN-81       2850       2450       1500
TURNER     08-SEP-81       2450       1500       1250
MARTIN     28-SEP-81       1500       1250       5000
KING       17-NOV-81       1250       5000        950
JAMES      03-DEC-81       5000        950       3000
FORD       03-DEC-81        950       3000       1300

ENAME      HIREDATE      PRESAL    CURRSAL    NEXTSAL
---------- --------- ---------- ---------- ----------
MILLER     23-JAN-82       3000       1300       3000
SCOTT      09-DEC-82       1300       3000       1100
ADAMS      12-JAN-83       3000       1100          0

14 rows selected.

SQL> ED
```

```
Wrote file afiedt.buf

  1  SELECT  Ename, HireDate,
  2  LAG(Sal, 2, 0)
  3  OVER(ORDER BY HireDate) PreSal2,
  4  LAG(Sal, 1, 0)
  5  OVER(ORDER BY HireDate) PreSal1,
  6  Sal CurrSal,
  7  LEAD(Sal, 1, 0)
  8  OVER(ORDER BY HireDate) NextSal1
  9  LEAD(Sal, 2, 0)
 10  OVER(ORDER BY HireDate) NextSal2
 11* FROM  Emp
SQL> ED
Wrote file afiedt.buf

  1  SELECT  Ename, HireDate,
  2  LAG(Sal, 2, 0)
  3  OVER(ORDER BY HireDate) PreSal2,
  4  LAG(Sal, 1, 0)
  5  OVER(ORDER BY HireDate) PreSal1,
  6  Sal CurrSal,
  7  LEAD(Sal, 1, 0)
  8  OVER(ORDER BY HireDate) NextSal1,
  9  LEAD(Sal, 2, 0)
 10  OVER(ORDER BY HireDate) NextSal2
 11* FROM  Emp
SQL> /

ENAME      HIREDATE     PRESAL2    PRESAL1    CURRSAL   NEXTSAL1   NEXTSAL2
---------- --------- ---------- ---------- ---------- ---------- ----------
SMITH      17-DEC-80          0          0        800       1600       1250
ALLEN      20-FEB-81          0        800       1600       1250       2975
WARD       22-FEB-81        800       1600       1250       2975       2850
JONES      02-APR-81       1600       1250       2975       2850       2450
BLAKE      01-MAY-81       1250       2975       2850       2450       1500
CLARK      09-JUN-81       2975       2850       2450       1500       1250
TURNER     08-SEP-81       2850       2450       1500       1250       5000
MARTIN     28-SEP-81       2450       1500       1250       5000        950
KING       17-NOV-81       1500       1250       5000        950       3000
JAMES      03-DEC-81       1250       5000        950       3000       1300
FORD       03-DEC-81       5000        950       3000       1300       3000

ENAME      HIREDATE     PRESAL2    PRESAL1    CURRSAL   NEXTSAL1   NEXTSAL2
---------- --------- ---------- ---------- ---------- ---------- ----------
MILLER     23-JAN-82        950       3000       1300       3000       1100
SCOTT      09-DEC-82       3000       1300       3000       1100          0
ADAMS      12-JAN-83       1300       3000       1100          0          0

14 rows selected.

SQL> cl scr

SQL> SELECT  Ename, HireDate, Sal,
  2  Sal - LAG(Sal, 1, 0)
  3  OVER(ORDER BY HireDate) DiffPreSal
  4  FROM  Emp;
```

```
ENAME      HIREDATE          SAL DIFFPRESAL
---------- --------- ---------- ----------
SMITH      17-DEC-80         800        800
ALLEN      20-FEB-81        1600        800
WARD       22-FEB-81        1250       -350
JONES      02-APR-81        2975       1725
BLAKE      01-MAY-81        2850       -125
CLARK      09-JUN-81        2450       -400
TURNER     08-SEP-81        1500       -950
MARTIN     28-SEP-81        1250       -250
KING       17-NOV-81        5000       3750
JAMES      03-DEC-81         950      -4050
FORD       03-DEC-81        3000       2050

ENAME      HIREDATE          SAL DIFFPRESAL
---------- --------- ---------- ----------
MILLER     23-JAN-82        1300      -1700
SCOTT      09-DEC-82        3000       1700
ADAMS      12-JAN-83        1100      -1900

14 rows selected.

SQL> cl scr

SQL> SELECT  Ename, HireDate, Sal,
  2  Sal - LEAD(Sal, 1, 0)
  3  OVER(ORDER BY HireDate) DiffNextSal
  4  FROM  Emp;

ENAME      HIREDATE          SAL DIFFNEXTSAL
---------- --------- ---------- -----------
SMITH      17-DEC-80         800        -800
ALLEN      20-FEB-81        1600         350
WARD       22-FEB-81        1250       -1725
JONES      02-APR-81        2975         125
BLAKE      01-MAY-81        2850         400
CLARK      09-JUN-81        2450         950
TURNER     08-SEP-81        1500         250
MARTIN     28-SEP-81        1250       -3750
KING       17-NOV-81        5000        4050
JAMES      03-DEC-81         950       -2050
FORD       03-DEC-81        3000        1700

ENAME      HIREDATE          SAL DIFFNEXTSAL
---------- --------- ---------- -----------
MILLER     23-JAN-82        1300       -1700
SCOTT      09-DEC-82        3000        1900
ADAMS      12-JAN-83        1100        1100

14 rows selected.

SQL> cl scr

SQL> COLUMN Remarks FORMAT A30
SQL> SELECT E1.Ename, E1.HireDate, E1.Sal,
ABS(E1.DiffNExtSal)||DECODE(SIGN(E1.DiffNextSal),
```

```
  2                                       1, ' More Than Next Salary.',
  3                                       -1, ' Less Than Next Salary.',
  4                                       ' Salaries Equal.') Remarks
  5  FROM (SELECT  Ename, HireDate, Sal,
  6         Sal - LEAD(Sal, 1, 0)
  7         OVER(ORDER BY HireDate) DiffNextSal
  8         FROM  Emp) E1;

ENAME      HIREDATE         SAL REMARKS
---------- --------- ---------- ------------------------------
SMITH      17-DEC-80        800 800 Less Than Next Salary.
ALLEN      20-FEB-81       1600 350 More Than Next Salary.
WARD       22-FEB-81       1250 1725 Less Than Next Salary.
JONES      02-APR-81       2975 125 More Than Next Salary.
BLAKE      01-MAY-81       2850 400 More Than Next Salary.
CLARK      09-JUN-81       2450 950 More Than Next Salary.
TURNER     08-SEP-81       1500 250 More Than Next Salary.
MARTIN     28-SEP-81       1250 3750 Less Than Next Salary.
KING       17-NOV-81       5000 4050 More Than Next Salary.
JAMES      03-DEC-81        950 2050 Less Than Next Salary.
FORD       03-DEC-81       3000 1700 More Than Next Salary.

ENAME      HIREDATE         SAL REMARKS
---------- --------- ---------- ------------------------------
MILLER     23-JAN-82       1300 1700 Less Than Next Salary.
SCOTT      09-DEC-82       3000 1900 More Than Next Salary.
ADAMS      12-JAN-83       1100 1100 More Than Next Salary.

14 rows selected.

SQL> cl scr

SQL> COLUMN Remarks FORMAT A40
SQL> SELECT E1.Deptno, E1.DeptSalSum,
  2  ABS(E1.DeptSalSum - NextSal)||
  3  DECODE(NVL(SIGN(E1.DeptSalSum - NextSal), 0),
  4             1, ' More Budget Than Next Department',
  5             -1, ' Less Budget Than Next Department',
  6             0, ' Terminating Department') Remarks
  7  FROM (SELECT  Deptno, SUM(Sal) DeptSalSum,
  8         LEAD(SUM(Sal), 1, NULL)
  9         OVER(ORDER BY Deptno) NextSal
 10         FROM  Emp
 11         GROUP BY Deptno) E1;

    DEPTNO DEPTSALSUM REMARKS
---------- ---------- ----------------------------------------
        10       8750 2125 Less Budget Than Next Department
        20      10875 1475 More Budget Than Next Department
        30       9400  Terminating Department

SQL> cl scr

SQL> BREAK ON Deptno SKIP 1
SQL> COLUMN DaysDiff FORMAT A40
SQL> COLUMN DEPTNO FORMAT 99
SQL> COLUMN ENAME FORMAT A10
```

```
SQL> SELECT Deptno, Ename, HireDate,
  2  LAG(HireDate, 1, NULL)
  3  OVER(PARTITION BY Deptno
  4              ORDER BY HireDate, Ename)   Last_Hire,
  5  NVL(HireDate - LAG(HireDate, 1, Null)
  6           OVER (PARTITION BY Deptno
  7     ORDER BY HireDate, Ename), 0)||' Days of Difference.'  DaysDiff
  8  FROM  Emp
  9  ORDER BY DeptNo, HireDate;

DEPTNO ENAME      HIREDATE  LAST_HIRE DAYSDIFF
------ ---------- --------- --------- ---------------------------------------
    10 CLARK      09-JUN-81           0 Days of Difference.
       KING       17-NOV-81 09-JUN-81 161 Days of Difference.
       MILLER     23-JAN-82 17-NOV-81 67 Days of Difference.

    20 SMITH      17-DEC-80           0 Days of Difference.
       JONES      02-APR-81 17-DEC-80 106 Days of Difference.
       FORD       03-DEC-81 02-APR-81 245 Days of Difference.
       SCOTT      09-DEC-82 03-DEC-81 371 Days of Difference.
       ADAMS      12-JAN-83 09-DEC-82 34 Days of Difference.

    30 ALLEN      20-FEB-81           0 Days of Difference.

DEPTNO ENAME      HIREDATE  LAST_HIRE DAYSDIFF
------ ---------- --------- --------- ---------------------------------------
    30 WARD       22-FEB-81 20-FEB-81 2 Days of Difference.
       BLAKE      01-MAY-81 22-FEB-81 68 Days of Difference.
       TURNER     08-SEP-81 01-MAY-81 130 Days of Difference.
       MARTIN     28-SEP-81 08-SEP-81 20 Days of Difference.
       JAMES      03-DEC-81 28-SEP-81 66 Days of Difference.


14 rows selected.

SQL> BREAK ON Deptno DUP
SQL> cl scr

SQL> SELECT Ename, Deptno, Sal,
  2  FIRST_VALUE(Ename)
  3  OVER(PARTITION BY DeptNo
  4  ORDER BY Sal DESC)  Max_Sal_Name
  5  FROM   Emp ORDER BY Deptno, Sal DESC, Ename DESC;

ENAME      DEPTNO        SAL MAX_SAL_NA
---------- ------ ---------- ----------
KING           10       5000 KING
CLARK          10       2450 KING
MILLER         10       1300 KING
SCOTT          20       3000 FORD
FORD           20       3000 FORD
JONES          20       2975 FORD
ADAMS          20       1100 FORD
SMITH          20        800 FORD
BLAKE          30       2850 BLAKE
ALLEN          30       1600 BLAKE
TURNER         30       1500 BLAKE
```

```
ENAME      DEPTNO        SAL MAX_SAL_NA
---------- ------ ---------- ----------
WARD           30       1250 BLAKE
MARTIN         30       1250 BLAKE
JAMES          30        950 BLAKE

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  FIRST_VALUE(Ename)
  3  OVER(PARTITION BY DeptNo
  4  ORDER BY Sal DESC)  Max_Sal_Name
  5  FROM   Emp
  6* ORDER BY Deptno, Sal DESC
SQL> /

ENAME      DEPTNO        SAL MAX_SAL_NA
---------- ------ ---------- ----------
KING           10       5000 KING
CLARK          10       2450 KING
MILLER         10       1300 KING
FORD           20       3000 FORD
SCOTT          20       3000 FORD
JONES          20       2975 FORD
ADAMS          20       1100 FORD
SMITH          20        800 FORD
BLAKE          30       2850 BLAKE
ALLEN          30       1600 BLAKE
TURNER         30       1500 BLAKE

ENAME      DEPTNO        SAL MAX_SAL_NA
---------- ------ ---------- ----------
MARTIN         30       1250 BLAKE
WARD           30       1250 BLAKE
JAMES          30        950 BLAKE

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  LAST_VALUE(Ename)
  3  OVER(PARTITION BY DeptNo
  4  ORDER BY Sal DESC)  Last
  5  FROM   Emp
  6* ORDER BY Deptno, Sal DESC
SQL> /

ENAME      DEPTNO        SAL LAST
---------- ------ ---------- ----------
KING           10       5000 KING
CLARK          10       2450 CLARK
```

```
MILLER         10       1300 MILLER
FORD           20       3000 SCOTT
SCOTT          20       3000 SCOTT
JONES          20       2975 JONES
ADAMS          20       1100 ADAMS
SMITH          20        800 SMITH
BLAKE          30       2850 BLAKE
ALLEN          30       1600 ALLEN
TURNER         30       1500 TURNER

ENAME      DEPTNO        SAL LAST
---------- ------ ---------- ----------
MARTIN         30       1250 WARD
WARD           30       1250 WARD
JAMES          30        950 JAMES

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  FIRST_VALUE(Ename)
  3  OVER(PARTITION BY DeptNo
  4  ORDER BY Sal DESC)  Last
  5  FROM   Emp
  6* ORDER BY Deptno, Sal DESC
SQL> /

ENAME      DEPTNO        SAL LAST
---------- ------ ---------- ----------
KING           10       5000 KING
CLARK          10       2450 KING
MILLER         10       1300 KING
FORD           20       3000 FORD
SCOTT          20       3000 FORD
JONES          20       2975 FORD
ADAMS          20       1100 FORD
SMITH          20        800 FORD
BLAKE          30       2850 BLAKE
ALLEN          30       1600 BLAKE
TURNER         30       1500 BLAKE

ENAME      DEPTNO        SAL LAST
---------- ------ ---------- ----------
MARTIN         30       1250 BLAKE
WARD           30       1250 BLAKE
JAMES          30        950 BLAKE

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  FIRST_VALUE(Ename)
  3  OVER(PARTITION BY DeptNo
```

```
  4  ORDER BY Sal DESC)  First
  5  FROM   Emp
  6* ORDER BY Deptno, Sal DESC
SQL> /

ENAME      DEPTNO        SAL FIRST
---------- ------ ---------- ----------
KING           10       5000 KING
CLARK          10       2450 KING
MILLER         10       1300 KING
FORD           20       3000 FORD
SCOTT          20       3000 FORD
JONES          20       2975 FORD
ADAMS          20       1100 FORD
SMITH          20        800 FORD
BLAKE          30       2850 BLAKE
ALLEN          30       1600 BLAKE
TURNER         30       1500 BLAKE

ENAME      DEPTNO        SAL FIRST
---------- ------ ---------- ----------
MARTIN         30       1250 BLAKE
WARD           30       1250 BLAKE
JAMES          30        950 BLAKE

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  LAST_VALUE(Ename)
  3  OVER(PARTITION BY DeptNo
  4  ORDER BY Sal DESC)  Last
  5  FROM   Emp
  6* ORDER BY Deptno, Sal DESC
SQL> /

ENAME      DEPTNO        SAL LAST
---------- ------ ---------- ----------
KING           10       5000 KING
CLARK          10       2450 CLARK
MILLER         10       1300 MILLER
FORD           20       3000 SCOTT
SCOTT          20       3000 SCOTT
JONES          20       2975 JONES
ADAMS          20       1100 ADAMS
SMITH          20        800 SMITH
BLAKE          30       2850 BLAKE
ALLEN          30       1600 ALLEN
TURNER         30       1500 TURNER

ENAME      DEPTNO        SAL LAST
---------- ------ ---------- ----------
MARTIN         30       1250 WARD
WARD           30       1250 WARD
JAMES          30        950 JAMES
```

```
14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  LAST_VALUE(Ename)
  3  OVER(PARTITION BY DeptNo
  4  ORDER BY Deptno)  Last
  5  FROM   Emp
  6* ORDER BY Deptno
SQL> /

ENAME      DEPTNO        SAL LAST
---------- ------ ---------- ----------
CLARK          10       2450 MILLER
KING           10       5000 MILLER
MILLER         10       1300 MILLER
ADAMS          20       1100 SMITH
FORD           20       3000 SMITH
JONES          20       2975 SMITH
SCOTT          20       3000 SMITH
SMITH          20        800 SMITH
ALLEN          30       1600 WARD
BLAKE          30       2850 WARD
JAMES          30        950 WARD

ENAME      DEPTNO        SAL LAST
---------- ------ ---------- ----------
MARTIN         30       1250 WARD
TURNER         30       1500 WARD
WARD           30       1250 WARD

14 rows selected.

SQL> cl scr

SQL> SELECT Ename, Deptno, Sal,
  2  FIRST_VALUE(Ename)
  3  OVER(ORDER BY Sal ASC
  4  ROWS BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING)  Min_Sal_Name
  5  FROM (SELECT  *
  6    FROM  Emp
  7    WHERE Deptno = 30);

ENAME      DEPTNO        SAL MIN_SAL_NA
---------- ------ ---------- ----------
JAMES          30        950 JAMES
MARTIN         30       1250 JAMES
WARD           30       1250 JAMES
TURNER         30       1500 JAMES
ALLEN          30       1600 JAMES
BLAKE          30       2850 JAMES

6 rows selected.
```

```
SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  LAST_VALUE(Ename)
  3  OVER(ORDER BY Sal ASC
  4  )  Min_Sal_Name
  5  FROM (SELECT  *
  6    FROM  Emp
  7*   WHERE Deptno = 30)
SQL> /

ENAME      DEPTNO        SAL MIN_SAL_NA
---------- ------ ---------- ----------
JAMES          30        950 JAMES
MARTIN         30       1250 WARD
WARD           30       1250 WARD
TURNER         30       1500 TURNER
ALLEN          30       1600 ALLEN
BLAKE          30       2850 BLAKE

6 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  LAST_VALUE(Ename)
  3  OVER(ORDER BY Sal ASC
  4  ROWS BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING)  Min_Sal_Name
  5  FROM (SELECT  *
  6    FROM  Emp
  7*   WHERE Deptno = 30)
SQL> /

ENAME      DEPTNO        SAL MIN_SAL_NA
---------- ------ ---------- ----------
JAMES          30        950 BLAKE
MARTIN         30       1250 BLAKE
WARD           30       1250 BLAKE
TURNER         30       1500 BLAKE
ALLEN          30       1600 BLAKE
BLAKE          30       2850 BLAKE

6 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  LAST_VALUE(Ename)
  3  OVER(ORDER BY Sal ASC
  4  ROWS BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING)  Min_Sal_Name
  5* FROM Emp
  6  /

ENAME      DEPTNO        SAL MIN_SAL_NA
```

```
---------- ------ ---------- ----------
SMITH          20        800 KING
JAMES          30        950 KING
ADAMS          20       1100 KING
MARTIN         30       1250 KING
WARD           30       1250 KING
MILLER         10       1300 KING
TURNER         30       1500 KING
ALLEN          30       1600 KING
CLARK          10       2450 KING
BLAKE          30       2850 KING
JONES          20       2975 KING

ENAME      DEPTNO        SAL MIN_SAL_NA
---------- ------ ---------- ----------
FORD           20       3000 KING
SCOTT          20       3000 KING
KING           10       5000 KING

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  FIRSt_VALUE(Ename)
  3  OVER(ORDER BY Sal ASC
  4  ROWS BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING)  Min_Sal_Name
  5* FROM Emp
SQL> /

ENAME      DEPTNO        SAL MIN_SAL_NA
---------- ------ ---------- ----------
SMITH          20        800 SMITH
JAMES          30        950 SMITH
ADAMS          20       1100 SMITH
MARTIN         30       1250 SMITH
WARD           30       1250 SMITH
MILLER         10       1300 SMITH
TURNER         30       1500 SMITH
ALLEN          30       1600 SMITH
CLARK          10       2450 SMITH
BLAKE          30       2850 SMITH
JONES          20       2975 SMITH

ENAME      DEPTNO        SAL MIN_SAL_NA
---------- ------ ---------- ----------
FORD           20       3000 SMITH
SCOTT          20       3000 SMITH
KING           10       5000 SMITH

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
```

```
  2  FIRST_VALUE(Ename)
  3  OVER(
  4  PARTITION BY Deptno
  5  ORDER BY Sal ASC
  6  ROWS BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING)  Min_Sal_Name
  7* FROM Emp
SQL> /

ENAME      DEPTNO        SAL MIN_SAL_NA
---------- ------ ---------- ----------
MILLER         10       1300 MILLER
CLARK          10       2450 MILLER
KING           10       5000 MILLER
SMITH          20        800 SMITH
ADAMS          20       1100 SMITH
JONES          20       2975 SMITH
FORD           20       3000 SMITH
SCOTT          20       3000 SMITH
JAMES          30        950 JAMES
MARTIN         30       1250 JAMES
WARD           30       1250 JAMES

ENAME      DEPTNO        SAL MIN_SAL_NA
---------- ------ ---------- ----------
TURNER         30       1500 JAMES
ALLEN          30       1600 JAMES
BLAKE          30       2850 JAMES

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  FIRST_VALUE(Ename)
  3  OVER(
  4  PARTITION BY Deptno
  5  ORDER BY Sal ASC
  6  ROWS BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING)  Min_Sal_Name,
  7  LAST_VALUE(Ename)
  8  OVER(
  9  PARTITION BY Deptno
 10  ORDER BY Sal ASC
 11  ROWS BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING)  Max_Sal_Name
 12* FROM Emp
SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  FIRST_VALUE(Ename)
  3  OVER(
  4  PARTITION BY Deptno
  5  ORDER BY Sal ASC
  6  ROWS BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING)  Min_Sal_Name,
  7  LAST_VALUE(Ename)
  8  OVER(
  9  PARTITION BY Deptno
```

```
 10  ORDER BY Sal ASC
 11  ROWS BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING)  Max_Sal_Name
 12* FROM Emp
SQL> /

ENAME      DEPTNO        SAL MIN_SAL_NA MAX_SAL_NA
---------- ------ ---------- ---------- ----------
MILLER         10       1300 MILLER     KING
CLARK          10       2450 MILLER     KING
KING           10       5000 MILLER     KING
SMITH          20        800 SMITH      SCOTT
ADAMS          20       1100 SMITH      SCOTT
JONES          20       2975 SMITH      SCOTT
FORD           20       3000 SMITH      SCOTT
SCOTT          20       3000 SMITH      SCOTT
JAMES          30        950 JAMES      BLAKE
MARTIN         30       1250 JAMES      BLAKE
WARD           30       1250 JAMES      BLAKE

ENAME      DEPTNO        SAL MIN_SAL_NA MAX_SAL_NA
---------- ------ ---------- ---------- ----------
TURNER         30       1500 JAMES      BLAKE
ALLEN          30       1600 JAMES      BLAKE
BLAKE          30       2850 JAMES      BLAKE

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  SUM(Sal)
  3  OVER(
  4  ORDER BY Sal ASC
  5  ROWS BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING)
  6* FROM Emp
SQL> /

ENAME      DEPTNO        SAL
---------- ------ ----------
SUM(SAL)OVER(ORDERBYSALASCROWSBETWEENUNBOUNDEDPRECEDINGANDUNBOUNDEDFOLLOWING)
--------------------------------------------------------------------------------
SMITH          20        800
                                                                          29025

JAMES          30        950
                                                                          29025

ADAMS          20       1100
                                                                          29025


ENAME      DEPTNO        SAL
---------- ------ ----------
SUM(SAL)OVER(ORDERBYSALASCROWSBETWEENUNBOUNDEDPRECEDINGANDUNBOUNDEDFOLLOWING)
--------------------------------------------------------------------------------
MARTIN         30       1250
```

```
                                                                      29025

WARD           30       1250
                                                                      29025

MILLER         10       1300
                                                                      29025


ENAME      DEPTNO        SAL
---------- ------ ----------
SUM(SAL)OVER(ORDERBYSALASCROWSBETWEENUNBOUNDEDPRECEDINGANDUNBOUNDEDFOLLOWING)
--------------------------------------------------------------------------------
TURNER         30       1500
                                                                      29025

ALLEN          30       1600
                                                                      29025

CLARK          10       2450
                                                                      29025


ENAME      DEPTNO        SAL
---------- ------ ----------
SUM(SAL)OVER(ORDERBYSALASCROWSBETWEENUNBOUNDEDPRECEDINGANDUNBOUNDEDFOLLOWING)
--------------------------------------------------------------------------------
BLAKE          30       2850
                                                                      29025

JONES          20       2975
                                                                      29025

FORD           20       3000
                                                                      29025


ENAME      DEPTNO        SAL
---------- ------ ----------
SUM(SAL)OVER(ORDERBYSALASCROWSBETWEENUNBOUNDEDPRECEDINGANDUNBOUNDEDFOLLOWING)
--------------------------------------------------------------------------------
SCOTT          20       3000
                                                                      29025

KING           10       5000
                                                                      29025


14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  SUM(Sal)
  3  OVER(
  4  ORDER BY Sal ASC
```

```
  5  ROWS BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING) "Slide Sal"
  6* FROM Emp
SQL> /

ENAME      DEPTNO        SAL  Slide Sal
---------- ------ ---------- ----------
SMITH          20        800      29025
JAMES          30        950      29025
ADAMS          20       1100      29025
MARTIN         30       1250      29025
WARD           30       1250      29025
MILLER         10       1300      29025
TURNER         30       1500      29025
ALLEN          30       1600      29025
CLARK          10       2450      29025
BLAKE          30       2850      29025
JONES          20       2975      29025

ENAME      DEPTNO        SAL  Slide Sal
---------- ------ ---------- ----------
FORD           20       3000      29025
SCOTT          20       3000      29025
KING           10       5000      29025

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  SUM(Sal)
  3  OVER(
  4  ORDER BY Sal ASC
  5  ROWS BETWEEN 1 PRECEDING AND UNBOUNDED FOLLOWING) "Slide Sal"
  6* FROM Emp
SQL> /

ENAME      DEPTNO        SAL  Slide Sal
---------- ------ ---------- ----------
SMITH          20        800      29025
JAMES          30        950      29025
ADAMS          20       1100      28225
MARTIN         30       1250      27275
WARD           30       1250      26175
MILLER         10       1300      24925
TURNER         30       1500      23675
ALLEN          30       1600      22375
CLARK          10       2450      20875
BLAKE          30       2850      19275
JONES          20       2975      16825

ENAME      DEPTNO        SAL  Slide Sal
---------- ------ ---------- ----------
FORD           20       3000      13975
SCOTT          20       3000      11000
KING           10       5000       8000
```

```
14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  SUM(Sal)
  3  OVER(
  4  ORDER BY Sal ASC
  5  ROWS BETWEEN 2 PRECEDING AND UNBOUNDED FOLLOWING) "Slide Sal"
  6* FROM Emp
SQL> /

ENAME      DEPTNO        SAL  Slide Sal
---------- ------ ---------- ----------
SMITH          20        800      29025
JAMES          30        950      29025
ADAMS          20       1100      29025
MARTIN         30       1250      28225
WARD           30       1250      27275
MILLER         10       1300      26175
TURNER         30       1500      24925
ALLEN          30       1600      23675
CLARK          10       2450      22375
BLAKE          30       2850      20875
JONES          20       2975      19275

ENAME      DEPTNO        SAL  Slide Sal
---------- ------ ---------- ----------
FORD           20       3000      16825
SCOTT          20       3000      13975
KING           10       5000      11000

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  SUM(Sal)
  3  OVER(
  4  ORDER BY Sal ASC
  5  ROWS BETWEEN 0 PRECEDING AND UNBOUNDED FOLLOWING) "Slide Sal"
  6* FROM Emp
SQL> /

ENAME      DEPTNO        SAL  Slide Sal
---------- ------ ---------- ----------
SMITH          20        800      29025
JAMES          30        950      28225
ADAMS          20       1100      27275
MARTIN         30       1250      26175
WARD           30       1250      24925
MILLER         10       1300      23675
TURNER         30       1500      22375
ALLEN          30       1600      20875
CLARK          10       2450      19275
```

```
BLAKE          30       2850      16825
JONES          20       2975      13975

ENAME      DEPTNO        SAL  Slide Sal
---------- ------ ---------- ----------
FORD           20       3000      11000
SCOTT          20       3000       8000
KING           10       5000       5000

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  SUM(Sal)
  3  OVER(
  4  ORDER BY Sal ASC
  5  ROWS BETWEEN 1 PRECEDING AND 1 FOLLOWING) "Slide Sal"
  6* FROM Emp
SQL> /

ENAME      DEPTNO        SAL  Slide Sal
---------- ------ ---------- ----------
SMITH          20        800       1750
JAMES          30        950       2850
ADAMS          20       1100       3300
MARTIN         30       1250       3600
WARD           30       1250       3800
MILLER         10       1300       4050
TURNER         30       1500       4400
ALLEN          30       1600       5550
CLARK          10       2450       6900
BLAKE          30       2850       8275
JONES          20       2975       8825

ENAME      DEPTNO        SAL  Slide Sal
---------- ------ ---------- ----------
FORD           20       3000       8975
SCOTT          20       3000      11000
KING           10       5000       8000

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT Ename, Deptno, Sal,
  2  SUM(Sal)
  3  OVER(
  4  ORDER BY Sal ASC
  5  ROWS BETWEEN 1 PRECEDING AND 1 FOLLOWING) "Center Sum",
  6  TO_CHAR(AVG(Sal)
  7  OVER(
  8  ORDER BY Sal ASC
  9  ROWS BETWEEN 1 PRECEDING AND 1 FOLLOWING), '9G999D99') "Center Avg"
 10* FROM Emp
```

```
SQL> /

ENAME      DEPTNO        SAL Center Sum Center Av
---------- ------ ---------- ---------- ---------
SMITH          20        800       1750    875.00
JAMES          30        950       2850    950.00
ADAMS          20       1100       3300  1,100.00
MARTIN         30       1250       3600  1,200.00
WARD           30       1250       3800  1,266.67
MILLER         10       1300       4050  1,350.00
TURNER         30       1500       4400  1,466.67
ALLEN          30       1600       5550  1,850.00
CLARK          10       2450       6900  2,300.00
BLAKE          30       2850       8275  2,758.33
JONES          20       2975       8825  2,941.67

ENAME      DEPTNO        SAL Center Sum Center Av
---------- ------ ---------- ---------- ---------
FORD           20       3000       8975  2,991.67
SCOTT          20       3000      11000  3,666.67
KING           10       5000       8000  4,000.00

14 rows selected.

SQL> cl scr

SQL> SELECT
  2  ROW_NUMBER()
  3  OVER(ORDER BY Sal DESC
  4  NULLS LAST) RowNo,
  5  Ename, Deptno
  6  FROM  Emp;

     ROWNO ENAME      DEPTNO
---------- ---------- ------
         1 KING           10
         2 FORD           20
         3 SCOTT          20
         4 JONES          20
         5 BLAKE          30
         6 CLARK          10
         7 ALLEN          30
         8 TURNER         30
         9 MILLER         10
        10 MARTIN         30
        11 WARD           30

     ROWNO ENAME      DEPTNO
---------- ---------- ------
        12 ADAMS          20
        13 JAMES          30
        14 SMITH          20

14 rows selected.

SQL> ED
Wrote file afiedt.buf
```

```
  1  SELECT
  2  ROW_NUMBER()
  3  OVER(
  4  PARTITION BY Deptno
  5  ORDER BY Sal DESC
  6  NULLS LAST) RowNo,
  7  Ename, Deptno
  8* FROM  Emp
SQL> /

     ROWNO ENAME      DEPTNO
---------- ---------- ------
         1 KING           10
         2 CLARK          10
         3 MILLER         10
         1 FORD           20
         2 SCOTT          20
         3 JONES          20
         4 ADAMS          20
         5 SMITH          20
         1 BLAKE          30
         2 ALLEN          30
         3 TURNER         30

     ROWNO ENAME      DEPTNO
---------- ---------- ------
         4 MARTIN         30
         5 WARD           30
         6 JAMES          30

14 rows selected.

SQL> cl scr

SQL> SELECT Deptno, Ename,
  2         ROW_NUMBER()
  3         OVER (PARTITION BY Deptno
  4         ORDER BY Sal DESC NULLS LAST)  SeqNo
  5         FROM  Emp;

DEPTNO ENAME           SEQNO
------ ---------- ----------
    10 KING                1
    10 CLARK               2
    10 MILLER              3
    20 FORD                1
    20 SCOTT               2
    20 JONES               3
    20 ADAMS               4
    20 SMITH               5
    30 BLAKE               1
    30 ALLEN               2
    30 TURNER              3

DEPTNO ENAME           SEQNO
------ ---------- ----------
```

```
    30 MARTIN              4
    30 WARD                5
    30 JAMES               6

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT E1.*
  2  FROM (
  3   SELECT Deptno, Ename,
  4   ROW_NUMBER()
  5   OVER (PARTITION BY Deptno
  6   ORDER BY Sal DESC NULLS LAST)  SeqNo
  7   FROM  Emp
  8   ) E1
  9* WHERE E1.Seqno <= 3
SQL> /

DEPTNO ENAME           SEQNO
------ ---------- ----------
    10 KING                1
    10 CLARK               2
    10 MILLER              3
    20 FORD                1
    20 SCOTT               2
    20 JONES               3
    30 BLAKE               1
    30 ALLEN               2
    30 TURNER              3

9 rows selected.

SQL> SELECT Deptno,
  2  MAX(DECODE(Seqno, 1, Ename, NULL)) First,
  3  MAX(DECODE(Seqno, 2, Ename, NULL)) Second,
  4  MAX(DECODE(Seqno, 3, Ename, NULL)) Third
  5  FROM  (SELECT Deptno, Ename,
  6         ROW_NUMBER()
  7         OVER (PARTITION BY Deptno
  8         ORDER BY Sal DESC NULLS LAST)  SeqNo
  9         FROM  Emp)
 10  WHERE SeqNo <= 3
 11  GROUP BY Deptno;

DEPTNO FIRST      SECOND     THIRD
------ ---------- ---------- ----------
    10 KING       CLARK      MILLER
    20 FORD       SCOTT      JONES
    30 BLAKE      ALLEN      TURNER

SQL> SELECT Deptno,
  2  MAX(DECODE(Seqno, 1, Ename, NULL)) First,
  3  MAX(DECODE(Seqno, 2, Ename, NULL)) Second,
  4  MAX(DECODE(Seqno, 3, Ename, NULL)) Third
  5  FROM  (SELECT Deptno, Ename,
```

```
  6         ROW_NUMBER()
  7         OVER (PARTITION BY Deptno
  8         ORDER BY HireDate NULLS LAST)  SeqNo
  9         FROM  Emp)
 10  WHERE SeqNo <= 3
 11  GROUP BY Deptno;

DEPTNO FIRST      SECOND     THIRD
------ ---------- ---------- ----------
    10 CLARK      KING       MILLER
    20 SMITH      JONES      FORD
    30 ALLEN      WARD       BLAKE

SQL> cl scr

SQL> SELECT Deptno, Ename,
  2         ROW_NUMBER()
  3         OVER (ORDER BY HireDate NULLS LAST)  SeqNo
  4         FROM  Emp;

DEPTNO ENAME           SEQNO
------ ---------- ----------
    20 SMITH               1
    30 ALLEN               2
    30 WARD                3
    20 JONES               4
    30 BLAKE               5
    10 CLARK               6
    30 TURNER              7
    30 MARTIN              8
    10 KING                9
    30 JAMES              10
    20 FORD               11

DEPTNO ENAME           SEQNO
------ ---------- ----------
    10 MILLER             12
    20 SCOTT              13
    20 ADAMS              14

14 rows selected.

SQL> ED
Wrote file afiedt.buf

  1  SELECT E1.*
  2  FROM (
  3   SELECT Deptno, Ename,
  4   ROW_NUMBER()
  5   OVER (ORDER BY HireDate NULLS LAST)  SeqNo
  6   FROM  Emp
  7   ) E1
  8* WHERE E1.Seqno <= 3
SQL> /

DEPTNO ENAME           SEQNO
------ ---------- ----------
```

```
    20 SMITH               1
    30 ALLEN               2
    30 WARD                3

SQL> SELECT Deptno,
  2  NVL(MAX(DECODE(Seqno, 1, Ename, NULL)), 'N.A.') First,
  3  NVL(MAX(DECODE(Seqno, 2, Ename, NULL)), 'N.A') Second,
  4  NVL(MAX(DECODE(Seqno, 3, Ename, NULL)), 'N.A') Third
  5  FROM  (SELECT Deptno, Ename,
  6         ROW_NUMBER()
  7         OVER (ORDER BY HireDate NULLS LAST)  SeqNo
  8         FROM  Emp)
  9  WHERE SeqNo <= 4 OR Deptno IN(10, 20, 30)
 10  GROUP BY Deptno;

DEPTNO FIRST      SECOND     THIRD
------ ---------- ---------- ----------
    10 N.A.       N.A        N.A
    20 SMITH      N.A        N.A
    30 N.A.       ALLEN      WARD

SQL> cl scr

SQL> SELECT  Deptno,
  2  DECODE (SeqNo, 1, Ename, NULL)   First,
  3  DECODE (SeqNo, 2, Ename, NULL)  Second,
  4  DECODE (SeqNo, 3, Ename, NULL)  Third
  5  FROM  (SELECT  Deptno,  Ename,
  6         ROW_NUMBER()
  7         OVER (PARTITION BY Deptno
  8         ORDER BY Sal DESC NULLS LAST)  SeqNo
  9         FROM  Emp)
 10  WHERE SeqNo <= 3;

DEPTNO FIRST      SECOND     THIRD
------ ---------- ---------- ----------
    10 KING
    10            CLARK
    10                       MILLER
    20 FORD
    20            SCOTT
    20                       JONES
    30 BLAKE
    30            ALLEN
    30                       TURNER

9 rows selected.

SQL> SELECT Deptno,
  2  MAX(DECODE(Seqno, 1, Ename, NULL)) First,
  3  MAX(DECODE(Seqno, 2, Ename, NULL)) Second,
  4  MAX(DECODE(Seqno, 3, Ename, NULL)) Third
  5  FROM  (SELECT Deptno, Ename,
  6         ROW_NUMBER()
  7         OVER (PARTITION BY Deptno
  8         ORDER BY Sal DESC NULLS LAST)  SeqNo
  9         FROM  Emp)
```

```
 10  WHERE SeqNo <= 3
 11  GROUP BY Deptno;

DEPTNO FIRST      SECOND     THIRD
------ ---------- ---------- ----------
    10 KING       CLARK      MILLER
    20 FORD       SCOTT      JONES
    30 BLAKE      ALLEN      TURNER

SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno,
  2  MAX(DECODE(Seqno, 1, Ename, NULL)) First,
  3  MAX(DECODE(Seqno, 2, Ename, NULL)) Second,
  4  MAX(DECODE(Seqno, 3, Ename, NULL)) Third,
  5  SUM(Sal)
  6  FROM  (SELECT Deptno, Ename, Sal
  7         ROW_NUMBER()
  8         OVER (PARTITION BY Deptno
  9         ORDER BY Sal DESC NULLS LAST)  SeqNo
 10         FROM  Emp)
 11  WHERE SeqNo <= 3
 12* GROUP BY Deptno
SQL> /
            ROW_NUMBER()
                      *
ERROR at line 7:
ORA-00923: FROM keyword not found where expected


SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno,
  2  MAX(DECODE(Seqno, 1, Ename, NULL)) First,
  3  MAX(DECODE(Seqno, 2, Ename, NULL)) Second,
  4  MAX(DECODE(Seqno, 3, Ename, NULL)) Third,
  5  SUM(Sal)
  6  FROM  (SELECT Deptno, Ename, Sal,
  7         ROW_NUMBER()
  8         OVER (PARTITION BY Deptno
  9         ORDER BY Sal DESC NULLS LAST)  SeqNo
 10         FROM  Emp)
 11  WHERE SeqNo <= 3
 12* GROUP BY Deptno
SQL> /

DEPTNO FIRST      SECOND     THIRD        SUM(SAL)
------ ---------- ---------- ---------- ----------
    10 KING       CLARK      MILLER           8750
    20 FORD       SCOTT      JONES            8975
    30 BLAKE      ALLEN      TURNER           5950

SQL> ED
Wrote file afiedt.buf
```

```
  1  SELECT Deptno,
  2  DECODE(Seqno, 1, Ename, NULL) First,
  3  DECODE(Seqno, 2, Ename, NULL) Second,
  4  DECODE(Seqno, 3, Ename, NULL) Third,
  5  Sal
  6  FROM  (SELECT Deptno, Ename, Sal,
  7         ROW_NUMBER()
  8         OVER (PARTITION BY Deptno
  9         ORDER BY Sal DESC NULLS LAST)  SeqNo
 10         FROM  Emp)
 11  WHERE SeqNo <= 3
 12* GROUP BY Deptno
SQL> /
DECODE(Seqno, 1, Ename, NULL) First,
       *
ERROR at line 2:
ORA-00979: not a GROUP BY expression


SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno,
  2  DECODE(Seqno, 1, Ename, NULL) First,
  3  DECODE(Seqno, 2, Ename, NULL) Second,
  4  DECODE(Seqno, 3, Ename, NULL) Third,
  5  Sal
  6  FROM  (SELECT Deptno, Ename, Sal,
  7         ROW_NUMBER()
  8         OVER (PARTITION BY Deptno
  9         ORDER BY Sal DESC NULLS LAST)  SeqNo
 10         FROM  Emp)
 11* WHERE SeqNo <= 3
SQL> /

DEPTNO FIRST      SECOND     THIRD              SAL
------ ---------- ---------- ---------- ----------
    10 KING                                   5000
    10            CLARK                       2450
    10                       MILLER           1300
    20 FORD                                   3000
    20            SCOTT                       3000
    20                       JONES            2975
    30 BLAKE                                  2850
    30            ALLEN                       1600
    30                       TURNER           1500

9 rows selected.

SQL> cl scr

SQL> SELECT
  2  Empno,
  3  Deptno,
  4  HireDate,
  5  FIRST_VALUE(HireDate)
  6  OVER (
```

```
  7         PARTITION BY Deptno
  8         ORDER BY HireDate
  9         ) FirstDate,
 10  HireDate - FIRST_VALUE(HireDate)
 11          OVER (
 12                      PARTITION BY Deptno
 13                      ORDER BY HireDate
 14                      ) NDays
 15  FROM Emp
 16  ORDER BY Deptno, NDays;

     EMPNO DEPTNO HIREDATE  FIRSTDATE      NDAYS
---------- ------ --------- --------- ----------
      7782     10 09-JUN-81 09-JUN-81          0
      7839     10 17-NOV-81 09-JUN-81        161
      7934     10 23-JAN-82 09-JUN-81        228
      7369     20 17-DEC-80 17-DEC-80          0
      7566     20 02-APR-81 17-DEC-80        106
      7902     20 03-DEC-81 17-DEC-80        351
      7788     20 09-DEC-82 17-DEC-80        722
      7876     20 12-JAN-83 17-DEC-80        756
      7499     30 20-FEB-81 20-FEB-81          0
      7521     30 22-FEB-81 20-FEB-81          2
      7698     30 01-MAY-81 20-FEB-81         70

     EMPNO DEPTNO HIREDATE  FIRSTDATE      NDAYS
---------- ------ --------- --------- ----------
      7844     30 08-SEP-81 20-FEB-81        200
      7654     30 28-SEP-81 20-FEB-81        220
      7900     30 03-DEC-81 20-FEB-81        286

14 rows selected.

SQL> cl scr

SQL> SELECT
  2  Empno,
  3  Deptno,
  4  HireDate,
  5  LAST_VALUE(Hiredate)
  6  OVER (
  7   PARTITION BY Deptno
  8   ORDER BY HireDate
  9   ROWS BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING
 10   ) LastDate,
 11  LAST_VALUE(Hiredate)
 12  OVER (
 13   PARTITION BY Deptno
 14   ORDER BY Hiredate
 15   ROWS BETWEEN UNBOUNDED PRECEDING AND UNBOUNDED FOLLOWING
 16   ) - HireDate NDays
 17  FROM Emp
 18  ORDER BY Deptno, NDays DESC
 19  /

     EMPNO DEPTNO HIREDATE  LASTDATE       NDAYS
---------- ------ --------- --------- ----------
```

```
      7782     10 09-JUN-81 23-JAN-82        228
      7839     10 17-NOV-81 23-JAN-82         67
      7934     10 23-JAN-82 23-JAN-82          0
      7369     20 17-DEC-80 12-JAN-83        756
      7566     20 02-APR-81 12-JAN-83        650
      7902     20 03-DEC-81 12-JAN-83        405
      7788     20 09-DEC-82 12-JAN-83         34
      7876     20 12-JAN-83 12-JAN-83          0
      7499     30 20-FEB-81 03-DEC-81        286
      7521     30 22-FEB-81 03-DEC-81        284
      7698     30 01-MAY-81 03-DEC-81        216

     EMPNO DEPTNO HIREDATE  LASTDATE       NDAYS
---------- ------ --------- --------- ----------
      7844     30 08-SEP-81 03-DEC-81         86
      7654     30 28-SEP-81 03-DEC-81         66
      7900     30 03-DEC-81 03-DEC-81          0

14 rows selected.

SQL> SPOOL OFF
SQL> SELECT Deptno,
  2  NVL(MAX(DECODE(Seqno, 1, Ename, NULL)), 'N.A.') First,
  3  NVL(MAX(DECODE(Seqno, 2, Ename, NULL)), 'N.A') Second,
  4  NVL(MAX(DECODE(Seqno, 3, Ename, NULL)), 'N.A') Third
  5  FROM  (SELECT Deptno, Ename,
  6         ROW_NUMBER()
  7         OVER (ORDER BY HireDate NULLS LAST)  SeqNo
  8         FROM  Emp)
  9  WHERE SeqNo <= 4 OR Deptno IN(10, 20, 30)
 10  GROUP BY Deptno;

    DEPTNO FIRST      SECOND     THIRD
---------- ---------- ---------- ----------
        10 N.A.       N.A        N.A
        20 SMITH      N.A        N.A
        30 N.A.       ALLEN      WARD

SQL> cl scr

SQL> SELECT  Deptno,
  2  DECODE (SeqNo, 1, Ename, NULL)   First,
  3  DECODE (SeqNo, 2, Ename, NULL)  Second,
  4  DECODE (SeqNo, 3, Ename, NULL)  Third
  5  FROM  (SELECT  Deptno,  Ename,
  6         ROW_NUMBER()
  7         OVER (PARTITION BY Deptno
  8         ORDER BY Sal DESC NULLS LAST)  SeqNo
  9         FROM  Emp)
 10  WHERE SeqNo <= 3;

    DEPTNO FIRST      SECOND     THIRD
---------- ---------- ---------- ----------
        10 KING
        10            CLARK
        10                       MILLER
        20 FORD
```

```
        20            SCOTT
        20                        JONES
        30 BLAKE
        30            ALLEN
        30                        TURNER

9 rows selected.

SQL> SELECT Deptno,
  2  MAX(DECODE(Seqno, 1, Ename, NULL)) First,
  3  MAX(DECODE(Seqno, 2, Ename, NULL)) Second,
  4  MAX(DECODE(Seqno, 3, Ename, NULL)) Third
  5  FROM  (SELECT Deptno, Ename,
  6         ROW_NUMBER()
  7         OVER (PARTITION BY Deptno
  8         ORDER BY Sal DESC NULLS LAST)  SeqNo
  9         FROM  Emp)
 10  WHERE SeqNo <= 3
 11  GROUP BY Deptno;

    DEPTNO FIRST      SECOND     THIRD
---------- ---------- ---------- ----------
        10 KING       CLARK      MILLER
        20 FORD       SCOTT      JONES
        30 BLAKE      ALLEN      TURNER

SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno,
  2  MAX(DECODE(Seqno, 1, Ename, NULL)) First,
  3  MAX(DECODE(Seqno, 2, Ename, NULL)) Second,
  4  MAX(DECODE(Seqno, 3, Ename, NULL)) Third,
  5  Sal
  6  FROM  (SELECT Deptno, Ename, Sal
  7         ROW_NUMBER()
  8         OVER (PARTITION BY Deptno
  9         ORDER BY Sal DESC NULLS LAST)  SeqNo
 10         FROM  Emp)
 11  WHERE SeqNo <= 3
 12* GROUP BY Deptno
SQL> /
            ROW_NUMBER()
                       *
ERROR at line 7:
ORA-00923: FROM keyword not found where expected


SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno,
  2  MAX(DECODE(Seqno, 1, Ename, NULL)) First,
  3  MAX(DECODE(Seqno, 2, Ename, NULL)) Second,
  4  MAX(DECODE(Seqno, 3, Ename, NULL)) Third,
  5  Sal
  6  FROM  (SELECT Deptno, Ename, Sal,
```

```
  7         ROW_NUMBER()
  8         OVER (PARTITION BY Deptno
  9         ORDER BY Sal DESC NULLS LAST)  SeqNo
 10         FROM  Emp)
 11  WHERE SeqNo <= 3
 12* GROUP BY Deptno
SQL> /
Sal
*
ERROR at line 5:
ORA-00979: not a GROUP BY expression


SQL> ED
Wrote file afiedt.buf

  1  SELECT Deptno,
  2  MAX(DECODE(Seqno, 1, Ename, NULL)) First,
  3  MAX(DECODE(Seqno, 2, Ename, NULL)) Second,
  4  MAX(DECODE(Seqno, 3, Ename, NULL)) Third,
  5  SUM(Sal) SalSum
  6  FROM  (SELECT Deptno, Ename, Sal,
  7         ROW_NUMBER()
  8         OVER (PARTITION BY Deptno
  9         ORDER BY Sal DESC NULLS LAST)  SeqNo
 10         FROM  Emp)
 11  WHERE SeqNo <= 3
 12* GROUP BY Deptno
SQL> /

    DEPTNO FIRST      SECOND     THIRD          SALSUM
---------- ---------- ---------- ---------- ----------
        10 KING       CLARK      MILLER           8750
        20 FORD       SCOTT      JONES            8975
        30 BLAKE      ALLEN      TURNER           5950

SQL> cl scr

SQL> SELECT  Deptno,
  2  DECODE (SeqNo, 1, Ename, NULL)   First,
  3  DECODE (SeqNo, 2, Ename, NULL)  Second,
  4  DECODE (SeqNo, 3, Ename, NULL)  Third,
  5  Sal
  6  FROM  (SELECT  Deptno,  Ename, Sal
  7         ROW_NUMBER()
  8         OVER (PARTITION BY Deptno
  9         ORDER BY Sal DESC NULLS LAST)  SeqNo
 10         FROM  Emp)
 11  WHERE SeqNo <= 3;
            ROW_NUMBER()
                      *
ERROR at line 7:
ORA-00923: FROM keyword not found where expected


SQL> ED
Wrote file afiedt.buf
```

```
  1  SELECT  Deptno,
  2  DECODE (SeqNo, 1, Ename, NULL)   First,
  3  DECODE (SeqNo, 2, Ename, NULL)  Second,
  4  DECODE (SeqNo, 3, Ename, NULL)  Third,
  5  Sal
  6  FROM  (SELECT  Deptno,  Ename, Sal,
  7         ROW_NUMBER()
  8         OVER (PARTITION BY Deptno
  9         ORDER BY Sal DESC NULLS LAST)  SeqNo
 10         FROM  Emp)
 11* WHERE SeqNo <= 3
SQL> /

    DEPTNO FIRST      SECOND     THIRD              SAL
---------- ---------- ---------- ---------- ----------
        10 KING                                   5000
        10            CLARK                       2450
        10                       MILLER           1300
        20 FORD                                   3000
        20            SCOTT                       3000
        20                       JONES            2975
        30 BLAKE                                  2850
        30            ALLEN                       1600
        30                       TURNER           1500

9 rows selected.

SQL> SELECT  Deptno,
  2  NVL(DECODE(SeqNo, 1, Ename, NULL), '***')   First,
  3  NVL(DECODE(SeqNo, 2, Ename, NULL), '***')  Second,
  4  NVL(DECODE(SeqNo, 3, Ename, NULL), '***')  Third
  5  FROM  (SELECT  Deptno,  Ename,
  6         ROW_NUMBER()
  7         OVER (PARTITION BY Deptno
  8         ORDER BY Sal DESC NULLS LAST)  SeqNo
  9         FROM  Emp)
 10  WHERE SeqNo <= 3;

    DEPTNO FIRST      SECOND     THIRD
---------- ---------- ---------- ----------
        10 KING       ***        ***
        10 ***        CLARK      ***
        10 ***        ***        MILLER
        20 FORD       ***        ***
        20 ***        SCOTT      ***
        20 ***        ***        JONES
        30 BLAKE      ***        ***
        30 ***        ALLEN      ***
        30 ***        ***        TURNER

9 rows selected.

SQL> cl scr

SQL> SELECT
  2   DECODE(RN,
```

```
  3               1, Ename,
  4               2, Ename,
  5               3, Ename,
  6                     'Rest'
  7               ),
  8   SUM(SAL)
  9  FROM (
 10   SELECT
 11   ROW_NUMBER()
 12   OVER(ORDER BY Sal DESC) RN,
 13   Ename,
 14   SAL
 15               FROM EMP
 16             )
 17  GROUP BY
 18  DECODE(RN,
 19         1, ENAME,
 20         2, ENAME,
 21         3, ENAME,
 22               'Rest'
 23         )
 24  ORDER BY 2;

DECODE(RN,   SUM(SAL)
---------- ----------
FORD             3000
SCOTT            3000
KING             5000
Rest            18025

SQL> cl scr

SQL> SELECT
  2   NumRow,
  3   Deptno,
  4   Sal,
  5   MAX(Total)
  6   OVER() Rest
  7   FROM (
  8               SELECT
  9                     NumRow,
 10                     Deptno,
 11                     Sal,
 12                     SUM(Sal)
 13               OVER (ORDER BY NumRow
 14                           RANGE BETWEEN 3 FOLLOWING AND
 15                           UNBOUNDED FOLLOWING) Total
 16   FROM
 17   (SELECT
 18             Empno,
 19             Deptno,
 20             Sal,
 21             SUM(Sal) OVER (ORDER BY Empno) Cumulative,
 22             DENSE_RANK() OVER (ORDER BY Sal DESC) NumRow
 23        FROM Emp) B)
 24  WHERE NumRow <= 3;
```

```
    NUMROW     DEPTNO        SAL       REST
---------- ---------- ---------- ----------
         1         10       5000      15050
         2         20       3000      15050
         2         20       3000      15050
         3         20       2975      15050

SQL> cl scr

SQL> SELECT Ename, Job, Comm
  2  FROM Emp
  3  WHERE Job = 'CLERK';

ENAME      JOB              COMM
---------- --------- ----------
JAMES      CLERK
SMITH      CLERK
ADAMS      CLERK
MILLER     CLERK
```