深 圳 大 学 实 验 报 告

课程名称：Database System

实验项目名称：SQL 的多表连接查询以及视图

学院：Computer Science and Software Engineering

专业：Computer Science

指导教师：Basker George

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实验时间：11th October, 2024

实验报告提交时间：16th October, 2024

教务部制

实验目的与要求：(Purpose of Experiment purpose and Requirements)

* Please show all work for these problems.

Just writing down the answer will not get full credit.

Answers to the following questions must include:

1. **SQL Query command (60 Points)**
2. **Screenshot of your SQL command result (30 Points)**
   Note: Oral Question in LAB (10 points)

EXERCISES 2 JOINS

1. Find the name and salary of employees in Luton.
2. Join the DEPT table to the EMP table and show in department number order.
3. List the names of all salesmen who work in SALES
4. List all departments that do not have any employees.
5. For each employee whose salary exceeds his manager's salary, list the employee's name and salary and the manager's name and salary.
6. List the employees who have BLAKE as their manager.
7. List all the employee Name and his Manager's name, even if that employee doesn't have a manager

EXERCISES 3 FUNCTIONS

1 Find how many employees have a title of manager without listing them.

2 Compute the average annual salary plus commission for all salesmen

3 Find the highest and lowest salaries and the difference between them (single SELECT statement)

4 Find the number of characters in the longest department name

5 Count the number of people in department 30 who receive a salary and the number of people who receive a commission (single statement).

6 List the average commission of employees who receive a commission, and the average commission of all employees (assume employees who do not receive a commission attract zero commission)

7 List the average salary of employees that receive a salary, the average commission of employees that receive a commission, the average salary plus commission of only those employees that receive a commission and the average salary plus commission of all employees including those that do not receive a commission. (single statement)

8 Compute the daily and hourly salary for employees in department 30, round to the nearest penny. Assume there are 22 working days in a month and 8 working hours in a day.

9 Issue the same query as the previous one except that this time truncate (TRUNC) to the nearest penny rather than round.

EXERCISES 4 DATES

1 Select the name, job, and date of hire of the employees in department 20. (Format the hiredate column using a picture MM/DD/YY)

2 Use a picture to format hiredate as DAY(day of the week), MONTH (name of the month,) DD (day of the month) and YYYY(year)

3 Which employees were hired in March?

4 Which employees were hired on a Tuesday?

5 Are there any employees who have worked more than 16 years for the company?

6 Show the weekday of the first day of the month in which each employee was hired. (plus their names)

7 Show details of employee hiredates and the date of their first payday. (Paydays occur on the last Friday of each month) (plus their names) (need to create User Defined Function)

8 Refine your answer to 7 such that it works even if an employee is hired after the last Friday of the month (cf Martin)

EXERCISES 5 GROUP BY & HAVING

1 List the department number and average salary of each department.

2 Divide all employees into groups by department and by job within department. Count the employees in each group and compute each group's average annual salary.

3 Issue the same query as above except list the department name rather than the department number.

4 List the average annual salary for all job groups having more than 2 employees in the group.

5 Find all departments with an average commission greater than 25% of average salary.

6 Find each department's average annual salary for all its employees except the managers and the president.

7A. List the Department ID and Name where there are at least one Manager and two clerk

7. List the Department ID and Name where there are at least one Manager and two clerk and whose average salary is greater that the company’s average salary.

8. List the name of the Manager who manages most employee

9. List the name of all the Manager who manages atleast 2 employees

EXERCISES 6 SUB QUERIES.

1 List the name and job of employees who have the same job as Jones.

2 Find all the employees in Department 10 that have a job that is the same as anyone in department 30.

3 List the name, job, and department of employees who have the same job as Jones or a salary greater than or equal to Ford.

4 Find all employees in department 10 that have a job that is the same as anyone in the Sales department

5 Find the employees located in Liverpool who have the same job as Allen. Return the results in alphabetical order by employee name.

6 Find all the employees that earn more than the average salary of employees in their department.

7 Find all the employees that earn more than JONES, using temporary labels to abbreviate table names.

8. List the Name of all employees who earn Highest salary and Second Highest salary.

EXERCISES 7 Data Manipulation

1 Create a new table called loans with columns named LNO NUMBER (3), EMPNO NUMBER (4), TYPE CHAR(1), AMNT NUMBER (8,2), Create all constraints, such as Primary Key, Foreign Key, Check

2 Insert the following data

LNO	EMPNO	TYPE	AMNT
23	7499	M	20000.00
42	7499	C	2000.00
65	7844	M	3564.00

3 Check that you have created 3 new records in Loans

4 The Loans table must be altered to include another column OUTST NUMBER(8,2)

5 Add 10% interest to all M type loans

6 Remove all loans less than £3000.00

7 Change the name of loans table to accounts

8 Change the name of column LNO to LOANNO

9 Create a view for use by personnel in department 30 showing employee name, number, job and hiredate

10 Use the view to show employees in department 30 having jobs which are not salesman

11 Create a view which shows summary information for each department.

实验过程及内容：(**Methods and steps)**

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Use MySQL Server

EXERCISES 2 JOINS

1. Find the name and salary of employees in Luton.

Sql query command:

```
select e.ENAME,e.SAL
from emp e,dept d
where e.DEPTNO = d.DEPTNO and d.LOC = 'LUTON';
```

LOC varchar	ENAME varchar	SAL newdecimal
Filter	Filter	Filter
LUTON	GREEN	18500.00
LUTON	STEVENS	24750.00
LUTON	BARNES	11950.00

Figure 1

2. Join the DEPT table to the EMP table and show in department number order.

Sql query command:

```
select * from dept
inner join emp using (DEPTNO)
order by emp.DEPTNO
```

DEPTNO int	DNAME varchar	LOC varchar	EMPNO int	ENAME varchar	JOB varchar	MGR int	HIREDATE date	SAL newdecimal	COMM newdecimal
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
10	ACCOUNTING	LONDON	7782	CLARK	MANAGER	7839	1988-06-09	27500.00	(NULL)
10	ACCOUNTING	LONDON	7839	KING	PRESIDENT	(NULL)	1983-11-17	82500.00	(NULL)
10	ACCOUNTING	LONDON	7934	MILLER	CLERK	7782	1995-01-23	13250.00	(NULL)
20	RESEARCH	PRESTON	7369	SMITH	CLERK	7902	2009-12-17	13750.00	(NULL)
20	RESEARCH	PRESTON	7566	JONES	MANAGER	7839	1989-04-02	26850.00	(NULL)
20	RESEARCH	PRESTON	7788	SCOTT	ANALYST	7566	1987-04-19	19500.00	(NULL)
20	RESEARCH	PRESTON	7876	ADAMS	CLERK	7788	1996-05-23	11900.00	(NULL)
20	RESEARCH	PRESTON	7902	FORD	ANALYST	7566	1991-12-03	21500.00	(NULL)
30	SALES	LIVERPOOL	7499	ALLEN	SALESMAN	7698	1989-02-20	19000.00	6400.00
30	SALES	LIVERPOOL	7521	WARD	SALESMAN	7698	1993-02-22	18500.00	4250.00
30	SALES	LIVERPOOL	7654	MARTIN	SALESMAN	7698	1997-09-28	15675.00	3500.00

Figure 2

3. List the names of all salesmen who work in SALES

Sql query command:

```
select e.ENAME
from emp e inner join dept d using(DEPTNO)
where trim(e.JOB) = 'SALESMAN' and trim(d.DNAME) = 'SALES';
```

ENAME varchar
Filter
ALLEN
WARD
MARTIN
TURNER

Figure 3

4. List all departments that do not have any employees.

Sql query command:

```
select d.DEPTNO from dept d
where d.DEPTNO not in (select DEPTNO from emp);
```

DEPTNO int
Filter

Figure 4

5. For each employee whose salary exceeds his manager's salary, list the employee's name and salary and the manager's name and salary.

Sql query command:

```
select e.ENAME,e.SAL,m.ENAME,m.SAL
from emp e inner join emp m on e.MGR = m.EMPNO
where e.SAL > m.SAL;
```

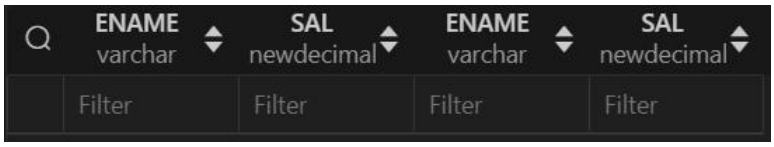


Figure 5

6. List the employees who have BLAKE as their manager.

Sql query command:

```
select e.ENAME
from emp e inner join emp m on e.MGR = m.EMPNO
where trim(m.ENAME) = 'BLAKE';
```

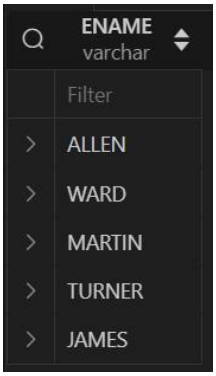


Figure 6

7. List all the employee Name and his Manager's name, even if that employee doesn't have a manager.

Sql query command:

```
select e.ENAME,m.ENAME
from emp e left join emp m on e.MGR = m.EMPNO;
```

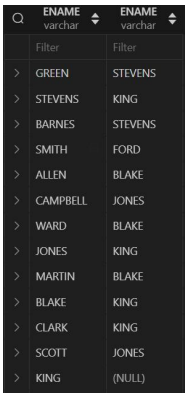


Figure 7

EXERCISES 3 FUNCTIONS

1. Find how many employees have a title of manager without listing them.

Sql query command:

```
select count(JOB) from emp
where JOB= ‘MANAGER’;
```

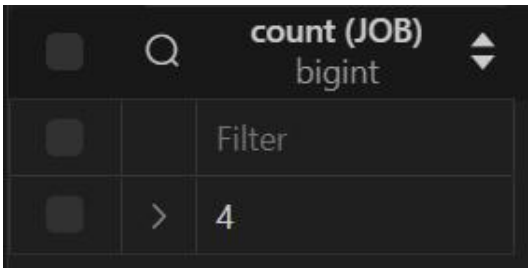


Figure 8

2. Compute the average annual salary plus commission for all salesmen.

Sql query command:

```
select avg(e.SAL+e.COMM)*12 from emp e;
```

Figure 9

3. Find the highest and lowest salaries and the difference between them (single SELECT statement)

Sql query command:

```
select max(SAL) highest_salary,min(SAL) lowest_salary,max(SAL)-min(SAL)
from emp;
```

Figure 10

4. Find the number of characters in the longest department name

Sql query command:

```
select max(length(DNAME))
from dept;
```

Figure 11

5. Count the number of people in department 30 who receive a salary and the number of people who receive a commission (single statement).

Sql query command:

```
select count(SAL>0 ),count(COMM>0 l)
from emp
where DEPTNO = 30;
```

Figure 12

6. List the average commission of employees who receive a commission, and the average commission of all employees (assume employees who do not receive a commission attract zero commission)

Sql query command:

```
select avg(case when COMM>=0 then COMM end),avg(COMM) from emp;
```

Figure 13

7. List the average salary of employees that receive a salary, the average commission of employees that receive a commission, the average salary plus commission of only those employees that receive a commission and the average salary plus commission of all employees including those that do not receive a commission. (single statement)

Sql query command:

```
select
   avg(case when SAL>=0 then SAL end) as avg_sal,
   avg(case when COMM>=0 then COMM end) as avg_comm,
```

```
    avg(case when COMM>=0 then COMM+SAL end) as avg_sal_plus_comm,
    avg(SAL+COMM) as avg_sal_plus_comm_all
from emp;
```

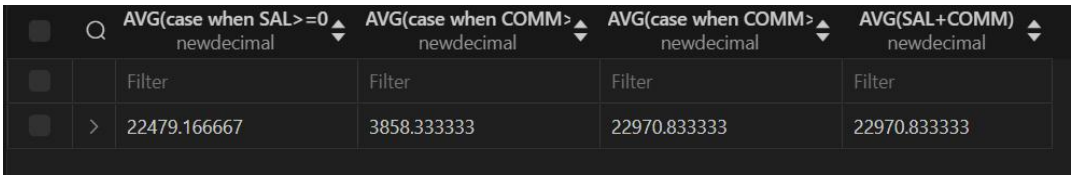


Figure 14

8. Compute the daily and hourly salary for employees in department 30, round to the nearest penny. Assume there are 22 working days in a month and 8 working hours in a day.

Sql query command:

```
select
    round((SAL / 22), 2) as daily_salary,
    round((SAL / (22 * 8)), 2) as hourly_salary
from emp
where DEPTNO = 30;
```

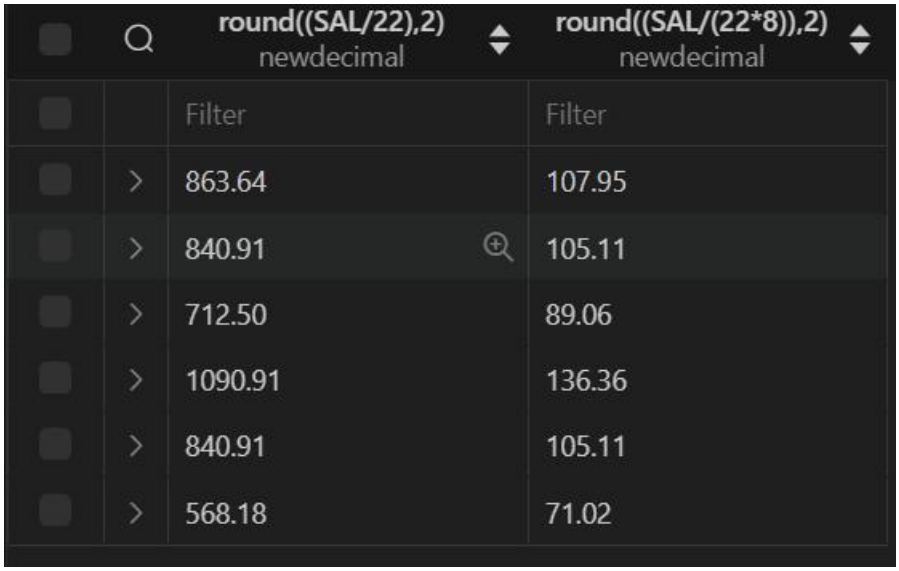
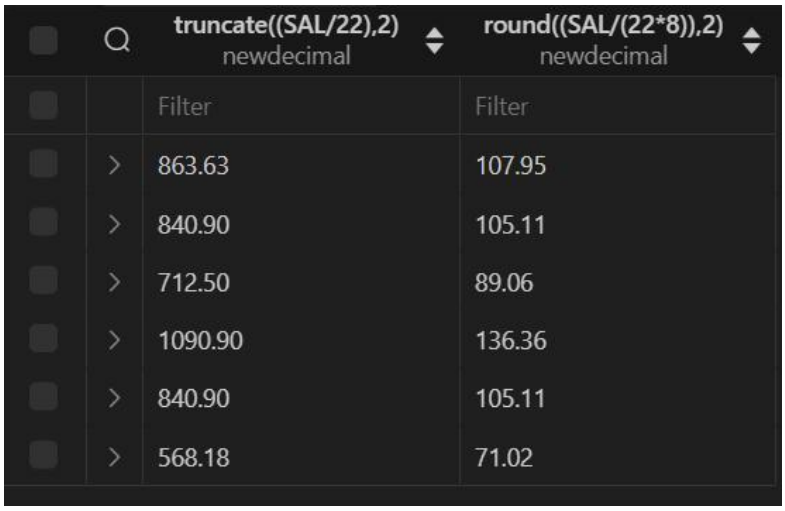


Figure 15

9. Issue the same query as the previous one except that this time truncate (TRUNC) to the nearest penny rather than round.

Sql query command:

```
select
    truncate((SAL / 22), 2) as daily_salary,
    truncate((SAL / (22 * 8)), 2) as hourly_salary
from emp
where DEPTNO = 30;
```



truncate((SAL/22),2) newdecimal	round((SAL/(22*8)),2) newdecimal
Filter	Filter
863.63	107.95
840.90	105.11
712.50	89.06
1090.90	136.36
840.90	105.11
568.18	71.02

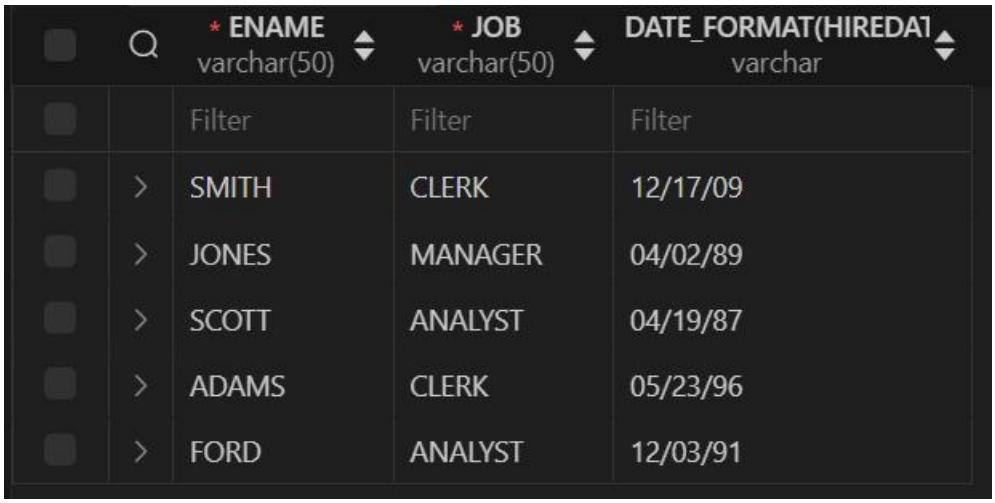
Figure 16

EXERCISES 4 DATES

1 Select the name, job, and date of hire of the employees in department 20. (Format the hiredate column using a picture MM/DD/YY)

Sql query command:

```
select ENAME, JOB, date_format(HIREDATE,'%m/%d/%y')
from emp
where DEPTNO = 20;
```



* ENAME varchar(50)	* JOB varchar(50)	DATE_FORMAT(HIREDAT varchar
Filter	Filter	Filter
SMITH	CLERK	12/17/09
JONES	MANAGER	04/02/89
SCOTT	ANALYST	04/19/87
ADAMS	CLERK	05/23/96
FORD	ANALYST	12/03/91

Figure 17

2 Use a picture to format hiredate as DAY(day of the week), MONTH (name of the month,) DD (day of the month) and YYYY(year)

Sql query command:

```
select ENAME, JOB, date_format(HIREDATE,'%W,%M %d %Y')
from emp;
```

GREEN	SALESMAN	Monday,July,24,1995
STEVENS	MANAGER	Friday,January,14,1994
BARNES	CLERK	Monday,January,16,1995
SMITH	CLERK	Thursday,December,17,200
ALLEN	SALESMAN	Monday,February,20,1989
CAMPBELL	ANALYST	Friday,October,30,1992
WARD	SALESMAN	Monday,February,22,1993
JONES	MANAGER	Sunday,April,02,1989
MARTIN	SALESMAN	Sunday,September,28,1997
BLAKE	MANAGER	Tuesday,May,01,1990
CLARK	MANAGER	Thursday,June,09,1988
SCOTT	ANALYST	Sunday,April,19,1987

Figure 18

3 Which employees were hired in March?

Sql query command:

```
select * from emp
where HIREDATE like '%-03-%';
```

EMPNO int	ENAME varchar(50)	JOB varchar(50)	MGR int	HIREDATE date	SAL decimal(10,2)	COMM decimal(10,2)	DEPTNO int

Figure 19

4 Which employees were hired on a Tuesday?

Sql query command:

```
select * from emp
where date_format(HIREDATE,'%W') = 'Tuesday';
```

EMPNO int	ENAME varchar(50)	JOB varchar(50)	MGR int	HIREDATE date	SAL decimal(10,2)	COMM decimal(10,2)	DEPTNO int
7698	BLAKE	MANAGER	7839	1990-05-01	24000.00	(NULL)	30
7844	TURNER	SALESMAN	7698	1992-09-08	18500.00	6250.00	30
7902	FORD	ANALYST	7566	1991-12-03	21500.00	(NULL)	20

Figure 20

5 Are there any employees who have worked more than 16 years for the company?

Sql query command:

```
select * from emp
where datediff(now(),HIREDATE)/365 > 16;
```

EMPNO int	ENAME varchar(50)	JOB varchar(50)	MGR int	HIREDATE date	SAL decimal(10,2)	COMM decimal(10,2)	DEPTN int
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
3258	GREEN	SALESMAN	4422	1995-07-24	18500.00	2750.00	50
4422	STEVENS	MANAGER	7839	1994-01-14	24750.00	(NULL)	50
6548	BARNES	CLERK	4422	1995-01-16	11950.00	(NULL)	50
7499	ALLEN	SALESMAN	7698	1989-02-20	19000.00	6400.00	30
7500	CAMPBELL	ANALYST	7566	1992-10-30	24500.00	0.00	40
7521	WARD	SALESMAN	7698	1993-02-22	18500.00	4250.00	30
7566	JONES	MANAGER	7839	1989-04-02	26850.00	(NULL)	20
7654	MARTIN	SALESMAN	7698	1997-09-28	15675.00	3500.00	30
7698	BLAKE	MANAGER	7839	1990-05-01	24000.00	(NULL)	30
7782	CLARK	MANAGER	7839	1988-06-09	27500.00	(NULL)	10
7788	SCOTT	ANALYST	7566	1987-04-19	19500.00	(NULL)	20

Figure 21

6 Show the weekday of the first day of the month in which each employee was hired. (plus their names)

Sql query command:

```
select ENAME, dayname(date_format(HIREDATE,'%Y-%m-01'))
from emp;
```

GREEN	Saturday
STEVENS	Saturday
BARNES	Sunday
SMITH	Tuesday
ALLEN	Wednesday
CAMPBELL	Thursday
WARD	Monday
JONES	Saturday
MARTIN	Monday
BLAKE	Tuesday
CLARK	Wednesday

Figure 22

7 Show details of employee hiredates and the date of their first payday. (Paydays occur on the last Friday of each month) (plus their names) (need to create User Defined Function)

Sql query command:

```
create function getfirstPayday(HIREDATE DATE) returns DATE
```

```
DETERMINISTIC
begin
	DECLARE last_Friday DATE;
	set last_Friday =
			case
				when dayofweek(last_day(HIREDATE))=7
					then last_day(HIREDATE) - interval 1 day
				when dayofweek(last_day(HIREDATE))=6
					then last_day(HIREDATE)
				else last_day(HIREDATE) - interval ( 1 +
dayofweek(last_day(HIREDATE)) ) day
				end;
	return last_Friday;
end;

select ENAME, HIREDATE, getfirstPayday(HIREDATE)
from emp;
```

	Filter	Filter	Filter
>	GREEN	1995-07-24	1995-07-28
>	STEVENS	1994-01-14	1994-01-28
>	BARNES	1995-01-16	1995-01-27
>	SMITH	2009-12-17	2009-12-25
>	ALLEN	1989-02-20	1989-02-24
>	CAMPBELL	1992-10-30	1992-10-30
>	WARD	1993-02-22	1993-02-26
>	JONES	1989-04-02	1989-04-28
>	MARTIN	1997-09-28	1997-09-26
>	BLAKE	1990-05-01	1990-05-25
>	CLARK	1988-06-09	1988-06-24
>	SCOTT	1987-04-19	1987-04-24
>	KING	1983-11-17	1983-11-25
>	TURNER	1992-09-08	1992-09-25

Figure 23

8 Refine your answer to 7 such that it works even if an employee is hired after the last Friday of the month (cf Martin)

Sql query command:

```
DELIMITER //

CREATE FUNCTION GetLastFriday(inputDate DATE)
RETURNS DATE
```

```
DETERMINISTIC
BEGIN
    DECLARE lastFriday DATE;
    SET lastFriday = LAST_DAY(inputDate);
    WHILE DAYOFWEEK(lastFriday) != 6 DO
        SET lastFriday = lastFriday - INTERVAL 1 DAY;
    END WHILE;
    -- 如果雇佣日期在最后一个星期五之后，返回下一个月的最后一个星期五
    IF inputDate > lastFriday THEN
        SET lastFriday = LAST_DAY(DATE_ADD(inputDate, INTERVAL 1 MONTH));
        WHILE DAYOFWEEK(lastFriday) != 6 DO
            SET lastFriday = lastFriday - INTERVAL 1 DAY;
        END WHILE;
    END IF;
    RETURN lastFriday;
END //
DELIMITER ;
select ENAME,HIREDATE,GetLastFriday(HIREDATE)
from emp;
```

Filter	Filter	Filter
GREEN	1995-07-24	1995-07-28
STEVENS	1994-01-14	1994-01-28
BARNES	1995-01-16	1995-01-27
SMITH	2009-12-17	2009-12-25
ALLEN	1989-02-20	1989-02-24
CAMPBELL	1992-10-30	1992-10-30
WARD	1993-02-22	1993-02-26
JONES	1989-04-02	1989-04-28
MARTIN	1997-09-28	1997-10-31
BLAKE	1990-05-01	1990-05-25
CLARK	1988-06-09	1988-06-24
SCOTT	1987-04-19	1987-04-24
KING	1983-11-17	1983-11-25
TURNER	1992-09-08	1992-09-25

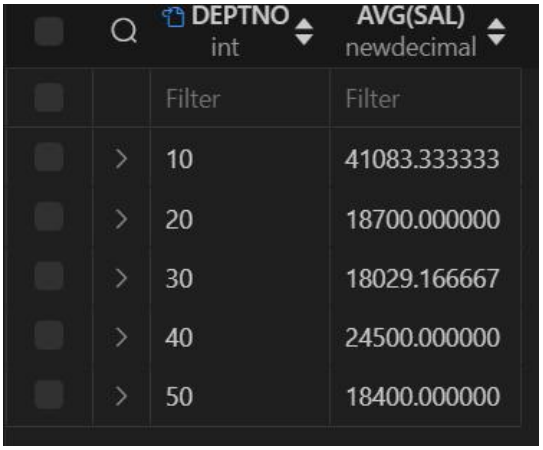
Figure 24

EXERCISES 5 GROUP BY & HAVING

1 List the department number and average salary of each department.

Sql query command:

```
select DEPTNO,avg(SAL)
from emp
group by DEPTNO;
```



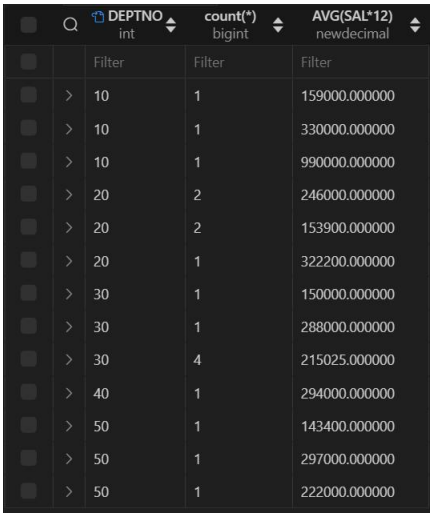
DEPTNO int	AVG(SAL) newdecimal
Filter	Filter
10	41083.333333
20	18700.000000
30	18029.166667
40	24500.000000
50	18400.000000

Figure 25

2 Divide all employees into groups by department and by job within department. Count the employees in each group and compute each group's average annual salary.

Sql query command:

```
select DEPTNO,count(*),avg(SAL)*12 as avg_annual_salary
from emp
group by DEPTNO,JOB
order by DEPTNO;
```



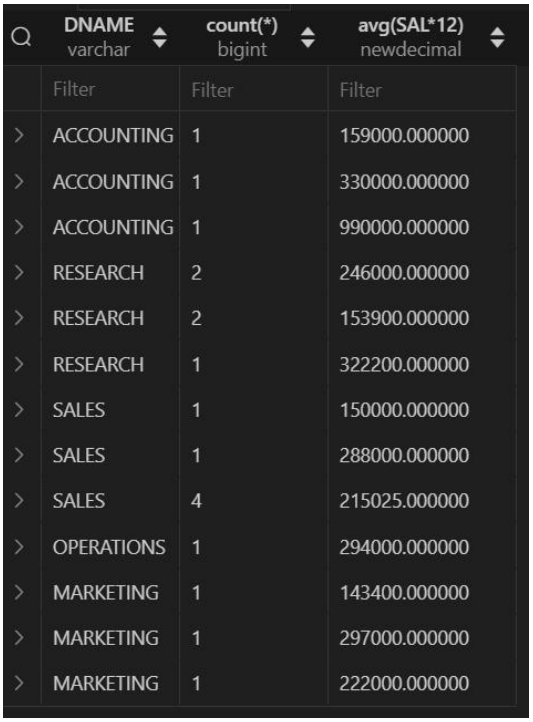
DEPTNO int	count(*) bigint	AVG(SAL*12) newdecimal
Filter	Filter	Filter
10	1	159000.000000
10	1	330000.000000
10	1	990000.000000
20	2	246000.000000
20	2	153900.000000
20	1	322200.000000
30	1	150000.000000
30	1	288000.000000
30	4	215025.000000
40	1	294000.000000
50	1	143400.000000
50	1	297000.000000
50	1	222000.000000

Figure 26

3 Issue the same query as above except list the department name rather than the department number.

Sql query command:

```
select DNAME, count(*), avg(SAL)*12 as avg_annual_salary
from emp left join dept on emp.DEPTNO = dept.DEPTNO
group by emp.DEPTNO, JOB
order by emp.DEPTNO;
```



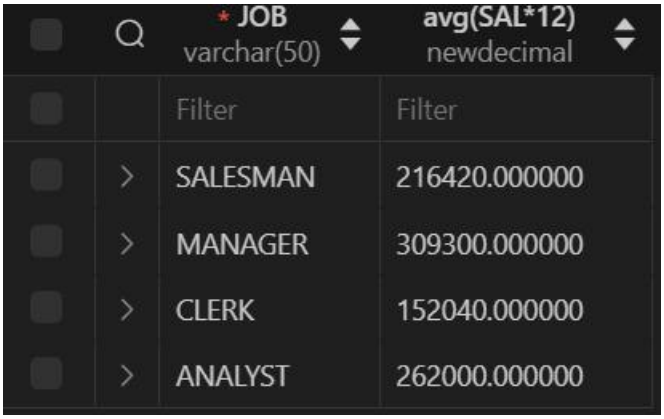
DNAME varchar	count(*) bigint	avg(SAL*12) newdecimal
Filter	Filter	Filter
ACCOUNTING	1	159000.000000
ACCOUNTING	1	330000.000000
ACCOUNTING	1	990000.000000
RESEARCH	2	246000.000000
RESEARCH	2	153900.000000
RESEARCH	1	322200.000000
SALES	1	150000.000000
SALES	1	288000.000000
SALES	4	215025.000000
OPERATIONS	1	294000.000000
MARKETING	1	143400.000000
MARKETING	1	297000.000000
MARKETING	1	222000.000000

Figure 27

4 List the average annual salary for all job groups having more than 2 employees in the group.

Sql query command:

```
select JOB, avg(SAL)*12 as avg_annual_salary
from emp
group by JOB
having count(EMPNO) >= 2;
```



* JOB varchar(50)	avg(SAL*12) newdecimal
Filter	Filter
SALESMAN	216420.000000
MANAGER	309300.000000
CLERK	152040.000000
ANALYST	262000.000000

Figure 28

5 Find all departments with an average commission greater than 25% of average salary.

Sql query command:

```
select DNAME
from emp left join dept on emp.DEPTNO = dept.DEPTNO
group by emp.DEPTNO
having avg(COMM) > avg(SAL)*0.25;
```

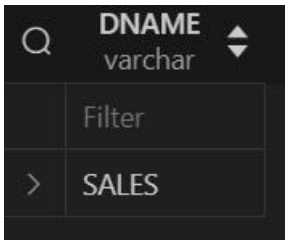


Figure 29

6 Find each department's average annual salary for all its employees except the managers and the president.

Sql query command:

```
select DEPTNO, avg(SAL)*12 as avg_annual_sal
from emp
where trim(JOB) not in ('MANAGER','PRESIDENT')
group by DEPTNO;
```

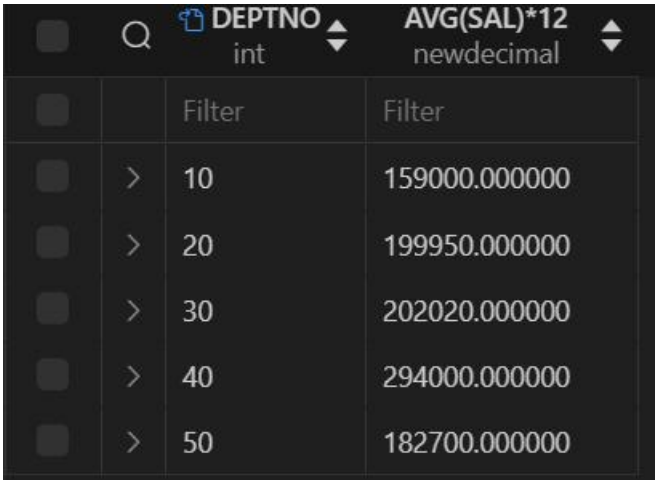
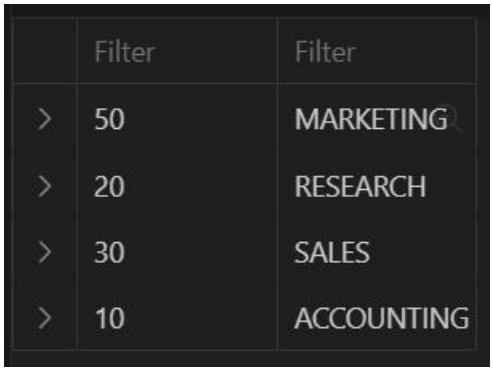


Figure 30

7 A. List the Department ID and Name where there are at least one Manager and two clerk

Sql query command:

```
select emp.DEPTNO, DNAME
from emp left join dept on emp.DEPTNO = dept.DEPTNO
group by emp.DEPTNO
having count(trim(JOB)='MANAGER' or null)>=1
    and count(trim(JOB)='CLERK' or null)>=2;
```



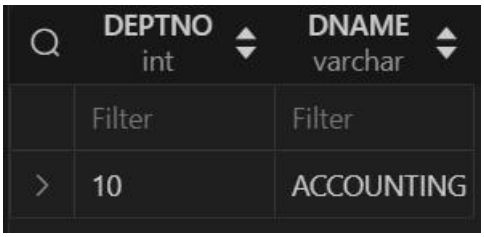
	Filter	Filter
>	50	MARKETING
>	20	RESEARCH
>	30	SALES
>	10	ACCOUNTING

Figure 31

7. List the Department ID and Name where there are at least one Manager and two clerk and whose average salary is greater than the company's average salary.

Sql query command:

```
select emp.DEPTNO, DNAME, avg(SAL)
from emp left join dept on emp.DEPTNO = dept.DEPTNO
group by emp.DEPTNO
having count(trim(JOB)='MANAGER' or null) >= 1
        and count(trim(JOB)='CLERK' or null) >= 2
        and avg(SAL)    >    ( select avg(SAL)
                               from emp );
```



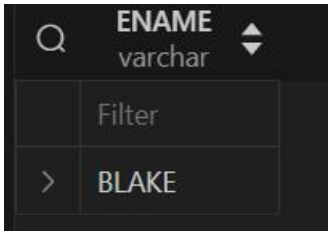
	DEPTNO int	DNAME varchar
	Filter	Filter
>	10	ACCOUNTING

Figure 32

8. List the name of the Manager who manages most employee

Sql query command:

```
select m.ENAME
from emp e left join emp m on e.MGR=m.EMPNO
group by e.MGR
order by count(e.MGR) desc
limit 1;
```



	ENAME varchar
	Filter
>	BLAKE

Figure 33

9. List the name of all the Manager who manages at least 2 employees

Sql query command:

```
select m.ENAME
from emp e left join emp m on e.MGR = m.EMPNO
where e.MGR != 0
group by e.MGR
having count(e.MGR) >= 2;
```

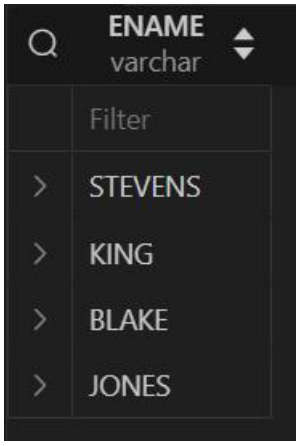


Figure 34

EXERCISES 6 SUB QUERIES.

1 List the name and job of employees who have the same job as Jones.

Sql query command:

```
select ENAME, JOB
from emp
where trim(JOB) = ( select trim(JOB) from emp where trim(ENAME)='JONES' );
```

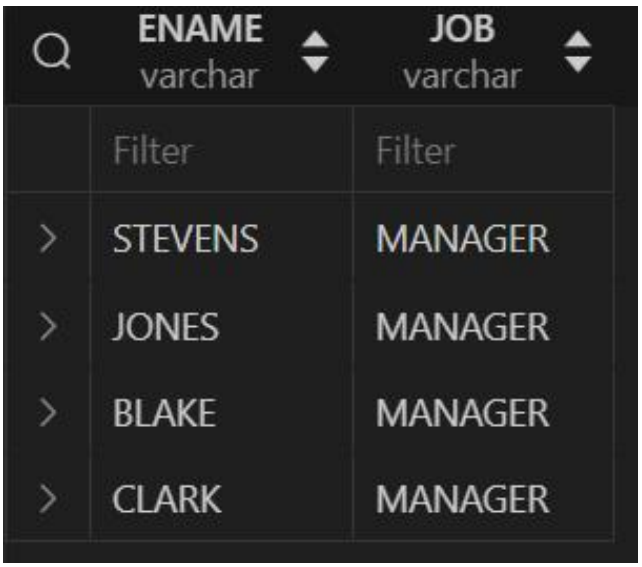
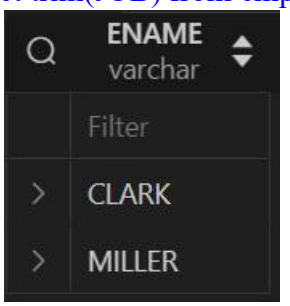


Figure 35

2 Find all the employees in Department 10 that have a job that is the same as anyone in department 30.

Sql query command:

```
select * from emp
where DEPTNO = 10
        and trim(JOB) in ( select trim(JOB) from emp where DEPTNO = 30 );
```



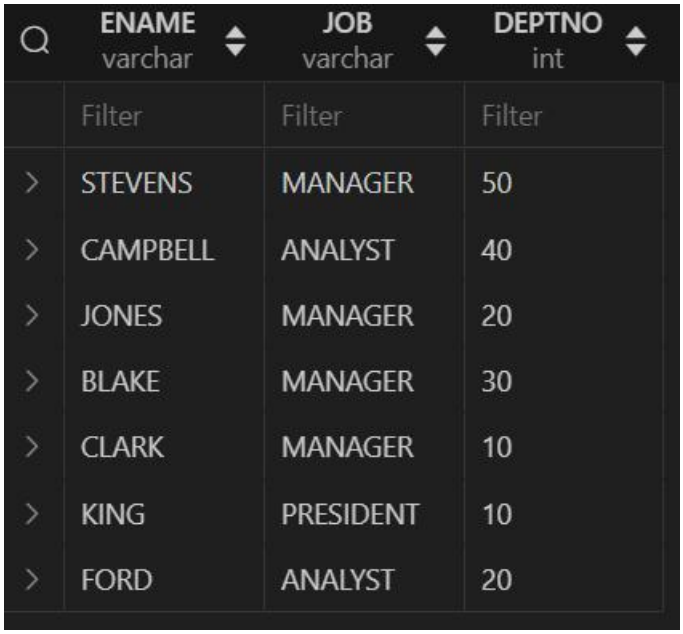
ENAME varchar
Filter
CLARK
MILLER

Figure 36

3 List the name, job, and department of employees who have the same job as Jones or a salary greater than or equal to Ford.

Sql query command:

```
select ENAME, JOB, DEPTNO
from emp
where trim(JOB) = ( select trim(JOB) from emp
                    where trim(ENAME) = 'JONES')
                        or SAL >= (select SAL from emp
                                   where trim(ENAME) = 'FORD' );
```



ENAME varchar	JOB varchar	DEPTNO int
Filter	Filter	Filter
STEVENS	MANAGER	50
CAMPBELL	ANALYST	40
JONES	MANAGER	20
BLAKE	MANAGER	30
CLARK	MANAGER	10
KING	PRESIDENT	10
FORD	ANALYST	20

Figure 37

4 Find all employees in department 10 that have a job that is the same as anyone in the Sales department

Sql query command:

```
select * from emp
where emp.DEPTNO = 10
        and trim(JOB) in ( select trim(JOB) from emp left join dept
                           on emp.DEPTNO = dept.DEPTNO
                           where trim(DNAME) = 'SALES'    );
```

ENAME varchar	JOB varchar	DEPTNO int
Filter	Filter	Filter
STEVENS	MANAGER	50
CAMPBELL	ANALYST	40
JONES	MANAGER	20
BLAKE	MANAGER	30
CLARK	MANAGER	10
KING	PRESIDENT	10
FORD	ANALYST	20

Figure 38

5 Find the employees located in Liverpool who have the same job as Allen. Return the results in alphabetical order by employee name.

Sql query command:

```
select * from emp
left join dept on emp.DEPTNO = dept.DEPTNO
where trim(LOC) = 'LIVERPOOL'
   and trim(JOB) = ( select trim(JOB) from emp
                     where trim(ENAME) = 'ALLEN' )
                     order by ENAME;
```

EMPNO int	ENAME varchar	JOB varchar	MGR int	HIREDATE date	SAL newdecimal	COMM newdecimal	DEPTNO int	DEPTNO int
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
7499	ALLEN	SALESMAN	7698	1989-02-20	19000.00	6400.00	30	30
7654	MARTIN	SALESMAN	7698	1997-09-28	15675.00	3500.00	30	30
7844	TURNER	SALESMAN	7698	1992-09-08	18500.00	6250.00	30	30
7521	WARD	SALESMAN	7698	1993-02-22	18500.00	4250.00	30	30

Figure 39

6 Find all the employees that earn more than the average salary of employees in their department.

Sql query command:

```
select * from emp e1
```

```
where SAL > ( select avg(SAL) from emp e2
              where e1.DEPTNO = e2.DEPTNO
              group by DEPTNO );
```

EMPNO int	ENAME varchar	JOB varchar	MGR int	HIREDATE date	SAL newdecimal	COMM newdecimal	DEPTNO int
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
3258	GREEN	SALESMAN	4422	1995-07-24	18500.00	2750.00	50
4422	STEVENS	MANAGER	7839	1994-01-14	24750.00	(NULL)	50
7499	ALLEN	SALESMAN	7698	1989-02-20	19000.00	6400.00	30
7521	WARD	SALESMAN	7698	1993-02-22	18500.00	4250.00	30
7566	JONES	MANAGER	7839	1989-04-02	26850.00	(NULL)	20
7698	BLAKE	MANAGER	7839	1990-05-01	24000.00	(NULL)	30
7788	SCOTT	ANALYST	7566	1987-04-19	19500.00	(NULL)	20
7839	KING	PRESIDENT	(NULL)	1983-11-17	82500.00	(NULL)	10
7844	TURNER	SALESMAN	7698	1992-09-08	18500.00	6250.00	30
7902	FORD	ANALYST	7566	1991-12-03	21500.00	(NULL)	20

Figure 40

7 Find all the employees that earn more than JONES, using temporary labels to abbreviate table names.

Sql query command:

```
select * from emp e1
where SAL > ( select SAL from emp e2
              where trim(e2.ENAME) = 'JONES' );
```

EMPNO int	ENAME varchar	JOB varchar	MGR int	HIREDATE date	SAL newdecimal	COMM newdecimal	DEPTNO int
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
7782	CLARK	MANAGER	7839	1988-06-09	27500.00	(NULL)	10
7839	KING	PRESIDENT	(NULL)	1983-11-17	82500.00	(NULL)	10

Figure 41

8. List the Name of all employees who earn Highest salary and Second Highest salary.

Sql query command:

```
select ENAME
from emp
order by SAL desc
limit 2;
```

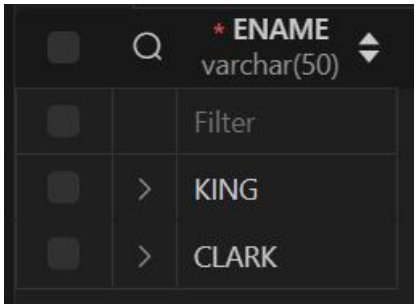


Figure 42

EXERCISES 7 Data Manipulation

1 Create a new table called loans with columns named LNO NUMBER (3), EMPNO NUMBER (4), TYPE CHAR(1), AMNT NUMBER (8,2), Create all constraints, such as Primary Key, Foreign Key, Check

Sql query command:

```
CREATE TABLE loans
(
    LNO     INT,
    EMPNO INT,
    TYPE    CHAR(1),
    AMNT    NUMERIC(8, 2),

    -- 约束
    CONSTRAINT cst_pk PRIMARY KEY (LNO),                    -- 主键约束
    CONSTRAINT cst_fk FOREIGN KEY (EMPNO) REFERENCES emp (EMPNO),    -- 外键约束
    CONSTRAINT cst_ck CHECK (AMNT > 0),                     -- 确保 AMNT 大于 0

);
```

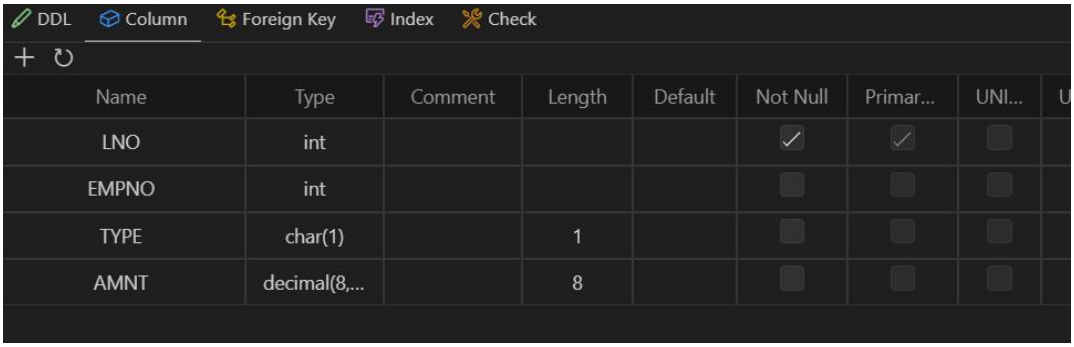


Figure 43

2 Insert the following data

LNO	EMPNO	TYPE	AMNT
23	7499	M	20000.00
42	7499	C	2000.00
65	7844	M	3564.00

Sql query command:

```
insert into loans(LNO, EMPNO, TYPE, AMNT)
values (23, 7499, 'M', 20000),
       (42, 7499, 'C', 2000),
       (65, 7844, 'M', 3564);
```

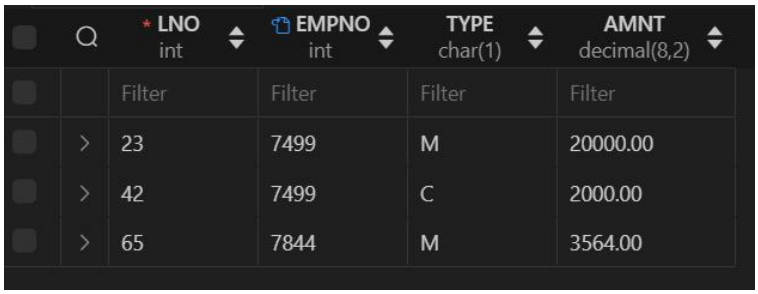


Figure 44

3 Check that you have created 3 new records in Loans

Sql query command:

```
select count(*) from loans;
```

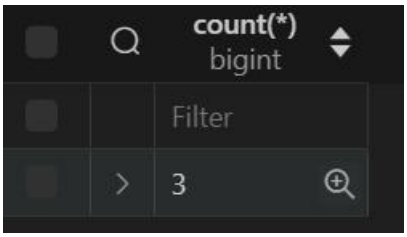


Figure45

4 The Loans table must be altered to include another column OUTST NUMBER(8,2)

Sql query command:

```
alter table loans
    add column OUTST numeric(8,2);
```

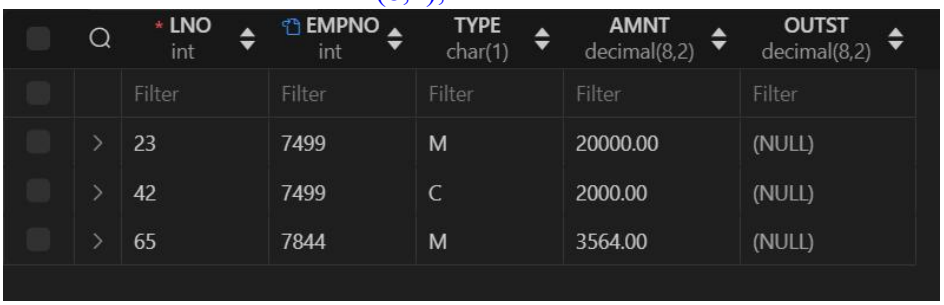
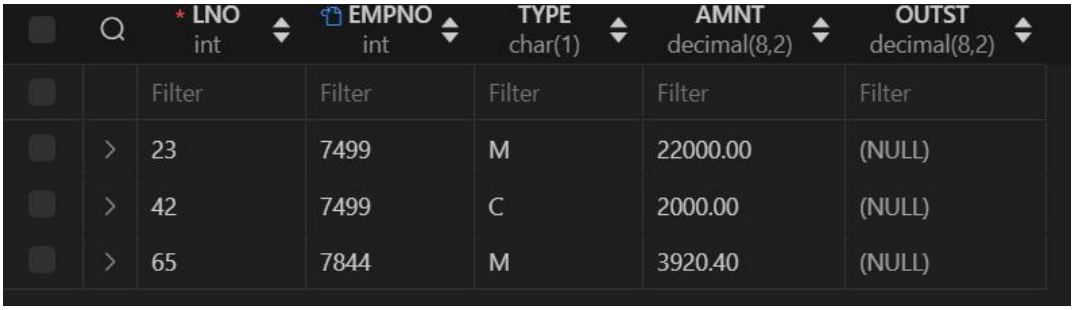


Figure 46

5 Add 10% interest to all M type loans

Sql query command:

```
update loans
set AMNT = 1.1*AMNT
where TYPE='M';
```



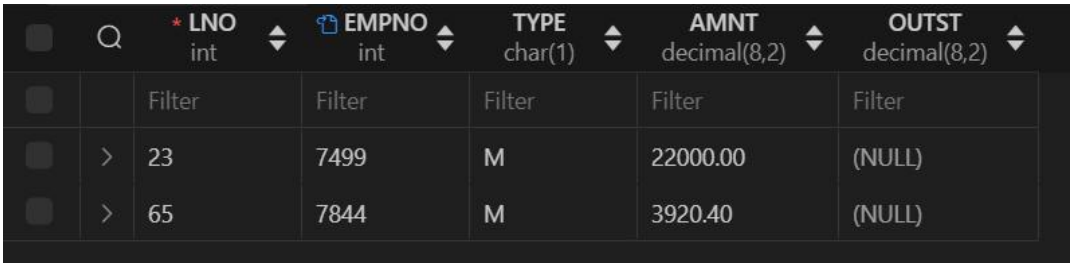
* LNO int	EMPNO int	TYPE char(1)	AMNT decimal(8,2)	OUTST decimal(8,2)
Filter	Filter	Filter	Filter	Filter
23	7499	M	22000.00	(NULL)
42	7499	C	2000.00	(NULL)
65	7844	M	3920.40	(NULL)

Figure 47

6 Remove all loans less than £3000.00

Sql query command:

```
delete from loans
where AMNT < 3000.00;
```



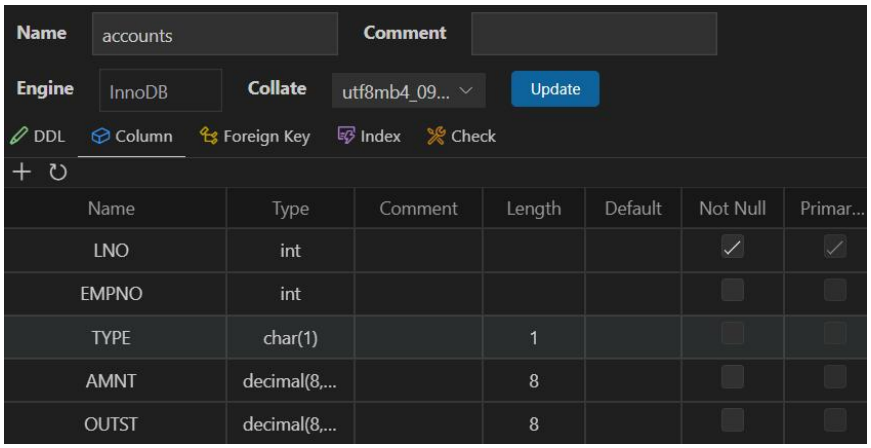
* LNO int	EMPNO int	TYPE char(1)	AMNT decimal(8,2)	OUTST decimal(8,2)
Filter	Filter	Filter	Filter	Filter
23	7499	M	22000.00	(NULL)
65	7844	M	3920.40	(NULL)

Figure 48

7 Change the name of loans table to accounts

Sql query command:

```
alter table loans
rename to accounts;
```



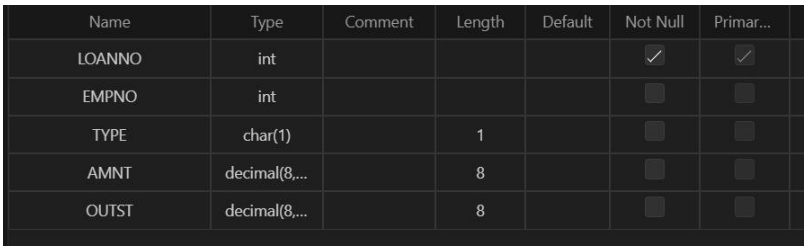
Name	Type	Comment	Length	Default	Not Null	Primar...
LNO	int				✓	✓
EMPNO	int					
TYPE	char(1)		1			
AMNT	decimal(8,...		8			
OUTST	decimal(8,...		8			

Figure 49

8 Change the name of column LNO to LOANNO

Sql query command:

```
alter table accounts
rename column LNO to LOANNO;
```



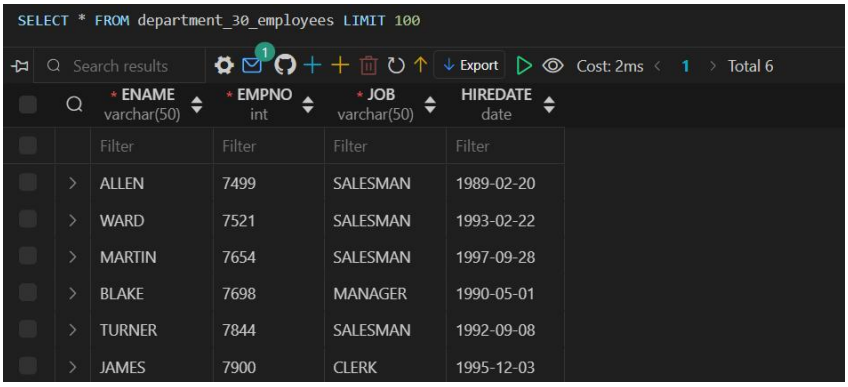
Name	Type	Comment	Length	Default	Not Null	Primar...
LOANNO	int				✓	✓
EMPNO	int					
TYPE	char(1)		1			
AMNT	decimal(8,...		8			
OUTST	decimal(8,...		8			

Figure 50

9 Create a view for use by personnel in department 30 showing employee name, number, job and hiredate

Sql query command:

```
create view department_30_employees as
select ENAME, EMPNO, JOB, HIREDATE
from emp
where DEPTNO = 30;
```



```
SELECT * FROM department_30_employees LIMIT 100
```

Search results | Export | Cost: 2ms | 1 | Total 6

* ENAME varchar(50)	* EMPNO int	* JOB varchar(50)	HIREDATE date
Filter	Filter	Filter	Filter
ALLEN	7499	SALESMAN	1989-02-20
WARD	7521	SALESMAN	1993-02-22
MARTIN	7654	SALESMAN	1997-09-28
BLAKE	7698	MANAGER	1990-05-01
TURNER	7844	SALESMAN	1992-09-08
JAMES	7900	CLERK	1995-12-03

Figure 51

10 Use the view to show employees in department 30 having jobs which are not salesman

Sql query command:

```
select * from department_30_employees
where trim(JOB) != 'SALESMAN';
```

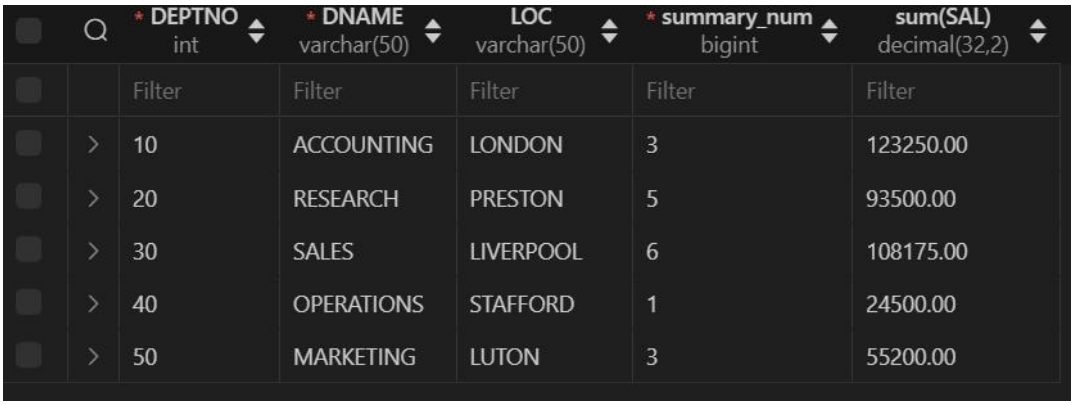
* ENAME varchar(50)	* EMPNO int	* JOB varchar(50)	HIREDATE date
Filter	Filter	Filter	Filter
BLAKE	7698	MANAGER	1990-05-01
JAMES	7900	CLERK	1995-12-03

Figure 52

11 Create a view which shows summary information for each department.

Sql query command:

```
create view dept_sum_info as
select d.DEPTNO,  DNAME,  LOC,
        count(e.EMPNO) summary_num,
        sum(SAL)
from dept d left join emp e on d.DEPTNO = e.DEPTNO
group by d.DEPTNO;
```



* DEPTNO int	* DNAME varchar(50)	LOC varchar(50)	* summary_num bigint	sum(SAL) decimal(32,2)
Filter	Filter	Filter	Filter	Filter
10	ACCOUNTING	LONDON	3	123250.00
20	RESEARCH	PRESTON	5	93500.00
30	SALES	LIVERPOOL	6	108175.00
40	OPERATIONS	STAFFORD	1	24500.00
50	MARKETING	LUTON	3	55200.00

Figure 53

指导教师批阅意见： The following problems was identified from the students answer: 成绩评定： Final Grade of Student is: 指导教师签字：Baker George 2023 年 11 月 09 日
备注：

注：1、报告内的项目或内容设置，可根据实际情况加以调整和补充。

2、教师批改学生实验报告时间应在学生提交实验报告时间后 10 日内。