

Name: Sarthak Jain
Programme: B.Tech CSE (Spec. AI&ML)
Course: Advanced Database Management Systems

LAB 4

Title: Use of Inbuilt functions and relational algebra operation

Objective: To understand the use of inbuilt function and relational algebra with sql query.

1. Create the following two tables (EMP and DEPT)

```
CREATE TABLE EMP(  
    EMPNO integer,  
    ENAME varchar(18),  
    JOB varchar(12),  
    MGR integer,  
    HIREDATE date,  
    SAL integer,  
    COMM integer,  
    DEPTNO integer  
);
```

The screenshot displays the Oracle Live SQL web interface. The top navigation bar includes a hamburger menu, the 'Live SQL' logo, and links for Feedback, Help, and a user profile. The left sidebar contains navigation options: Home, SQL Worksheet (selected), My Session, Schema, Quick SQL, My Scripts, My Tutorials, and Code Library. The main area is titled 'SQL Worksheet' and contains a text editor with the following SQL code:

```
1 CREATE TABLE EMP (  
2     EMPNO integer,  
3     ENAME varchar(18),  
4     JOB varchar(12),  
5     MGR integer,  
6     HIREDATE date,  
7     SAL integer,  
8     COMM integer,  
9     DEPTNO integer  
10 );
```

Below the editor, a message box states 'Table created.' The bottom of the interface features the Oracle logo, 'Integrated Cloud Applications & Platform Services' text, and a footer with copyright information, links to Oracle Learning Library, Ask Tom, Dev Gym, and Database Doc, and a note about the version (Live SQL 20.3.1, running Oracle Database 19c Enterprise Edition - 19.5.0.0.0) and the use of Oracle APEX.

```
CREATE TABLE DEPT(  
  DEPTNO integer,  
  DNAME varchar(16),  
  LOC varchar(16)  
);
```

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```
1 CREATE TABLE DEPT(  
2   DEPTNO integer,  
3   DNAME varchar(16),  
4   LOC varchar(16)  
5 );
```

Table created.

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^

* Inserting values *

```
INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, COMM, DEPTNO)
VALUES (7369, 'SMITH', 'CLERK', 7902, '17-DEC-80', 500, 800, 20);
```

```
INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, COMM, DEPTNO)
VALUES (7499, 'ALLEN', 'SALESMAN', 7698, '20-FEB-81', 1600, 300, 30);
```

```
INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, COMM, DEPTNO)
VALUES (7521, 'WARD', 'SALESMAN', 7698, '22-FEB-81', 1250, 500, 30);
```

```
INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, DEPTNO)
VALUES (7566, 'JONES', 'MANAGER', 7839, '02-APR-81', 2975, 20);
```

```
INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, COMM, DEPTNO)
VALUES (7654, 'MARTIN', 'SALESMAN', 7698, '28-SEP-81', 1250, 1400, 30);
```

```
INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, DEPTNO)
VALUES (7698, 'BLAKE', 'MANAGER', 7839, '01-MAY-81', 2850, 30);
```

```
INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, DEPTNO)
VALUES (7782, 'CLARK', 'MANAGER', 7839, '09-JUN-81', 2450, 10);
```

```
INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, DEPTNO)
VALUES (7788, 'SCOTT', 'ANALYST', 7566, '09-DEC-82', 3000, 20);
```

```
INSERT INTO EMP (EMPNO, ENAME, JOB, HIREDATE, SAL, DEPTNO)
VALUES (7839, 'KING', 'PRESIDENT', '17-NOV-81', 5000, 10);
```

```
INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, COMM, DEPTNO)
VALUES (7844, 'TURNER', 'SALESMAN', 7698, '08-SEP-81', 1500, 0, 30);
```

```
INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, DEPTNO)
VALUES (7876, 'ADAMS', 'CLERK', 7788, '12-JAN-83', 1100, 20);
```

```
INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, DEPTNO)
VALUES (7900, 'JAMES', 'CLERK', 7698, '03-DEC-81', 950, 30);
```

```
INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, DEPTNO)
VALUES (7902, 'FORD', 'ANALYST', 7566, '03-DEC-81', 3000, 20);
```

```
INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, DEPTNO)
VALUES (7934, 'MILLER', 'CLERK', 7782, '23-JAN-82', 1300, 10);
```

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```
23 INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, DEPTNO)
VALUES (7369, 'SCOTT', 'ANALYST', 7566, '09-DEC-82', 3000, 20);
24
25 INSERT INTO EMP (EMPNO, ENAME, JOB, HIREDATE, SAL, DEPTNO)
26 VALUES (7369, 'KING', 'PRESIDENT', '17-NOV-81', 5000, 10);
27
28 INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, COMM, DEPTNO)
29 VALUES (7369, 'TURNER', 'SALESMAN', 7698, '08-SEP-81', 1500, 0, 30);
30
31 INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, DEPTNO)
32 VALUES (7369, 'ADAMS', 'CLERK', 7788, '12-JAN-83', 1100, 20);
33
34 INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, DEPTNO)
35 VALUES (7369, 'JAMES', 'CLERK', 7698, '03-DEC-81', 950, 30);
36
37 INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, DEPTNO)
38 VALUES (7369, 'FORD', 'ANALYST', 7566, '03-DEC-81', 950, 30);
39
40 INSERT INTO EMP (EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, DEPTNO)
41 VALUES (7369, 'MILLER', 'CLERK', 7782, '23-JAN-82', 1300, 10);
42
```

1 row(s) inserted.

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```
1 SELECT * FROM EMP;
2
```

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	17-DEC-80	500	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	09-DEC-82	3000	-	20
7839	KING	PRESIDENT	-	17-NOV-81	5000	-	10
7844	TURNER	SALESMAN	7698	08-SEP-81	1500	0	30
7876	ADAMS	CLERK	7788	12-JAN-83	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

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INSERT INTO DEPT (DEPTNO, DNAME, LOC)
VALUES (10, 'ACCOUNTING', 'NEWYORK');

INSERT INTO DEPT (DEPTNO, DNAME, LOC)
VALUES (20, 'RESEARCH', 'DALLAS');

INSERT INTO DEPT (DEPTNO, DNAME, LOC)
VALUES (30, 'SALES', 'CHICAGO');

INSERT INTO DEPT (DEPTNO, DNAME, LOC)
VALUES (40, 'OPERATIONS', 'BOSTON');

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```
1 INSERT INTO DEPT (DEPTNO, DNAME, LOC)
2 VALUES (10, 'ACCOUNTING', 'NEWYORK');
3
4 INSERT INTO DEPT (DEPTNO, DNAME, LOC)
5 VALUES (20, 'RESEARCH', 'DALLAS');
6
7 INSERT INTO DEPT (DEPTNO, DNAME, LOC)
8 VALUES (30, 'SALES', 'CHICAGO');
9
10 INSERT INTO DEPT (DEPTNO, DNAME, LOC)
11 VALUES (40, 'OPERATIONS', 'BOSTON');
12
```

1 row(s) inserted.

1 row(s) inserted.

1 row(s) inserted.

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```
1 SELECT * FROM DEPT;
2
```

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

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Write the Nested Queries for the following queries.

1. List the details of the emps whose Salaries more than the employee BLAKE.

1.Solution.

```
SELECT * FROM EMP a_emp, EMP b_emp
WHERE a_emp.SAL > b_emp.SAL
AND b_emp.ENAME = 'BLAKE';
```

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```
1 SELECT * FROM EMP a_emp, EMP b_emp
2 WHERE a_emp.SAL > b_emp.SAL
3 AND b_emp.ENAME = 'BLAKE';
4
```

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO	EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7566	JONES	MANAGER	7839	02-APR-81	2975	-	20	7698	BLAKE	MANAGER	7839	01-MAY-81	2850	-	30
7788	SCOTT	ANALYST	7566	09-DEC-82	3000	-	20	7698	BLAKE	MANAGER	7839	01-MAY-81	2850	-	30
7839	KING	PRESIDENT	-	17-NOV-81	5000	-	10	7698	BLAKE	MANAGER	7839	01-MAY-81	2850	-	30
7902	FORD	ANALYST	7566	03-DEC-81	3000	-	20	7698	BLAKE	MANAGER	7839	01-MAY-81	2850	-	30

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2. List the emps whose Jobs are the same as ALLEN.

2.Solution.

```
SELECT * FROM EMP a_emp, EMP b_emp
WHERE a_emp.JOB = b_emp.JOB
AND b_emp.ENAME = 'ALLEN';
```

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```
1 SELECT * FROM EMP a_emp, EMP b_emp
2 WHERE a_emp.JOB = b_emp.JOB
3 AND b_emp.ENAME = 'ALLEN';
4
```

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO	EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30	7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7521	WARD	SALESMAN	7698	22-FEB-81	1250	500	30	7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7654	MARTIN	SALESMAN	7698	28-SEP-81	1250	1400	30	7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7844	TURNER	SALESMAN	7698	08-SEP-81	1500	0	30	7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30

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3. List the Emps whose Sal is same as FORD or SMITH in desc order of Names.

3.Solution.

```
SELECT * FROM EMP a_emp, EMP b_emp
WHERE a_emp.SAL = b_emp.SAL
AND a_emp.ENAME != b_emp.ENAME
AND (b_emp.ENAME = 'FORD' OR b_emp.ENAME = 'SMITH');
ORDER BY a_emp.ENAME DESC;
```

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```
1 SELECT * FROM EMP a_emp, EMP b_emp
2 WHERE a_emp.SAL = b_emp.SAL
3 AND a_emp.ENAME != b_emp.ENAME
4 AND (b_emp.ENAME = 'FORD' OR b_emp.ENAME = 'SMITH');
5 ORDER BY a_emp.ENAME DESC;
6
```

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO	EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7788	SCOTT	ANALYST	7566	09-DEC-82	3000	-	20	7902	FORD	ANALYST	7566	03-DEC-81	3000	-	20

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4. List the emps Whose Jobs are same as MILLER or Sal is more than ALLEN.

4.Solution.

```
SELECT * FROM EMP a_emp, EMP b_emp
WHERE (a_emp.JOB = b_emp.JOB AND b_emp.ENAME = 'MILLER')
OR (a_emp.SAL > b_emp.SAL AND b_emp.ENAME = 'ALLEN');
```

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```
1 SELECT * FROM EMP a_emp, EMP b_emp
2 WHERE (a_emp.JOB = b_emp.JOB AND b_emp.ENAME = 'MILLER')
3 OR (a_emp.SAL > b_emp.SAL AND b_emp.ENAME = 'ALLEN');
4 -- List the emps Whose Jobs are same as MILLER or Sal is more than ALLEN.
```

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO	EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7369	SMITH	CLERK	7902	17-DEC-80	500	800	20	7934	MILLER	CLERK	7782	23-JAN-82	1300	-	10
7876	ADAMS	CLERK	7788	12-JAN-83	1100	-	20	7934	MILLER	CLERK	7782	23-JAN-82	1300	-	10
7900	JAMES	CLERK	7698	03-DEC-81	950	-	30	7934	MILLER	CLERK	7782	23-JAN-82	1300	-	10
7934	MILLER	CLERK	7782	23-JAN-82	1300	-	10	7934	MILLER	CLERK	7782	23-JAN-82	1300	-	10
7566	JONES	MANAGER	7839	02-APR-81	2975	-	20	7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7698	BLAKE	MANAGER	7839	01-MAY-81	2850	-	30	7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7782	CLARK	MANAGER	7839	09-JUN-81	2450	-	10	7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7788	SCOTT	ANALYST	7566	09-DEC-82	3000	-	20	7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7839	KING	PRESIDENT	-	17-NOV-81	5000	-	10	7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7902	FORD	ANALYST	7566	03-DEC-81	3000	-	20	7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30

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5. Find the highest paid employee of the sales department.

5.Solution.



```
SELECT * FROM EMP  
WHERE SAL = (SELECT MAX(SAL) FROM EMP WHERE JOB = 'SALESMAN');
```





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1 SELECT * FROM EMP
2 WHERE SAL = (SELECT MAX(SAL) FROM EMP WHERE JOB = 'SALESMAN');
3

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30

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6. List the employees who are senior to most recently hired employee working under king.

6.Solution.

-- Everyone works under King since he is the president
-- Seniors will have more salary then juniors\

```
SELECT * FROM EMP
WHERE EMPNO IN (
    SELECT a_emp.EMPNO from EMP a_emp, EMP b_emp
    WHERE a_emp.SAL > b_emp.SAL
    AND b_emp.HIREDATE = (SELECT MAX(HIREDATE) from EMP)
);
```

The screenshot shows the 'Live SQL' web application interface. On the left is a navigation sidebar with links to Home, SQL Worksheet (active), My Session, Schema, Quick SQL, My Scripts, My Tutorials, and Code Library. The main area is titled 'SQL Worksheet' and contains a text editor with the following SQL query:

```
1 SELECT * FROM EMP
2 WHERE EMPNO IN (
3     SELECT a_emp.EMPNO from EMP a_emp, EMP b_emp
4     WHERE a_emp.SAL > b_emp.SAL
5     AND b_emp.HIREDATE = (SELECT MAX(HIREDATE) from EMP)
6 );
7 -- List the employees who are senior to most recently hired employee working under king.
```

Below the editor, a table displays the query results. The table has columns: EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, COMM, and DEPTNO. It contains 11 rows of data, representing employees who are senior to the most recently hired employee (King) and work under him.

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
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	09-DEC-82	3000	-	20
7839	KING	PRESIDENT	-	17-NOV-81	5000	-	10
7844	TURNER	SALESMAN	7698	08-SEP-81	1500	0	30
7902	FORD	ANALYST	7566	03-DEC-81	3000	-	20
7934	MILLER	CLERK	7782	23-JAN-82	1300	-	10

Below the table, it says 'Download CSV' and '11 rows selected.' At the bottom of the page, there is a footer with Oracle logo, 'Integrated Cloud Applications & Platform Services', copyright information, and links to Oracle Learning Library, Ask Tom, Dev Gym, Database Doc, and Twitter.

7. List the names of the emps who are getting the highest sal dept wise.

7.Solution.

```
SELECT * FROM EMP a_emp
WHERE a_emp.SAL
IN (SELECT MAX(SAL) FROM EMP b_emp WHERE b_emp.JOB = a_emp.JOB);
```

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```
1 select * from EMP a_emp
2 WHERE a_emp.SAL
3 in (select MAX(SAL) from EMP b_emp where b_emp.JOB = a_emp.JOB);
```

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7566	JONES	MANAGER	7839	02-APR-81	2975	-	20
7788	SCOTT	ANALYST	7566	09-DEC-82	3000	-	20
7839	KING	PRESIDENT	-	17-NOV-81	5000	-	10
7902	FORD	ANALYST	7566	03-DEC-81	3000	-	20
7934	MILLER	CLERK	7782	23-JAN-82	1300	-	10

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8. List the emps whose sal is equal to the average of max and minimum

8.Solution.

```
SELECT * FROM EMP
WHERE SAL = (
    SELECT AVG(SAL) FROM emp
    WHERE SAL = (
        SELECT MAX(SAL) FROM EMP
        OR SAL = (SELECT MIN(SAL) FROM EMP
    )
);
```

The screenshot shows the Live SQL web interface. At the top, there's a dark header with the 'Live SQL' logo, a 'Feedback' button, a 'Help' button, and a user profile icon for 'thelazycrazywizard@gmail.com'. Below the header is a 'SQL Worksheet' section with a toolbar containing 'Clear', 'Find', 'Actions', 'Save', and 'Run' buttons. The main area displays the SQL query from the previous block, with line numbers 1 through 8 on the left. Below the query editor, the result area shows 'no data found'. At the bottom, there's a footer with the Oracle logo, 'Integrated Cloud Applications & Platform Services', copyright information for 2020, and links to Oracle Learning Library, Ask Tom, Dev Gym, Database Doc 19c, 18c, 12c, and a Twitter link. It also mentions 'Live SQL 20.3.1, running Oracle Database 19c Enterprise Edition - 19.5.0.0.0' and 'Built with ❤️ using Oracle APEX'.

Live SQL

Feedback Help thelazycrazywizard@gmail.com

SQL Worksheet Clear Find Actions Save Run

```
1 SELECT * FROM EMP
2 WHERE SAL = (
3     SELECT AVG(SAL) FROM emp
4     WHERE SAL = (
5         SELECT MAX(SAL) FROM EMP
6         OR SAL = (SELECT MIN(SAL) FROM EMP
7     )
8 );
```

no data found

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9. List the emps who joined in the company on the same date.

9.Solution.

```
SELECT * FROM EMP a_emp
WHERE a_emp.HIREDATE IN (
    SELECT HIREDATE FROM EMP b_emp
    WHERE a_emp.EMPNO != b_emp.EMPNO
);
```

Live SQL

Feedback Help thelazycrazywizard@gmail.com

SQL Worksheet

Clear Find Actions Save Run

```
1 SELECT * FROM EMP a_emp
2 WHERE a_emp.HIREDATE IN (
3     SELECT HIREDATE FROM EMP b_emp
4     WHERE a_emp.EMPNO != b_emp.EMPNO
5 );
```

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7902	FORD	ANALYST	7566	03-DEC-81	3000	-	20
7900	JAMES	CLERK	7698	03-DEC-81	950	-	30

Download CSV

2 rows selected.

10. Find out the emps who joined in the company before their Managers.

10.Solution.

```
SELECT a_emp.* FROM EMP a_emp, EMP b_emp
WHERE a_emp.HIREDATE < b_emp.HIREDATE
AND a_emp.MGR = b_emp.EMPNO;
```

Live SQL

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ClearFindActionsSaveRun

```
1 SELECT a_emp.* FROM EMP a_emp, EMP b_emp
2 WHERE a_emp.HIREDATE < b_emp.HIREDATE
3 AND a_emp.MGR = b_emp.EMPNO;
4
```

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
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
7698	BLAKE	MANAGER	7839	01-MAY-81	2850	-	30
7782	CLARK	MANAGER	7839	09-JUN-81	2450	-	10
7369	SMITH	CLERK	7902	17-DEC-80	500	800	20

Download CSV
6 rows selected.

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