Database Management System

Lab 03

Data retrieval operations in SQL using join operations

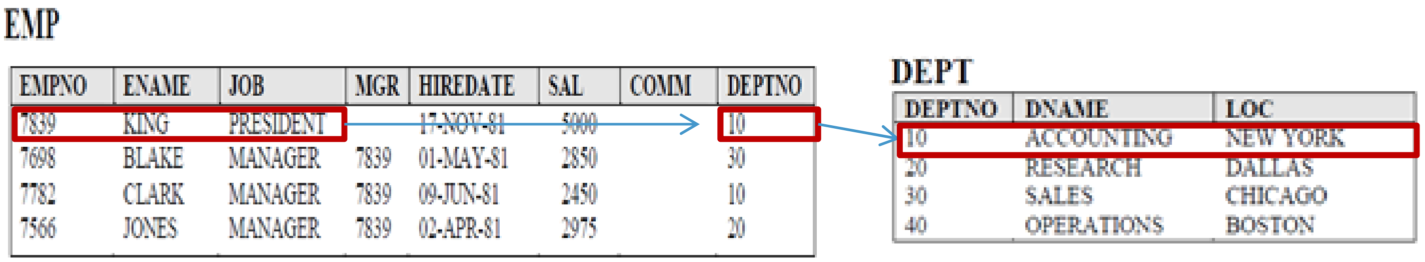
Introduction

In lab session 2, we learned different ways to retrieve data from a single table. However, we frequently need data from more than one tables

For example, suppose we need a report that displays

Employee id	Name	job	Department Name

The first three attributes are present in EMP table where as the last one is in DEPT table.



EMP

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7839	KING	PRESIDENT		17-NOV-81	5000		10
7698	BLAKE	MANAGER	7839	01-MAY-81	2850		30
7782	CLARK	MANAGER	7839	09-JUN-81	2450		10
7566	JONES	MANAGER	7839	02-APR-81	2975		20

DEPT

DEPTNO	DNAME	LOC
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATIONS	BOSTON

Cartesian Product(x)

Definition

One row of a first table into all rows of second table. Basically it will provide all possible rows combinations in 2 tables. It is represented by a symbol (X)

Examples:

Lets take example of 2 tables made by ourselves

Student		
Student_ID	Student_Name	Student_courseID
01	Usama	01
02	Aisha	02
03	Ali	02

Course	
Course_ID	Course_Name
01	DBMS
02	CCN

Cartesian Product(x)

Now Cartesian product of two tables will be written as :
Student **X** Course

Output rows would be

Student_ID	Student_Name	Student_courseID	Course_ID	Course_Name
01	Usama	01	01	DBMS
02	Aisha	02	01	DBMS
03	Ali	02	01	DBMS
01	Usama	01	02	CCN
02	Aisha	02	02	CCN
03	Ali	02	02	CCN

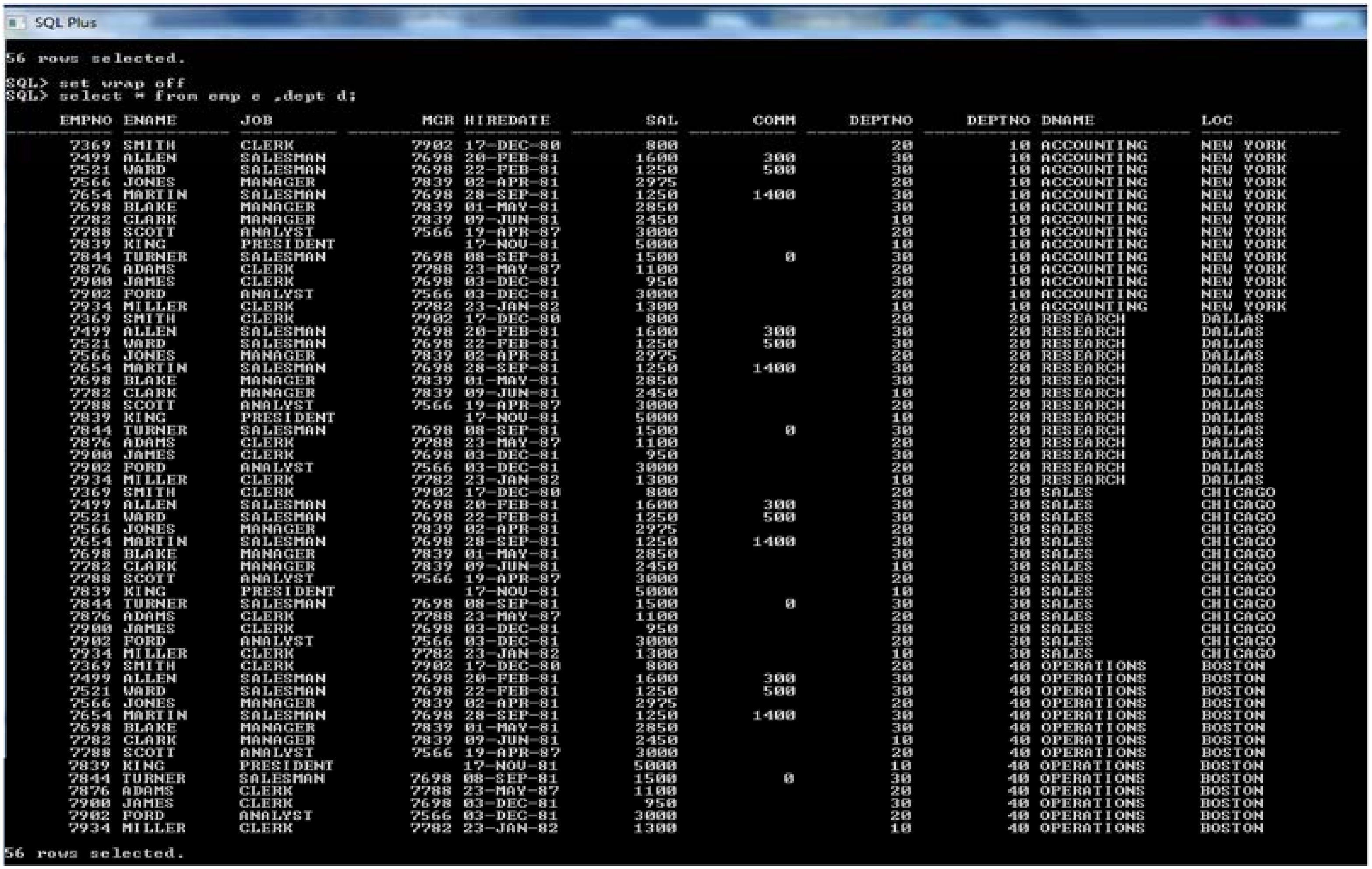
First table all rows with second table first row then First table all rows with second table Second row and so on …

Now Find out the caretesian product of ***Emp*** and ***Dept*** table after writing following command on your screen

```
set wrap off
```

This command makes your data properly wrapped

Cartesian Product(x)



```
56 rows selected.

SQL> set wrap off
SQL> select * from emp e ,dept d;

     EMPNO ENAME      JOB              MGR HIREDATE         SAL       COMM     DEPTNO     DEPTNO DNAME          LOC
---------- ---------- --------- ---------- --------- ---------- ---------- ---------- ---------- -------------- -------------
      7369 SMITH      CLERK           7902 17-DEC-80        800                    20         10 ACCOUNTING     NEW YORK
      7499 ALLEN      SALESMAN        7698 20-FEB-81       1600        300         30         10 ACCOUNTING     NEW YORK
      7521 WARD       SALESMAN        7698 22-FEB-81       1250        500         30         10 ACCOUNTING     NEW YORK
      7566 JONES      MANAGER         7839 02-APR-81       2975                    20         10 ACCOUNTING     NEW YORK
      7654 MARTIN     SALESMAN        7698 28-SEP-81       1250       1400         30         10 ACCOUNTING     NEW YORK
      7698 BLAKE      MANAGER         7839 01-MAY-81       2850                    30         10 ACCOUNTING     NEW YORK
      7782 CLARK      MANAGER         7839 09-JUN-81       2450                    10         10 ACCOUNTING     NEW YORK
      7788 SCOTT      ANALYST         7566 19-APR-87       3000                    20         10 ACCOUNTING     NEW YORK
      7839 KING       PRESIDENT            17-NOV-81       5000                    10         10 ACCOUNTING     NEW YORK
      7844 TURNER     SALESMAN        7698 08-SEP-81       1500          0         30         10 ACCOUNTING     NEW YORK
      7876 ADAMS      CLERK           7788 23-MAY-87       1100                    20         10 ACCOUNTING     NEW YORK
      7900 JAMES      CLERK           7698 03-DEC-81        950                    30         10 ACCOUNTING     NEW YORK
      7902 FORD       ANALYST         7566 03-DEC-81       3000                    20         10 ACCOUNTING     NEW YORK
      7934 MILLER     CLERK           7782 23-JAN-82       1300                    10         10 ACCOUNTING     NEW YORK
      7369 SMITH      CLERK           7902 17-DEC-80        800                    20         20 RESEARCH       DALLAS
      7499 ALLEN      SALESMAN        7698 20-FEB-81       1600        300         30         20 RESEARCH       DALLAS
      7521 WARD       SALESMAN        7698 22-FEB-81       1250        500         30         20 RESEARCH       DALLAS
      7566 JONES      MANAGER         7839 02-APR-81       2975                    20         20 RESEARCH       DALLAS
      7654 MARTIN     SALESMAN        7698 28-SEP-81       1250       1400         30         20 RESEARCH       DALLAS
      7698 BLAKE      MANAGER         7839 01-MAY-81       2850                    30         20 RESEARCH       DALLAS
      7782 CLARK      MANAGER         7839 09-JUN-81       2450                    10         20 RESEARCH       DALLAS
      7788 SCOTT      ANALYST         7566 19-APR-87       3000                    20         20 RESEARCH       DALLAS
      7839 KING       PRESIDENT            17-NOV-81       5000                    10         20 RESEARCH       DALLAS
      7844 TURNER     SALESMAN        7698 08-SEP-81       1500          0         30         20 RESEARCH       DALLAS
      7876 ADAMS      CLERK           7788 23-MAY-87       1100                    20         20 RESEARCH       DALLAS
      7900 JAMES      CLERK           7698 03-DEC-81        950                    30         20 RESEARCH       DALLAS
      7902 FORD       ANALYST         7566 03-DEC-81       3000                    20         20 RESEARCH       DALLAS
      7934 MILLER     CLERK           7782 23-JAN-82       1300                    10         20 RESEARCH       DALLAS
      7369 SMITH      CLERK           7902 17-DEC-80        800                    20         30 SALES          CHICAGO
      7499 ALLEN      SALESMAN        7698 20-FEB-81       1600        300         30         30 SALES          CHICAGO
      7521 WARD       SALESMAN        7698 22-FEB-81       1250        500         30         30 SALES          CHICAGO
      7566 JONES      MANAGER         7839 02-APR-81       2975                    20         30 SALES          CHICAGO
      7654 MARTIN     SALESMAN        7698 28-SEP-81       1250       1400         30         30 SALES          CHICAGO
      7698 BLAKE      MANAGER         7839 01-MAY-81       2850                    30         30 SALES          CHICAGO
      7782 CLARK      MANAGER         7839 09-JUN-81       2450                    10         30 SALES          CHICAGO
      7788 SCOTT      ANALYST         7566 19-APR-87       3000                    20         30 SALES          CHICAGO
      7839 KING       PRESIDENT            17-NOV-81       5000                    10         30 SALES          CHICAGO
      7844 TURNER     SALESMAN        7698 08-SEP-81       1500          0         30         30 SALES          CHICAGO
      7876 ADAMS      CLERK           7788 23-MAY-87       1100                    20         30 SALES          CHICAGO
      7900 JAMES      CLERK           7698 03-DEC-81        950                    30         30 SALES          CHICAGO
      7902 FORD       ANALYST         7566 03-DEC-81       3000                    20         30 SALES          CHICAGO
      7934 MILLER     CLERK           7782 23-JAN-82       1300                    10         30 SALES          CHICAGO
      7369 SMITH      CLERK           7902 17-DEC-80        800                    20         40 OPERATIONS     BOSTON
      7499 ALLEN      SALESMAN        7698 20-FEB-81       1600        300         30         40 OPERATIONS     BOSTON
      7521 WARD       SALESMAN        7698 22-FEB-81       1250        500         30         40 OPERATIONS     BOSTON
      7566 JONES      MANAGER         7839 02-APR-81       2975                    20         40 OPERATIONS     BOSTON
      7654 MARTIN     SALESMAN        7698 28-SEP-81       1250       1400         30         40 OPERATIONS     BOSTON
      7698 BLAKE      MANAGER         7839 01-MAY-81       2850                    30         40 OPERATIONS     BOSTON
      7782 CLARK      MANAGER         7839 09-JUN-81       2450                    10         40 OPERATIONS     BOSTON
      7788 SCOTT      ANALYST         7566 19-APR-87       3000                    20         40 OPERATIONS     BOSTON
      7839 KING       PRESIDENT            17-NOV-81       5000                    10         40 OPERATIONS     BOSTON
      7844 TURNER     SALESMAN        7698 08-SEP-81       1500          0         30         40 OPERATIONS     BOSTON
      7876 ADAMS      CLERK           7788 23-MAY-87       1100                    20         40 OPERATIONS     BOSTON
      7900 JAMES      CLERK           7698 03-DEC-81        950                    30         40 OPERATIONS     BOSTON
      7902 FORD       ANALYST         7566 03-DEC-81       3000                    20         40 OPERATIONS     BOSTON
      7934 MILLER     CLERK           7782 23-JAN-82       1300                    10         40 OPERATIONS     BOSTON

56 rows selected.
```

Types of Joins

1. **Inner-Join/Equi-Join**

   If the join contains an equality condition, it is called equi-join.

Example:

We discussed this example in lab 02 if you remember

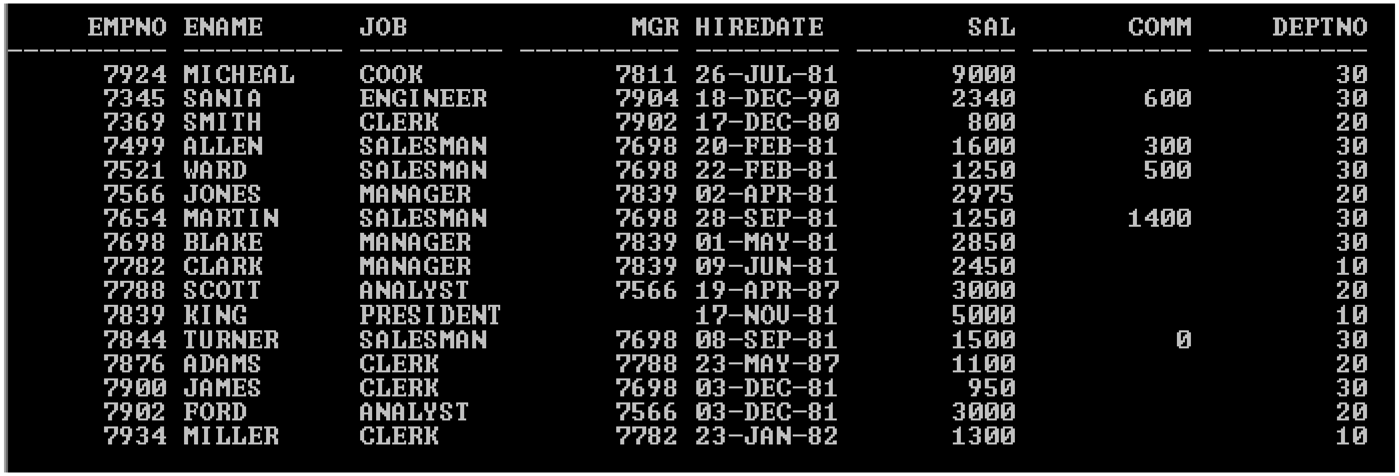
To retrieve the employee name, their job and department name, we need to extract data from two tables, EMP and DEPT. This type of join is called *Equi join* that is values in the DEPTNO column must be equal in both tables. *Equi* join is also called *simple join* or *inner join*.

```
SELECT E.ENAME, E.JOB, D.DNAME
FROM EMP E,DEPT D
WHERE E.DEPTNO=D.DEPTNO;
```

Types of Joins

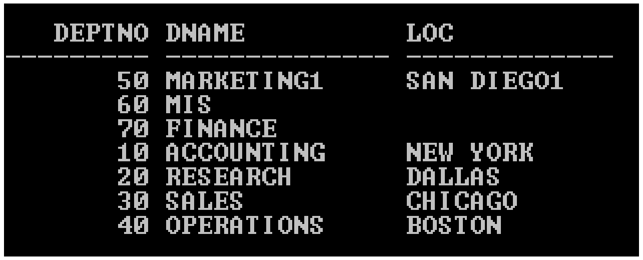
Have you notice one thing? By making a equi join few rows of **department table** that are not matching with any of the **employee table’s** department no are not becoming the part of our output.

Employee Table



```
     EMPNO ENAME      JOB              MGR HIREDATE         SAL       COMM     DEPTNO
---------- ---------- --------- ---------- --------- ---------- ---------- ----------
      7924 MICHEAL    COOK            7811 26-JUL-81       9000                    30
      7345 SANIA      ENGINEER        7904 18-DEC-90       2340        600         30
      7369 SMITH      CLERK           7902 17-DEC-80        800                    20
      7499 ALLEN      SALESMAN        7698 20-FEB-81       1600        300         30
      7521 WARD       SALESMAN        7698 22-FEB-81       1250        500         30
      7566 JONES      MANAGER         7839 02-APR-81       2975                    20
      7654 MARTIN     SALESMAN        7698 28-SEP-81       1250       1400         30
      7698 BLAKE      MANAGER         7839 01-MAY-81       2850                    30
      7782 CLARK      MANAGER         7839 09-JUN-81       2450                    10
      7788 SCOTT      ANALYST         7566 19-APR-87       3000                    20
      7839 KING       PRESIDENT            17-NOV-81       5000                    10
      7844 TURNER     SALESMAN        7698 08-SEP-81       1500          0         30
      7876 ADAMS      CLERK           7788 23-MAY-87       1100                    20
      7900 JAMES      CLERK           7698 03-DEC-81        950                    30
      7902 FORD       ANALYST         7566 03-DEC-81       3000                    20
      7934 MILLER     CLERK           7782 23-JAN-82       1300                    10
```

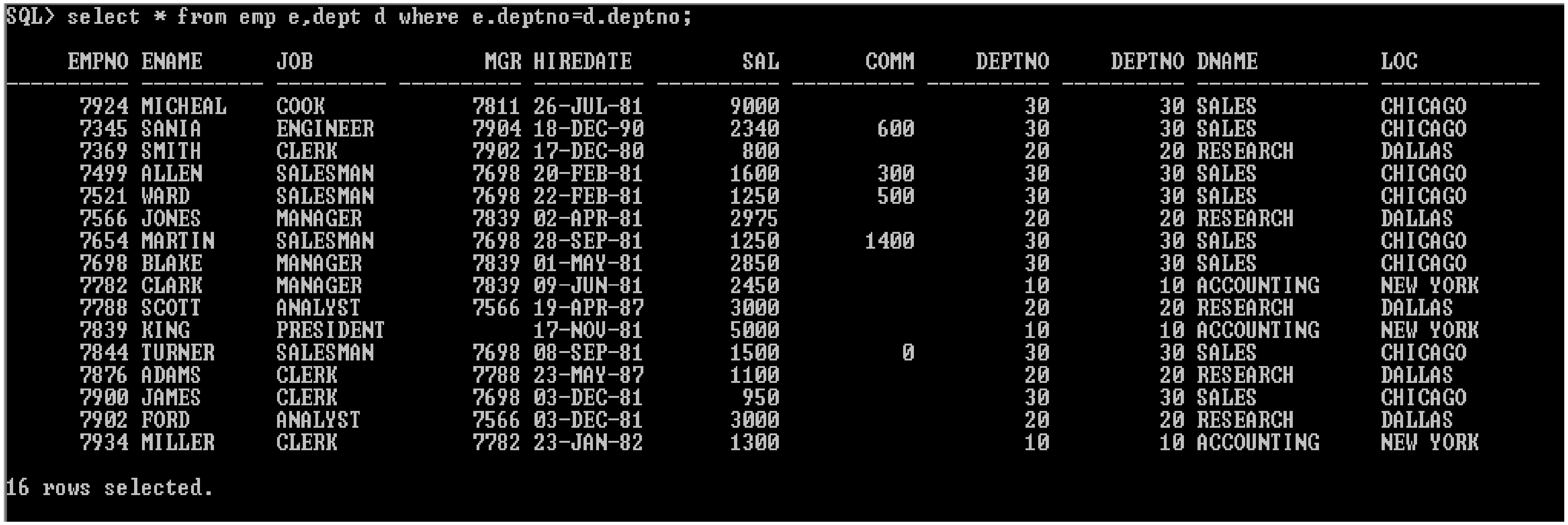
Department Table



```
   DEPTNO DNAME          LOC
--------- -------------- -------------
       50 MARKETING1     SAN DIEGO1
       60 MIS
       70 FINANCE
       10 ACCOUNTING     NEW YORK
       20 RESEARCH       DALLAS
       30 SALES          CHICAGO
       40 OPERATIONS     BOSTON
```

Types of Joins

Inner Join Output is



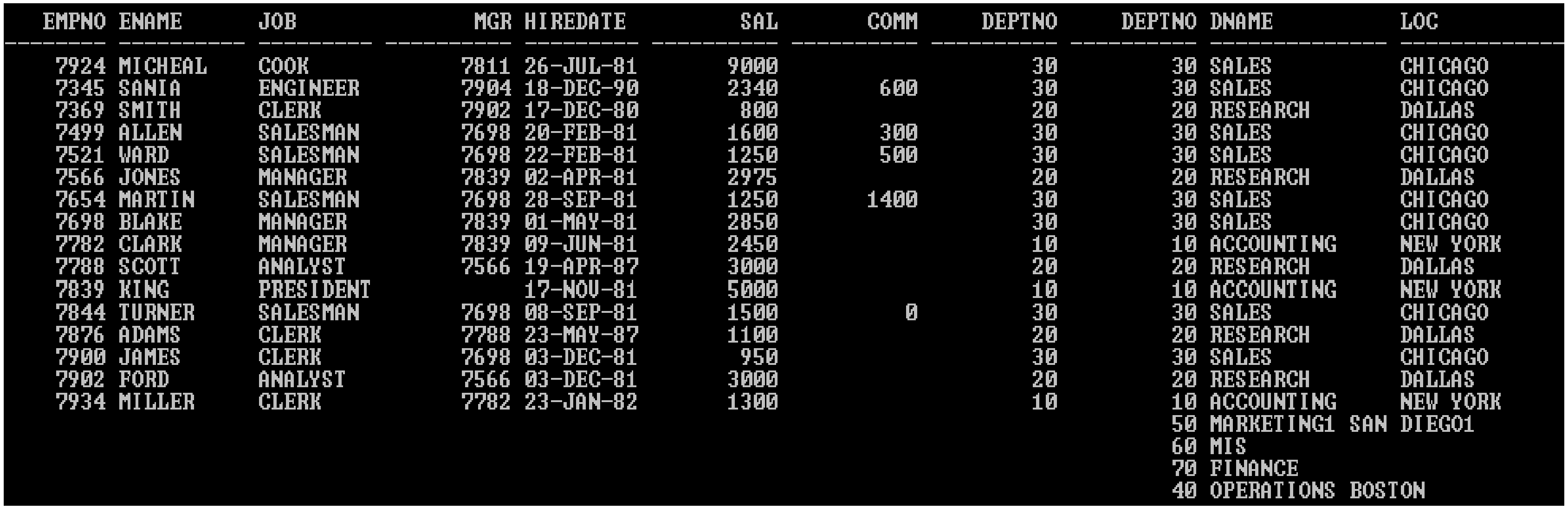
```
SQL> select * from emp e,dept d where e.deptno=d.deptno;

     EMPNO ENAME      JOB              MGR HIREDATE         SAL       COMM     DEPTNO     DEPTNO DNAME          LOC
---------- ---------- --------- ---------- --------- ---------- ---------- ---------- ---------- -------------- -------------
      7924 MICHEAL    COOK            7811 26-JUL-81       9000                    30         30 SALES          CHICAGO
      7345 SANIA      ENGINEER        7904 18-DEC-90       2340        600         30         30 SALES          CHICAGO
      7369 SMITH      CLERK           7902 17-DEC-80        800                    20         20 RESEARCH       DALLAS
      7499 ALLEN      SALESMAN        7698 20-FEB-81       1600        300         30         30 SALES          CHICAGO
      7521 WARD       SALESMAN        7698 22-FEB-81       1250        500         30         30 SALES          CHICAGO
      7566 JONES      MANAGER         7839 02-APR-81       2975                    20         20 RESEARCH       DALLAS
      7654 MARTIN     SALESMAN        7698 28-SEP-81       1250       1400         30         30 SALES          CHICAGO
      7698 BLAKE      MANAGER         7839 01-MAY-81       2850                    30         30 SALES          CHICAGO
      7782 CLARK      MANAGER         7839 09-JUN-81       2450                    10         10 ACCOUNTING     NEW YORK
      7788 SCOTT      ANALYST         7566 19-APR-87       3000                    20         20 RESEARCH       DALLAS
      7839 KING       PRESIDENT            17-NOV-81       5000                    10         10 ACCOUNTING     NEW YORK
      7844 TURNER     SALESMAN        7698 08-SEP-81       1500          0         30         30 SALES          CHICAGO
      7876 ADAMS      CLERK           7788 23-MAY-87       1100                    20         20 RESEARCH       DALLAS
      7900 JAMES      CLERK           7698 03-DEC-81        950                    30         30 SALES          CHICAGO
      7902 FORD       ANALYST         7566 03-DEC-81       3000                    20         20 RESEARCH       DALLAS
      7934 MILLER     CLERK           7782 23-JAN-82       1300                    10         10 ACCOUNTING     NEW YORK

16 rows selected.
```

Can I say this those departments that are not matching with the Employee table or that are missing in the employee table are not becoming the part of our output?

Answer is Yes. And in real time most of the time we need to see whole data even if its not matching with any one of the table and for that case we use a join named as **OUTER JOIN**

Types of Joins

In actual whole Data is as



```
   EMPNO ENAME      JOB              MGR HIREDATE         SAL       COMM     DEPTNO     DEPTNO DNAME          LOC
-------- ---------- --------- ---------- --------- ---------- ---------- ---------- ---------- -------------- -------------
    7924 MICHEAL    COOK            7811 26-JUL-81       9000                    30         30 SALES          CHICAGO
    7345 SANIA      ENGINEER        7904 18-DEC-90       2340        600         30         30 SALES          CHICAGO
    7369 SMITH      CLERK           7902 17-DEC-80        800                    20         20 RESEARCH       DALLAS
    7499 ALLEN      SALESMAN        7698 20-FEB-81       1600        300         30         30 SALES          CHICAGO
    7521 WARD       SALESMAN        7698 22-FEB-81       1250        500         30         30 SALES          CHICAGO
    7566 JONES      MANAGER         7839 02-APR-81       2975                    20         20 RESEARCH       DALLAS
    7654 MARTIN     SALESMAN        7698 28-SEP-81       1250       1400         30         30 SALES          CHICAGO
    7698 BLAKE      MANAGER         7839 01-MAY-81       2850                    30         30 SALES          CHICAGO
    7782 CLARK      MANAGER         7839 09-JUN-81       2450                    10         10 ACCOUNTING     NEW YORK
    7788 SCOTT      ANALYST         7566 19-APR-87       3000                    20         20 RESEARCH       DALLAS
    7839 KING       PRESIDENT            17-NOV-81       5000                    10         10 ACCOUNTING     NEW YORK
    7844 TURNER     SALESMAN        7698 08-SEP-81       1500          0         30         30 SALES          CHICAGO
    7876 ADAMS      CLERK           7788 23-MAY-87       1100                    20         20 RESEARCH       DALLAS
    7900 JAMES      CLERK           7698 03-DEC-81        950                    30         30 SALES          CHICAGO
    7902 FORD       ANALYST         7566 03-DEC-81       3000                    20         20 RESEARCH       DALLAS
    7934 MILLER     CLERK           7782 23-JAN-82       1300                    10         10 ACCOUNTING     NEW YORK
                                                                                            50 MARKETING1 SAN DIEGO1
                                                                                            60 MIS
                                                                                            70 FINANCE
                                                                                            40 OPERATIONS BOSTON
```

Types of Joins

2. Outer-Join

A join between two tables that returns the results of the inner join as well as unmatched rows in the **left** or unmatched rows in the **right** tables is a ***left*** or ***right*** outer join respectively.

a) Left Outer Join

A join between two tables that returns the results of the inner join as well as unmatched rows in the **left table**

Example:

```
SELECT E.ENAME, D.DEPTNO, D.DNAME
FROM EMP E LEFT OUTER JOIN DEPT D
ON (E.DEPTNO = D.DEPTNO);
```

Display left table's All rows that are not even matching with the right table

Employee is Left Table & Dept Is Right Table

As All rows of Employee table contains such a department that is present in a department table so above query's result will be same as inner join

Alternate Syntax

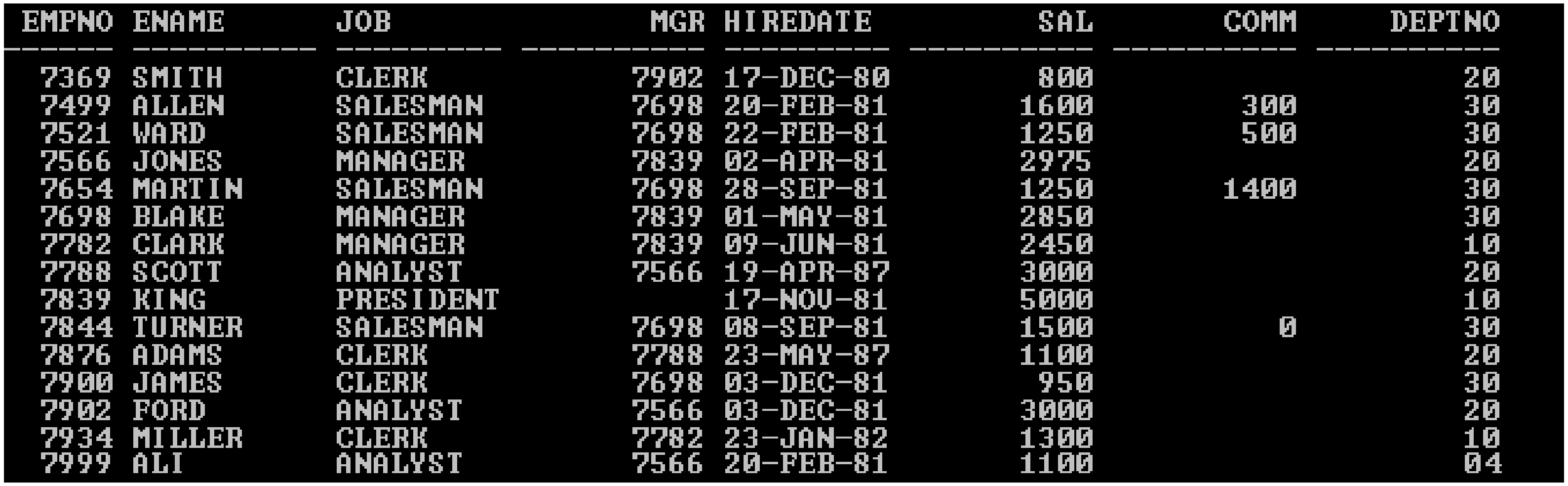
```
SELECT E.ENAME, D.DEPTNO,D.DNAME
FROM EMP E, DEPT D
WHERE E.DEPTNO = D.DEPTNO(+);
```

Plus is on right side show this is a left Outer join & can be convent as we are showing unmatched rows as blank in department table

Types of Joins

a) Left Outer Join(Cont.)

Just For Learning keeping integrity constraints a side for few minutes let say I have inserted a new row in employee table For Employee ALI whose Dept no is 04



```
 EMPNO ENAME      JOB              MGR HIREDATE         SAL       COMM     DEPTNO
------ ---------- --------- ---------- --------- ---------- ---------- ----------
  7369 SMITH      CLERK           7902 17-DEC-80        800                    20
  7499 ALLEN      SALESMAN        7698 20-FEB-81       1600        300         30
  7521 WARD       SALESMAN        7698 22-FEB-81       1250        500         30
  7566 JONES      MANAGER         7839 02-APR-81       2975                    20
  7654 MARTIN     SALESMAN        7698 28-SEP-81       1250       1400         30
  7698 BLAKE      MANAGER         7839 01-MAY-81       2850                    30
  7782 CLARK      MANAGER         7839 09-JUN-81       2450                    10
  7788 SCOTT      ANALYST         7566 19-APR-87       3000                    20
  7839 KING       PRESIDENT            17-NOV-81       5000                    10
  7844 TURNER     SALESMAN        7698 08-SEP-81       1500          0         30
  7876 ADAMS      CLERK           7788 23-MAY-87       1100                    20
  7900 JAMES      CLERK           7698 03-DEC-81        950                    30
  7902 FORD       ANALYST         7566 03-DEC-81       3000                    20
  7934 MILLER     CLERK           7782 23-JAN-82       1300                    10
  7999 ALI        ANALYST         7566 20-FEB-81       1100                    04
```

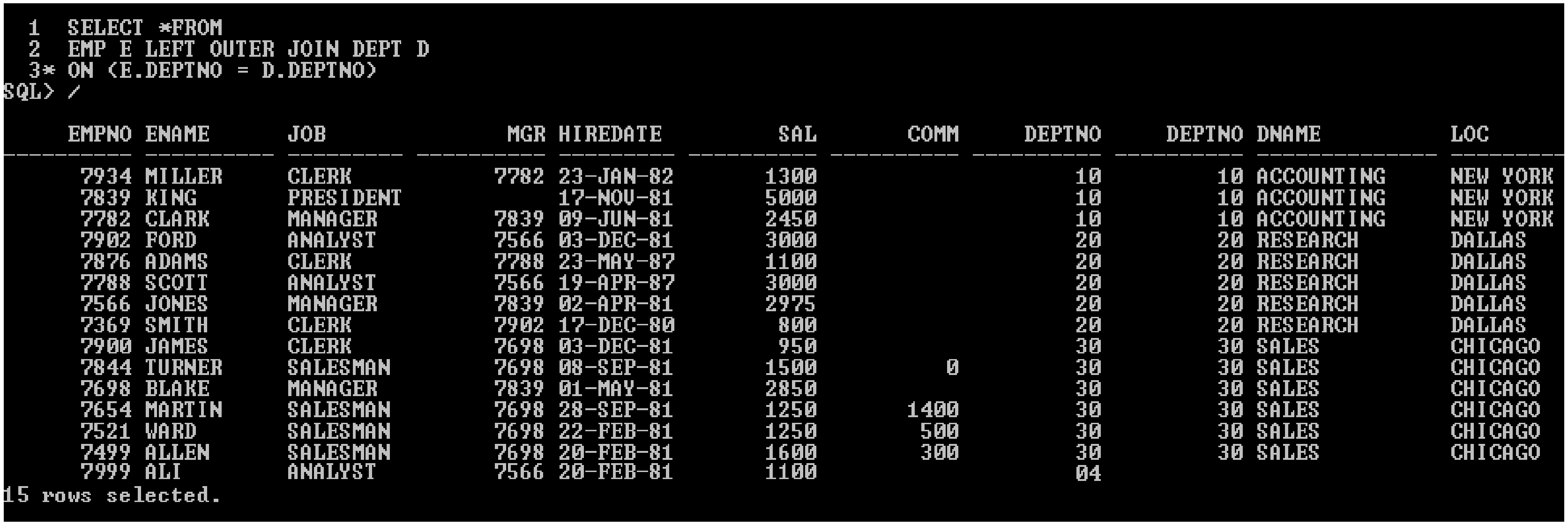
Now simple inner join will return only matched rows so output of inner join will be same after and before row addition. But that join is missing lefts table one row that is not matching with Right table any row if I will write the same Left Outer Join query as:

Types of Joins

a) Left Outer Join(Cont.)

So Missing information of ***Ali*** in the Left table will now be visible from following query:

```
SELECT *FROM
EMP E LEFT OUTER JOIN DEPT D
ON (E.DEPTNO = D.DEPTNO);
```



```
  1  SELECT *FROM
  2  EMP E LEFT OUTER JOIN DEPT D
  3* ON (E.DEPTNO = D.DEPTNO)
SQL> /

     EMPNO ENAME      JOB              MGR HIREDATE         SAL       COMM     DEPTNO     DEPTNO DNAME          LOC
---------- ---------- --------- ---------- --------- ---------- ---------- ---------- ---------- -------------- -------------
      7934 MILLER     CLERK           7782 23-JAN-82       1300                    10         10 ACCOUNTING     NEW YORK
      7839 KING       PRESIDENT            17-NOV-81       5000                    10         10 ACCOUNTING     NEW YORK
      7782 CLARK      MANAGER         7839 09-JUN-81       2450                    10         10 ACCOUNTING     NEW YORK
      7902 FORD       ANALYST         7566 03-DEC-81       3000                    20         20 RESEARCH       DALLAS
      7876 ADAMS      CLERK           7788 23-MAY-87       1100                    20         20 RESEARCH       DALLAS
      7788 SCOTT      ANALYST         7566 19-APR-87       3000                    20         20 RESEARCH       DALLAS
      7566 JONES      MANAGER         7839 02-APR-81       2975                    20         20 RESEARCH       DALLAS
      7369 SMITH      CLERK           7902 17-DEC-80        800                    20         20 RESEARCH       DALLAS
      7900 JAMES      CLERK           7698 03-DEC-81        950                    30         30 SALES          CHICAGO
      7844 TURNER     SALESMAN        7698 08-SEP-81       1500          0         30         30 SALES          CHICAGO
      7698 BLAKE      MANAGER         7839 01-MAY-81       2850                    30         30 SALES          CHICAGO
      7654 MARTIN     SALESMAN        7698 28-SEP-81       1250       1400         30         30 SALES          CHICAGO
      7521 WARD       SALESMAN        7698 22-FEB-81       1250        500         30         30 SALES          CHICAGO
      7499 ALLEN      SALESMAN        7698 20-FEB-81       1600        300         30         30 SALES          CHICAGO
      7999 ALI        ANALYST         7566 20-FEB-81       1100                    04
15 rows selected.
```

Types of Joins

b) Right Outer Join:

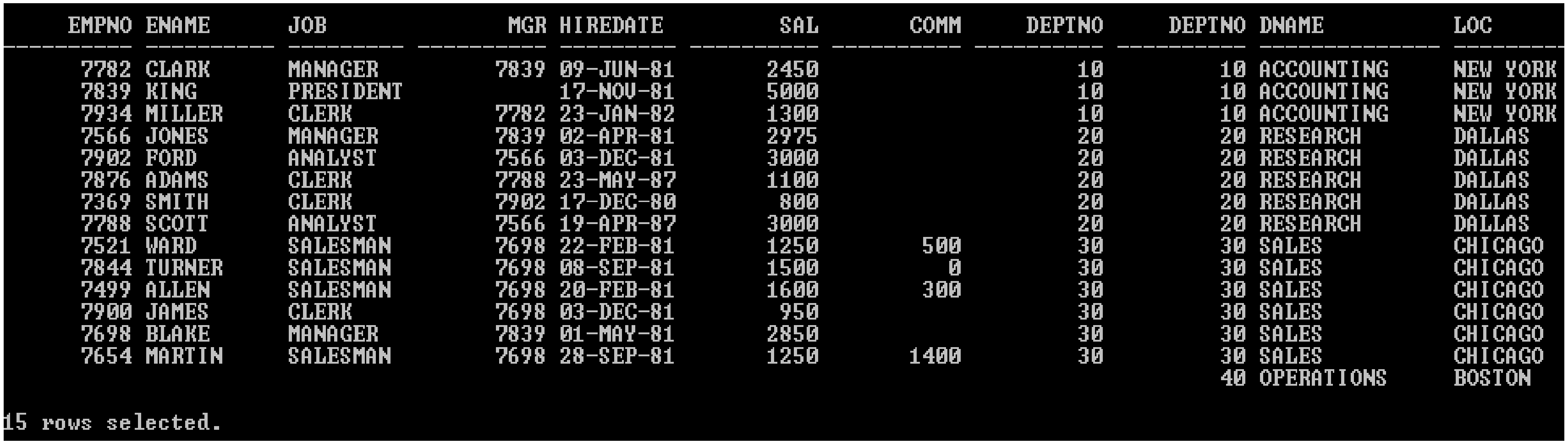
A join between two tables that returns the results of the inner join as well as unmatched rows in the **Right table**

Example:

```
SELECT *FROM
EMP E RIGHT OUTER JOIN DEPT D
ON (E.DEPTNO = D.DEPTNO);
```

Display Right table's All rows that are not even matching with the Left table

Employee is Left Table & Dept Is Right Table



```
     EMPNO ENAME      JOB              MGR HIREDATE         SAL       COMM     DEPTNO     DEPTNO DNAME          LOC
---------- ---------- --------- ---------- --------- ---------- ---------- ---------- ---------- -------------- ---------
      7782 CLARK      MANAGER         7839 09-JUN-81       2450                    10         10 ACCOUNTING     NEW YORK
      7839 KING       PRESIDENT            17-NOV-81       5000                    10         10 ACCOUNTING     NEW YORK
      7934 MILLER     CLERK           7782 23-JAN-82       1300                    10         10 ACCOUNTING     NEW YORK
      7566 JONES      MANAGER         7839 02-APR-81       2975                    20         20 RESEARCH       DALLAS
      7902 FORD       ANALYST         7566 03-DEC-81       3000                    20         20 RESEARCH       DALLAS
      7876 ADAMS      CLERK           7788 23-MAY-87       1100                    20         20 RESEARCH       DALLAS
      7369 SMITH      CLERK           7902 17-DEC-80        800                    20         20 RESEARCH       DALLAS
      7788 SCOTT      ANALYST         7566 19-APR-87       3000                    20         20 RESEARCH       DALLAS
      7521 WARD       SALESMAN        7698 22-FEB-81       1250        500         30         30 SALES          CHICAGO
      7844 TURNER     SALESMAN        7698 08-SEP-81       1500          0         30         30 SALES          CHICAGO
      7499 ALLEN      SALESMAN        7698 20-FEB-81       1600        300         30         30 SALES          CHICAGO
      7900 JAMES      CLERK           7698 03-DEC-81        950                    30         30 SALES          CHICAGO
      7698 BLAKE      MANAGER         7839 01-MAY-81       2850                    30         30 SALES          CHICAGO
      7654 MARTIN     SALESMAN        7698 28-SEP-81       1250       1400         30         30 SALES          CHICAGO
                                                                                              40 OPERATIONS     BOSTON

15 rows selected.
```

As All rows of Department table was not matching with departments in Employee table so its deptno = 40 was not retrieving by simple inner join.

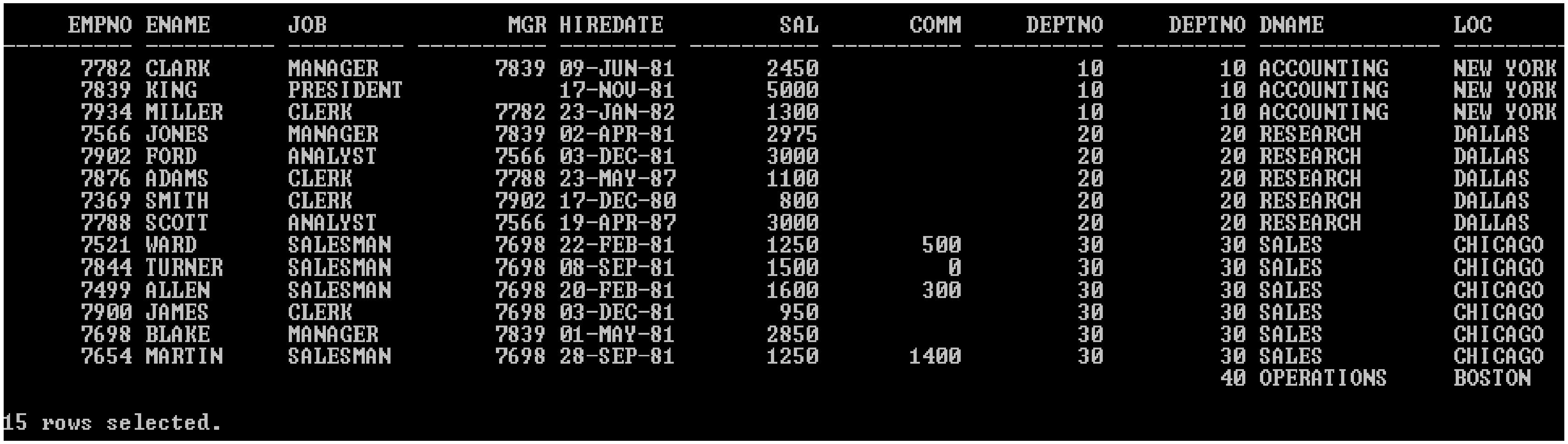
Types of Joins

b) Right Outer Join(cont.)

Alternate Syntax

```
SELECT E.ENAME, D.DEPTNO,D.DNAME
FROM EMP E, DEPT D
WHERE E.DEPTNO(+) = D.DEPTNO;
```

Plus is on left side show this is a Right Outer join and can be Convent that we are showing unmatched rows as blank in Employee table



```
     EMPNO ENAME      JOB              MGR HIREDATE         SAL       COMM     DEPTNO     DEPTNO DNAME          LOC
---------- ---------- --------- ---------- --------- ---------- ---------- ---------- ---------- -------------- -------------
      7782 CLARK      MANAGER         7839 09-JUN-81       2450                    10         10 ACCOUNTING     NEW YORK
      7839 KING       PRESIDENT            17-NOV-81       5000                    10         10 ACCOUNTING     NEW YORK
      7934 MILLER     CLERK           7782 23-JAN-82       1300                    10         10 ACCOUNTING     NEW YORK
      7566 JONES      MANAGER         7839 02-APR-81       2975                    20         20 RESEARCH       DALLAS
      7902 FORD       ANALYST         7566 03-DEC-81       3000                    20         20 RESEARCH       DALLAS
      7876 ADAMS      CLERK           7788 23-MAY-87       1100                    20         20 RESEARCH       DALLAS
      7369 SMITH      CLERK           7902 17-DEC-80        800                    20         20 RESEARCH       DALLAS
      7788 SCOTT      ANALYST         7566 19-APR-87       3000                    20         20 RESEARCH       DALLAS
      7521 WARD       SALESMAN        7698 22-FEB-81       1250        500         30         30 SALES          CHICAGO
      7844 TURNER     SALESMAN        7698 08-SEP-81       1500          0         30         30 SALES          CHICAGO
      7499 ALLEN      SALESMAN        7698 20-FEB-81       1600        300         30         30 SALES          CHICAGO
      7900 JAMES      CLERK           7698 03-DEC-81        950                    30         30 SALES          CHICAGO
      7698 BLAKE      MANAGER         7839 01-MAY-81       2850                    30         30 SALES          CHICAGO
      7654 MARTIN     SALESMAN        7698 28-SEP-81       1250       1400         30         30 SALES          CHICAGO
                                                                                                40 OPERATIONS     BOSTON

15 rows selected.
```

Types of Joins

c) Full Outer Join

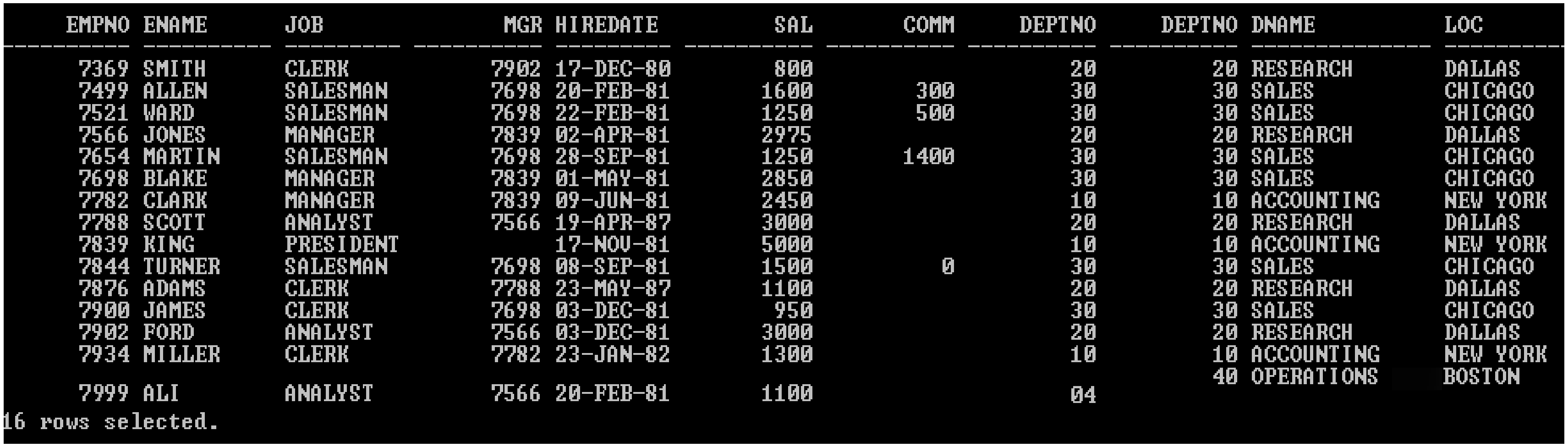
The FULL OUTER JOIN keyword combines the result of both LEFT and RIGHT joins.

Example:

```
SELECT *FROM
EMP E FULL OUTER JOIN DEPT D
ON (E.DEPTNO = D.DEPTNO);
```

Display Both table's All rows that are not even matching with the one another

Suppose my inserted row of Employee ***Ali*** is still present in a table then output of full outer join be



```
     EMPNO ENAME      JOB              MGR HIREDATE         SAL       COMM     DEPTNO     DEPTNO DNAME          LOC
---------- ---------- --------- ---------- --------- ---------- ---------- ---------- ---------- -------------- -------------
      7369 SMITH      CLERK           7902 17-DEC-80        800                    20         20 RESEARCH       DALLAS
      7499 ALLEN      SALESMAN        7698 20-FEB-81       1600        300         30         30 SALES          CHICAGO
      7521 WARD       SALESMAN        7698 22-FEB-81       1250        500         30         30 SALES          CHICAGO
      7566 JONES      MANAGER         7839 02-APR-81       2975                    20         20 RESEARCH       DALLAS
      7654 MARTIN     SALESMAN        7698 28-SEP-81       1250       1400         30         30 SALES          CHICAGO
      7698 BLAKE      MANAGER         7839 01-MAY-81       2850                    30         30 SALES          CHICAGO
      7782 CLARK      MANAGER         7839 09-JUN-81       2450                    10         10 ACCOUNTING     NEW YORK
      7788 SCOTT      ANALYST         7566 19-APR-87       3000                    20         20 RESEARCH       DALLAS
      7839 KING       PRESIDENT            17-NOV-81       5000                    10         10 ACCOUNTING     NEW YORK
      7844 TURNER     SALESMAN        7698 08-SEP-81       1500          0         30         30 SALES          CHICAGO
      7876 ADAMS      CLERK           7788 23-MAY-87       1100                    20         20 RESEARCH       DALLAS
      7900 JAMES      CLERK           7698 03-DEC-81        950                    30         30 SALES          CHICAGO
      7902 FORD       ANALYST         7566 03-DEC-81       3000                    20         20 RESEARCH       DALLAS
      7934 MILLER     CLERK           7782 23-JAN-82       1300                    10         10 ACCOUNTING     NEW YORK
                                                                                              40 OPERATIONS     BOSTON

      7999 ALI        ANALYST         7566 20-FEB-81       1100                    04
16 rows selected.
```

Types of Joins

3. **Non-Equijoin**

   If the join contains inequality condition**(i.e: <>, >, <, BETWEEN, etc.)** it is called non-equijoin.

Example:

Display employee name, salary and Grades of Employee.
Hint: Every grade have a specific Salary Range

```
SELECT E.ENAME, E.SAL, S.GRADE
FROM EMP E, SALGRADE S
WHERE E.SAL
BETWEEN S.LOSAL AND S.HISAL;
```

No Equality Condition in the Join of 2 tables

Types of Joins

4. **Self join**

A **self-join** is a query in which a table is joined (compared) to itself.

Example:

We have already verbally discuss this example in lab 01
Print Employee name & employee’s manager name. For this we need to join the EMP table to itself(perform a *self join*)

```
SELECT WORKER.ENAME,MANAGER.ENAME as “Manager”
FROM EMP WORKER, EMP MANAGER
WHERE WORKER.MGR = MANAGER.EMPNO;
```

To Print Name of Manager we used Self Join