Creating and Managing Tables

EX_NO:1 **DATE:17.2.24**

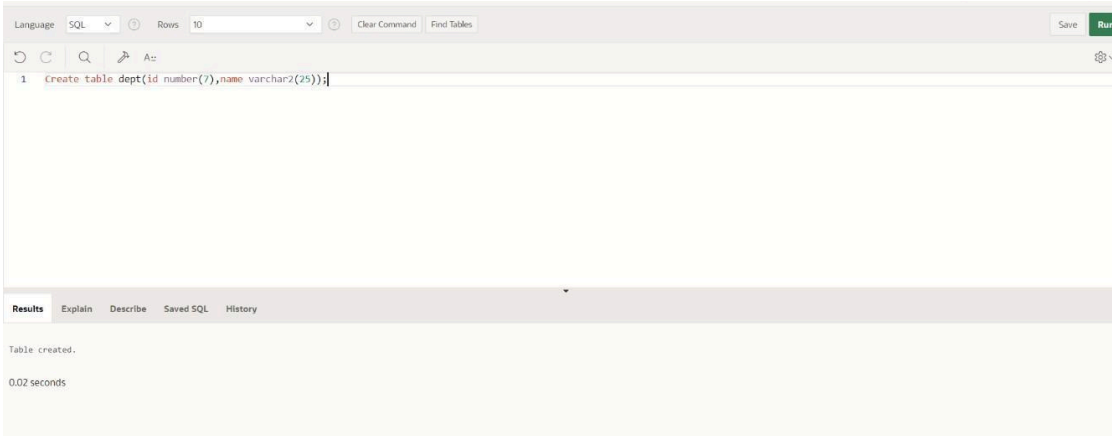
1. Create the DEPT table based on the DEPARTMENT following the table instance chart below. Confirm that the table is created.

Column name	ID	NAME
Key Type		
Nulls/Unique		
FK table		
FK column		
Data Type	Number	Varchar2
Length	7	25

QUERY:

Create table dept(id number(7),name varchar2(25));

OUTPUT:



RESULT:

The query is executed successfully.

2. Create the EMP table based on the following instance chart. Confirm that the table is created.

Column name	ID	LAST_NAME	FIRST_NAME	DEPT_ID
Key Type				
Nulls/Unique				

FK table				
FK column				

Data Type	Number	Varchar2	Varchar2	Number
Length	7	25	25	7

QUERY:
Create table emp(id number(7),Last_Name varchar2(25),First_Name varchar2(25),Dept_id number(7));

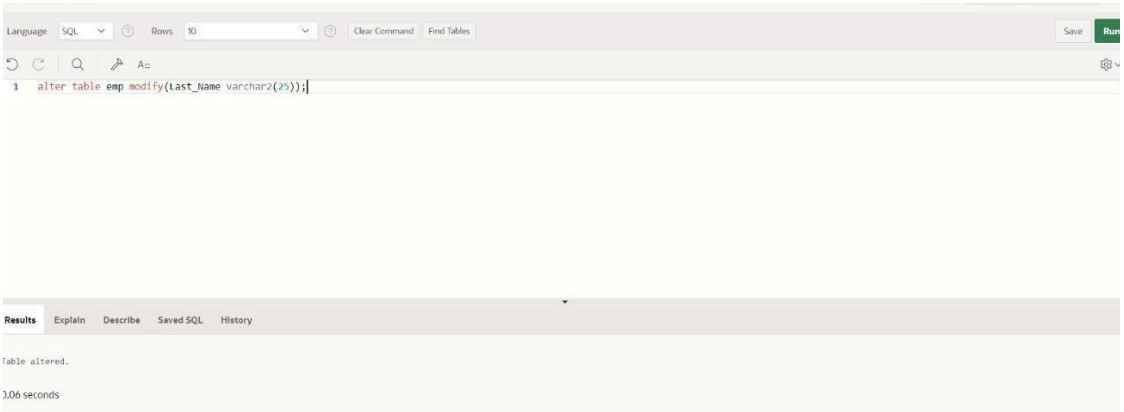
OUTPUT:

RESULT:
The query is executed successfully.

3. Modify the EMP table to allow for longer employee last names. Confirm the modification.(Hint: Increase the size to 50)

QUERY:
Alter table emp modify(Last_Name varchar2(25));

OUTPUT:



RESULT: The query is executed successfully

4. Create the EMPLOYEES2 table based on the structure of EMPLOYEES table. Include Only the Employee_id, First_name, Last_name, Salary and Dept_id coloumns. Name the columns Id, First_name, Last_name, salary and Dept_id respectively.

QUERY:

Create table employees2(id number(7),first_name varchar2(25),Last_name varchar2(25),Salary int,Dept_id number(7));

OUTPUT:

RESULT:

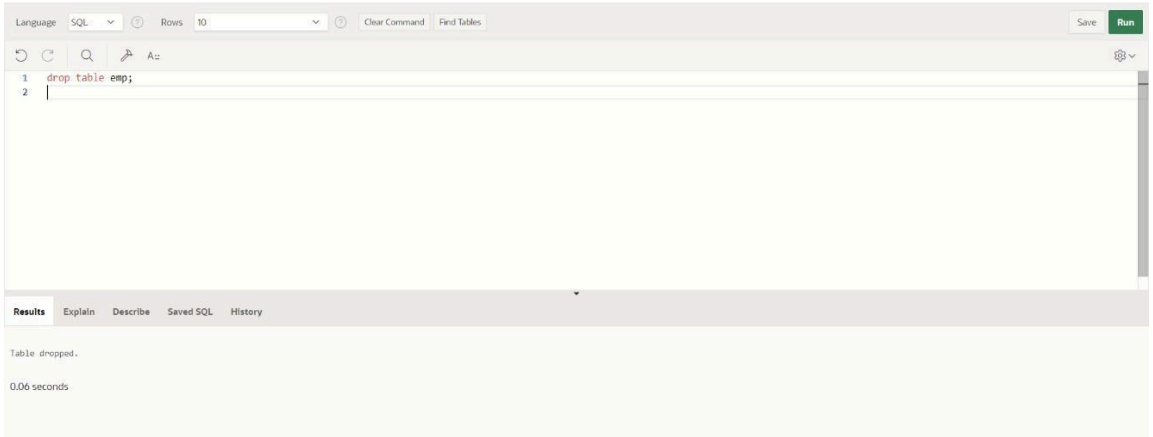
The query is executed successfully.

4. Drop the EMP table.

QUERY:

Drop table emp;

OUTPUT:



RESULT:

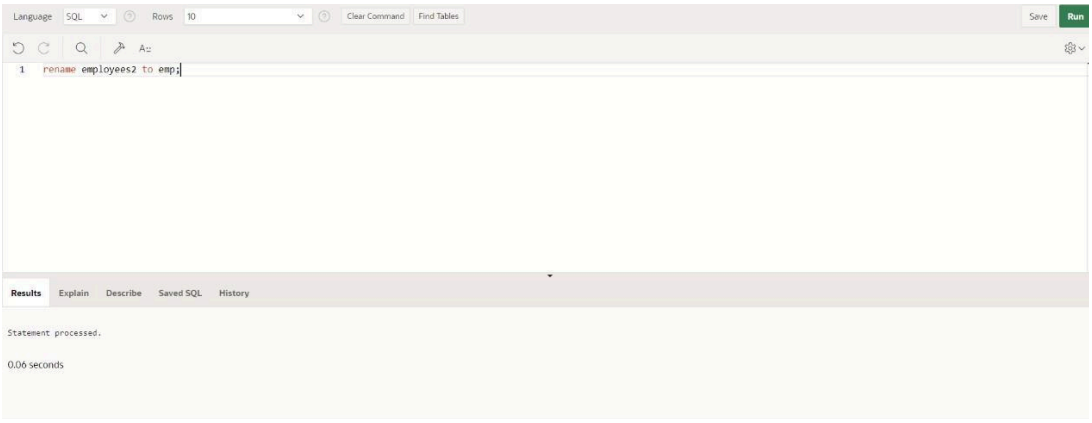
The query is executed successfully.

5. Rename the EMPLOYEES2 table as EMP.

QUERY:

Rename employees2 to emp;

OUTPUT:



RESULT:

The query is executed successfully.

6. Add a comment on DEPT and EMP tables. Confirm the modification by describing the table.

QUERY:

comment on table dept is 'Department
info'; comment on table emp is Employee
info';

OUTPUT:

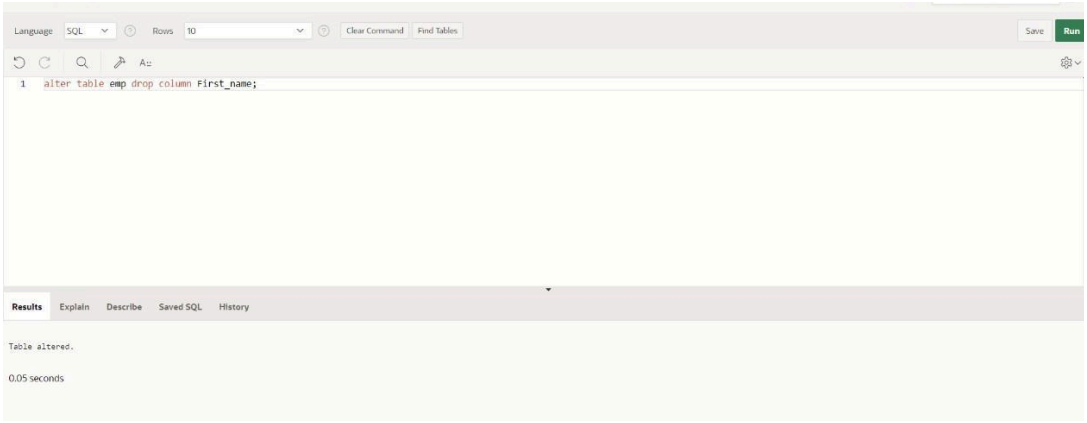
RESULT:
The query is executed successfully.

8. Drop the First_name column from the EMP table and confirm it.

QUERY:

Alter table emp drop column first_name;

OUTPUT:



RESULT:
The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

MANIPULATING DATA

EX_NO:2 **DATE:24.2.24**

1.Create MY_EMPLOYEE table with the following structure

NAME	NULL?	TYPE
ID	Not null	Number(4)
Last_name		Varchar(25)
First_name		Varchar(25)
Userid		Varchar(25)
Salary		Number(9,2)

QUERY:

Create table my_employee(id number(4),Last_Name varchar2(25),First_Name varchar2(25),Userid varchar2(25),Salary number(9,2));

OUTPUT:

RESULT:

The query is executed successfully.

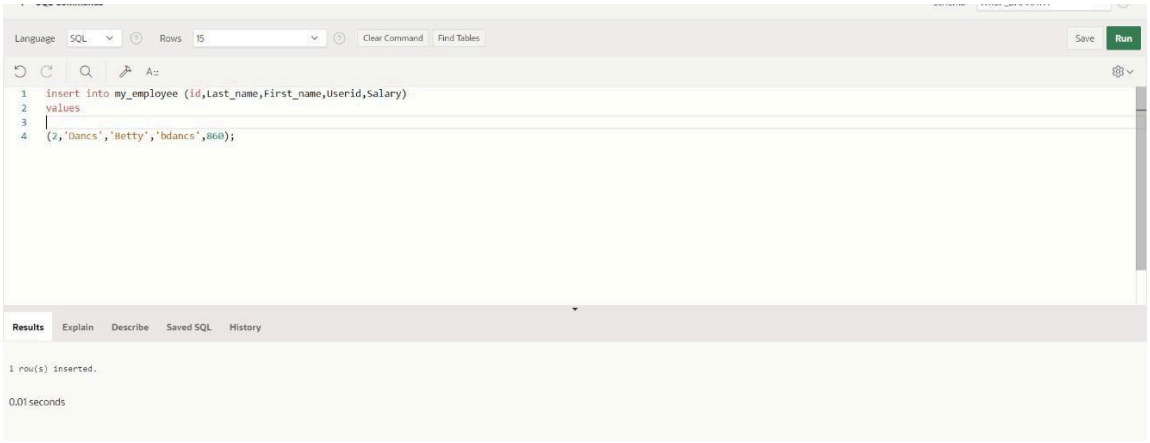
2. Add the first and second rows data to MY_EMPLOYEE table from the following sample data.

ID	Last_name	First_name	Userid	salary
1	Patel	Ralph	rpatel	895
2	Dancs	Betty	bdancs	860
3	Biri	Ben	bbiri	1100
4	Newman	Chad	Cnewman	750
5	Ropebur	Audrey	aropebur	1550

QUERY:

Insert into my_employee values(1,'Patel','Ralph','rpatel',895);
Insert into my_employee values(1,'Dancs','Betty','bdancs',860);

OUTPUT:



RESULT:

The query is executed successfully.

3. Display the table with values.

QUERY:

Select*from my_employee;

OUTPUT:

RESULT:

The query is executed successfully.

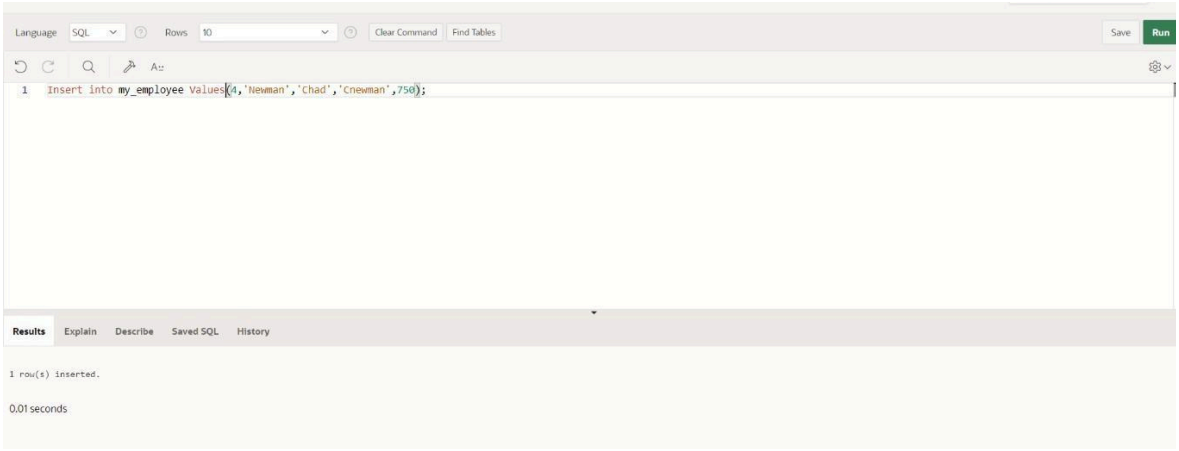
4. Populate the next two rows of data from the sample data. Concatenate the first letter of the first_name with the first seven characters of the last_name to produce Userid.

QUERY:

Insert into my_employee values(1,'Patel','Ralph','rpatel',1100);
Insert into my_employee values(1,'Dancs','Betty','bdancs',750);

OUTPUT:

RESULT:



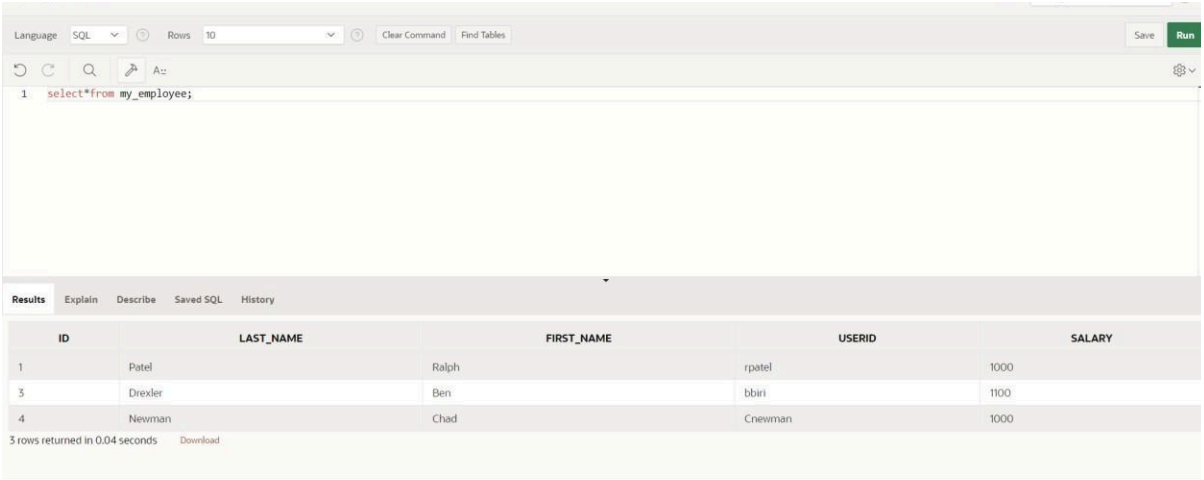
The query is executed successfully.

5.Make the data additions permanent.

QUERY:

Select*from my_employee;

OUTPUT:



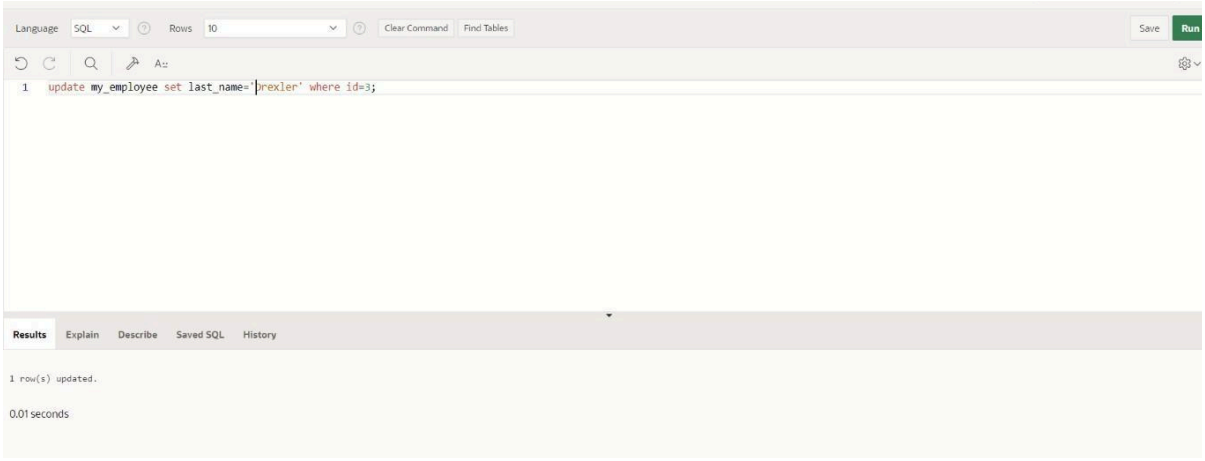
RESULT:

The query is executed successfully.

5. Change the last name of employee 3 to Drexler.

QUERY:
Update my_employee set last_name=’Drexler’ where id=3;

OUTPUT:

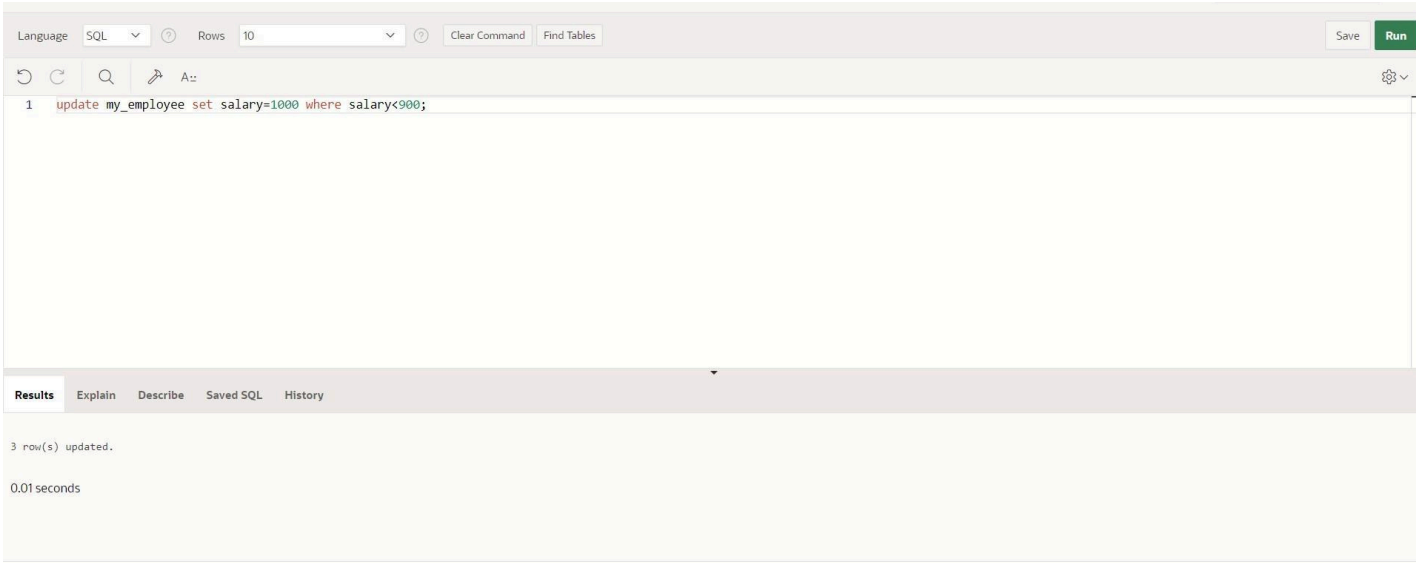


RESULT:
The query is executed successfully.

6. Change the salary to 1000 for all the employees with a salary less than 900.

QUERY:
update my_employee set salary=1000 where salary<900;

OUTPUT:

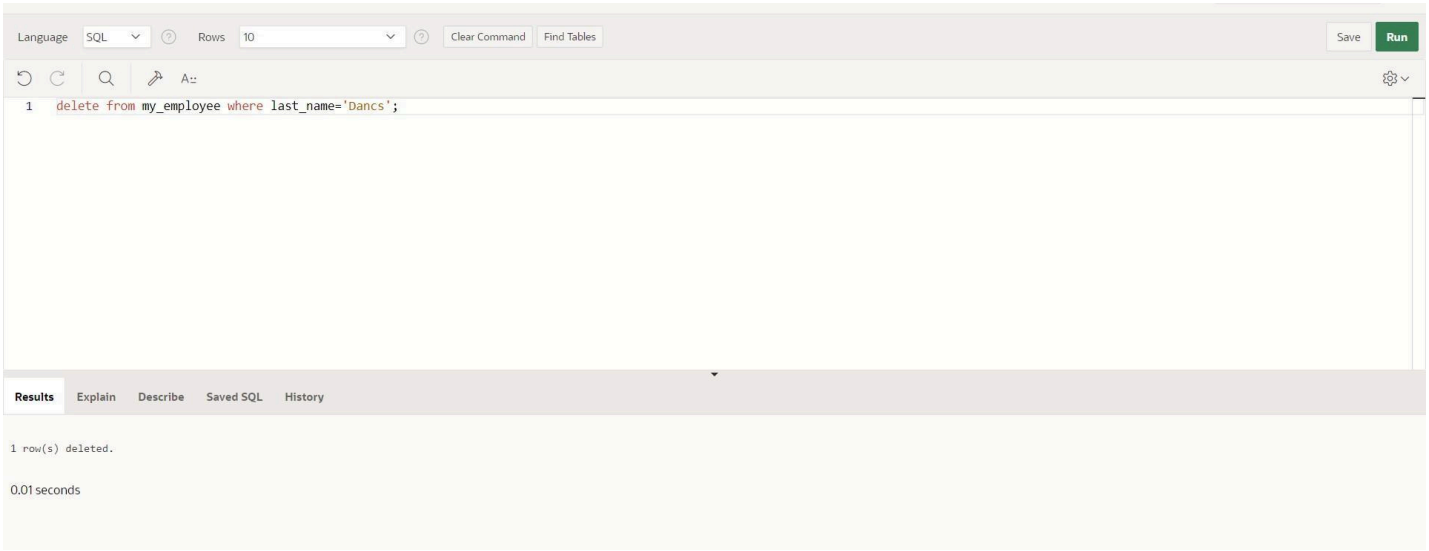


RESULT:
The query is executed successfully.

7. Delete Betty dancs from MY _EMPLOYEE table.

QUERY:
delete from my_employee where last_name=’Dancs’;

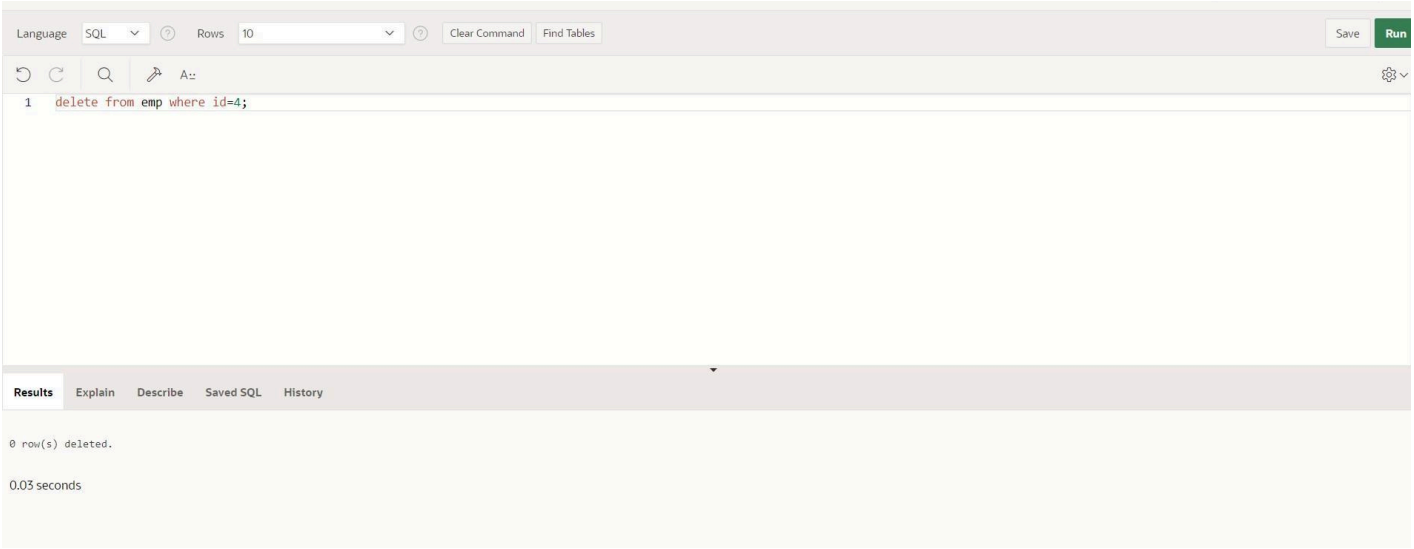
OUTPUT:



RESULT:
The query is executed successfully.

8. Empty the fourth row of the emp table.
QUERY:
Delete from emp where id=4;

OUTPUT:



RESULT:
The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

INCLUDING CONSTRAINTS

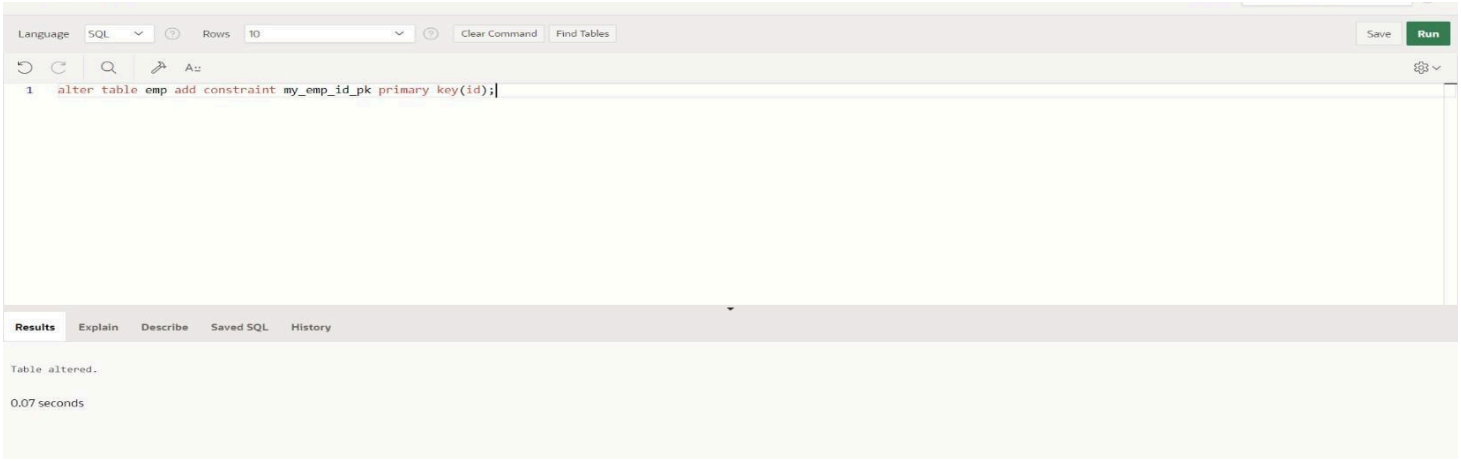
EX_NO:3 **DATE:28.2.24**

1. Add a table-level PRIMARY KEY constraint to the EMP table on the ID column.The constraint should be named at creation. Name the constraint my_emp_id_pk.

QUERY:

```
alter table emp add constraint my_emp_id_pk primary key(id);
```

OUTPUT:



RESULT:

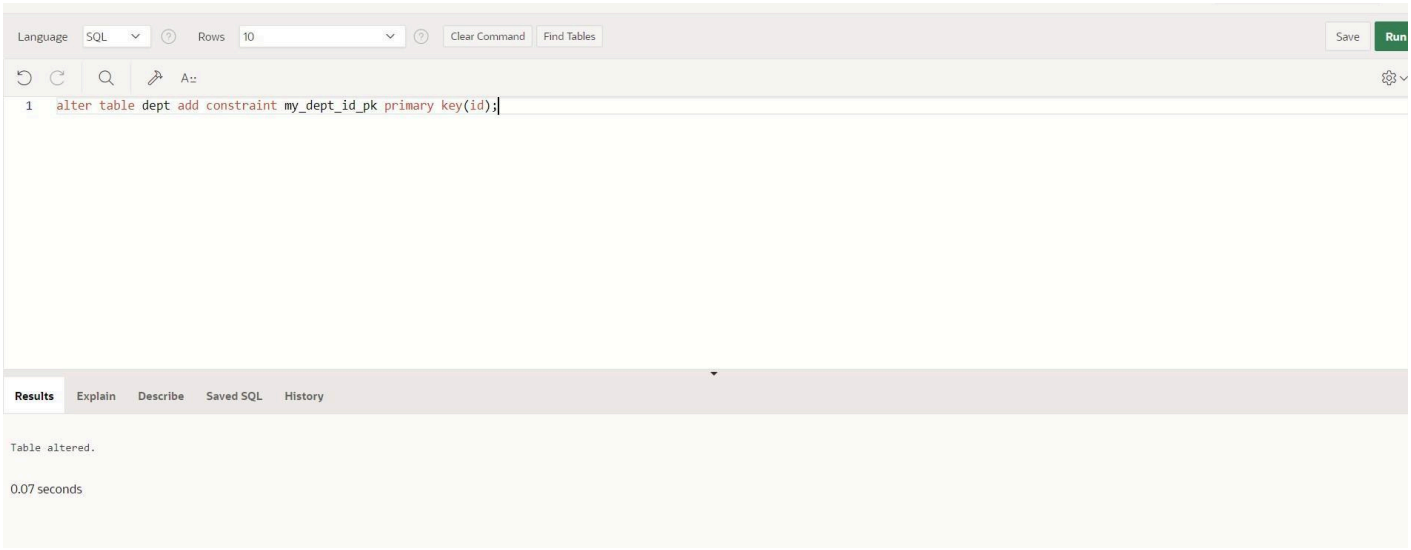
The query is executed successfully.

2. Create a PRIMAY KEY constraint to the DEPT table using the ID colum. The constraint should be named at creation. Name the constraint my_dept_id_pk.

QUERY:

```
Alter table emp add constraint my_dept_id_pk primary key(id);
```

OUTPUT:



RESULT:

The query is executed successfully.

3. Add a column DEPT_ID to the EMP table. Add a foreign key reference on the EMP table that ensures that the employee is not assigned to a nonexistent department. Name the constraint my_emp_dept_id_fk.

QUERY:

alter table emp add constraint my_emp_dept_id_fk foreign key(dept_id) references emp(id);

OUTPUT:

RESULT:

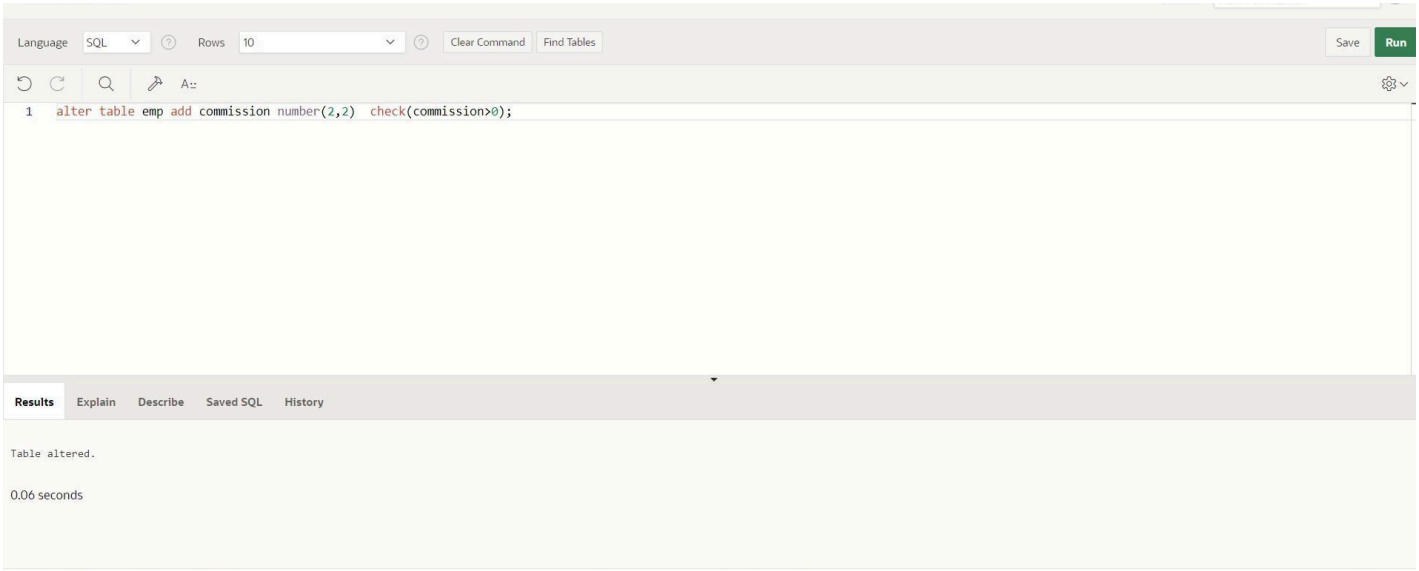
The query is executed successfully.

4. Modify the EMP table. Add a COMMISSION column of NUMBER data type, precision 2, scale 2. Add a constraint to the commission column that ensures that a commission value is greater than zero.

QUERY:

Alter table emp add constraint number(2,2) check(commission);

OUTPUT:



RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

Writing Basic SQL SELECT Statements

EX_NO:4 **DATE:2.3.24**

1. The following statement executes successfully.

Identify the Errors

SELECT employee_id, last_name
sal*12 ANNUAL SALARY
FROM employees;

QUERY:

Select employee_id,last_name, sal*12 as “ANNUAL SALARY” from employees;

OUTPUT

RESULT:

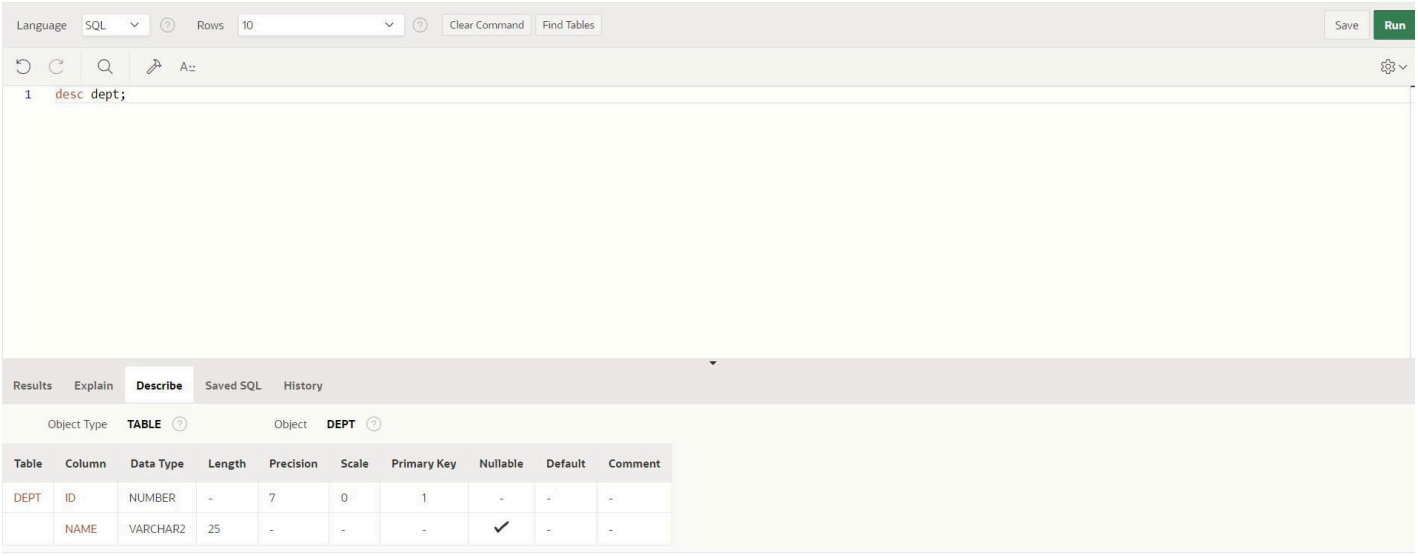
The query is executed successfully.

2. Show the structure of departments in the table. Select all the data from it.

QUERY:

Desc dept;

OUTPUT:



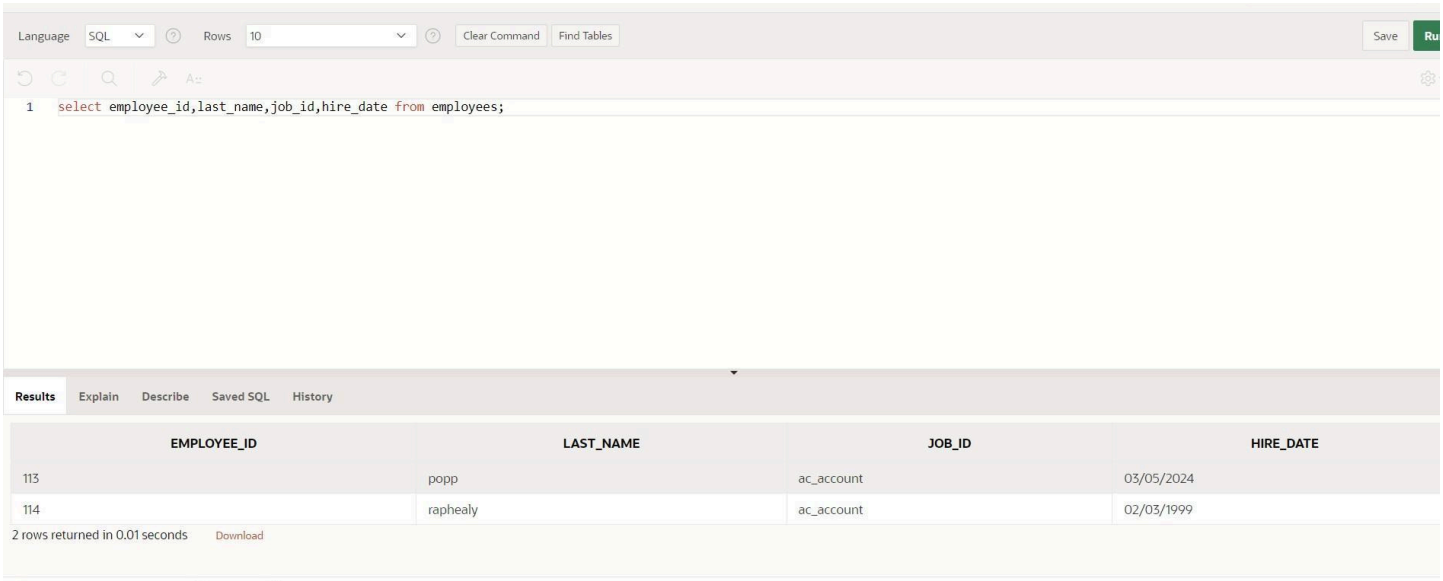
RESULT:
The query is executed successfully.

3. Create a query to display the last name, job code, hire date, and employee number for each employee, with employee number appearing first.

QUERY:

Select employee_id,last_name,job_id,hire_date from employees;

OUTPUT:



RESULT:

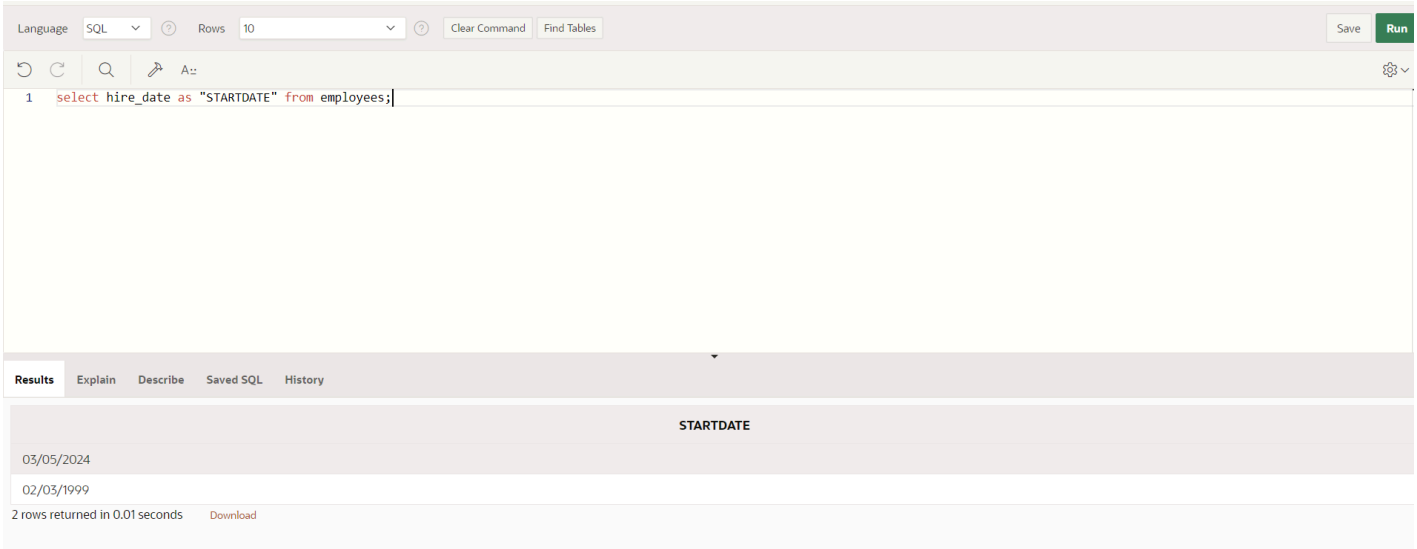
The query is executed successfully.

4. Provide an alias STARTDATE for the hire date.

QUERY:

select hire_date as “STARTDATE” from employees;

OUTPUT:



RESULT:

The query is executed successfully.

3. Create a query to display unique job codes from the employee table.

QUERY:

```
select distinct job_id from employees;
```

OUTPUT:

RESULT:

The query is executed successfully.

4. Display the last name concatenated with the job ID , separated by a comma and space, and name the column EMPLOYEE and TITLE.

QUERY:

```
Select last_name||', '||job_id as "EMPLOYEE_AND_TITLE" from employees;
```

OUTPUT:

RESULT:

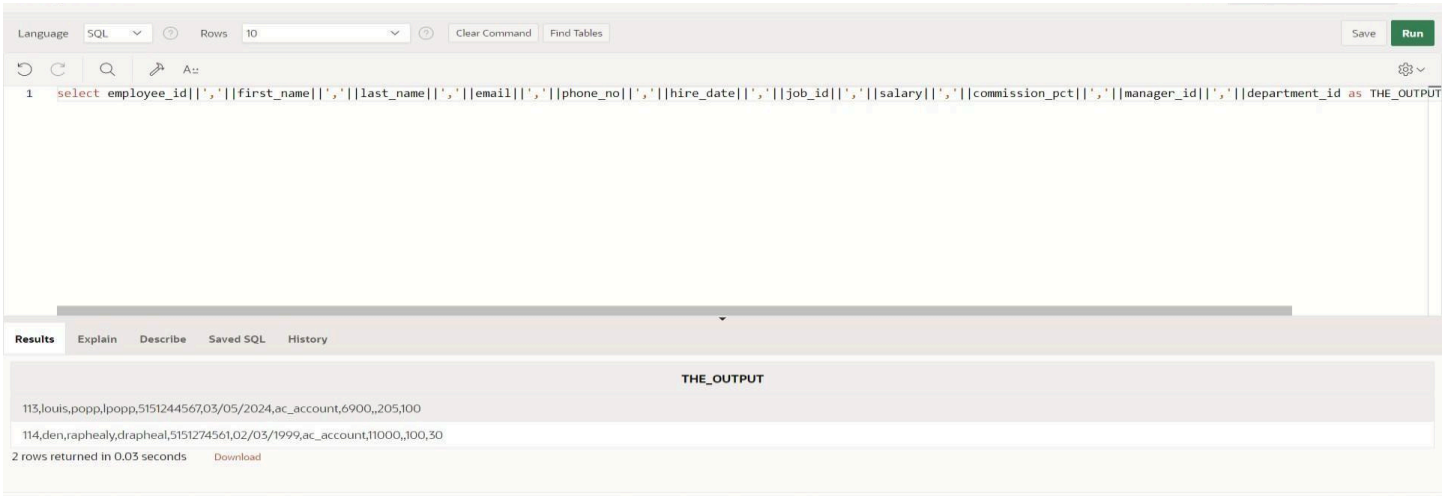
The query is executed successfully.

5. Create a query to display all the data from the employees table. Separate each column by a comma. Name the column THE_OUTPUT.

QUERY:

```
Select
employee_id||','||first_name||','||last_name||','||email||','||phone_no||','||hire_date||','||job_id||','||salary||','||commission_pct||','||manager_id||','||department_id as THE_OUTPUT from employees;
```

OUTPUT:



RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

RESTRICTING AND SORTING DATA

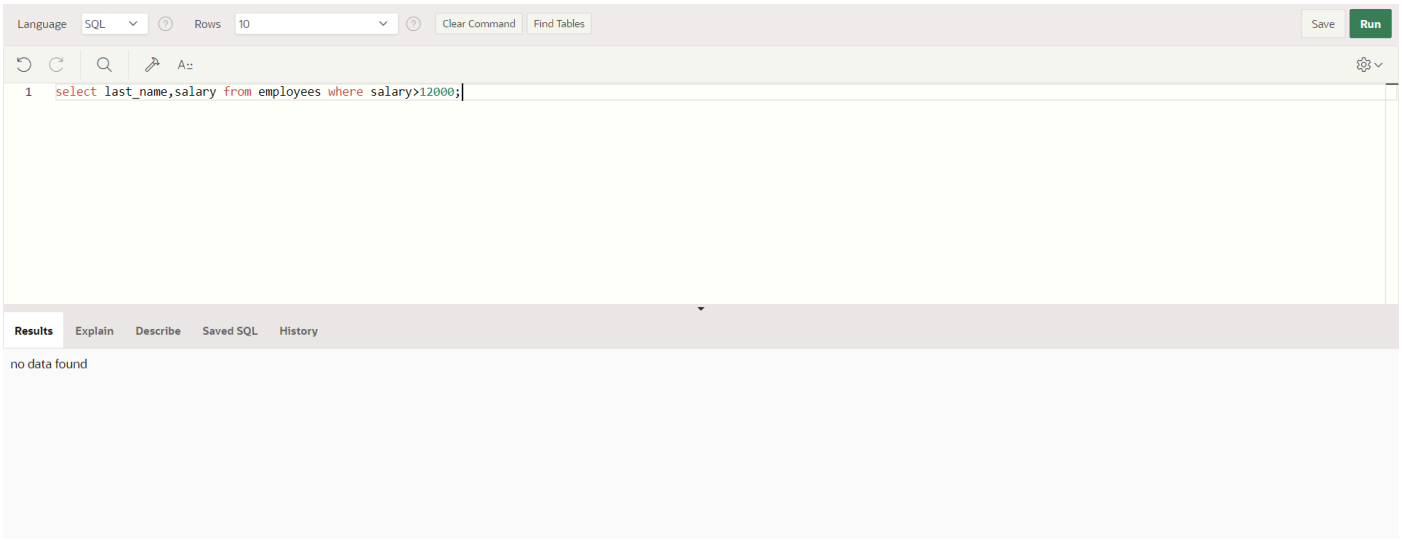
EX_NO:5 **DATE: 06.03.2024**

1.Create a query to display the last name and salary of employees earning more than 12000.

QUERY:

Select last_name from employees where salary>12000;

OUTPUT:



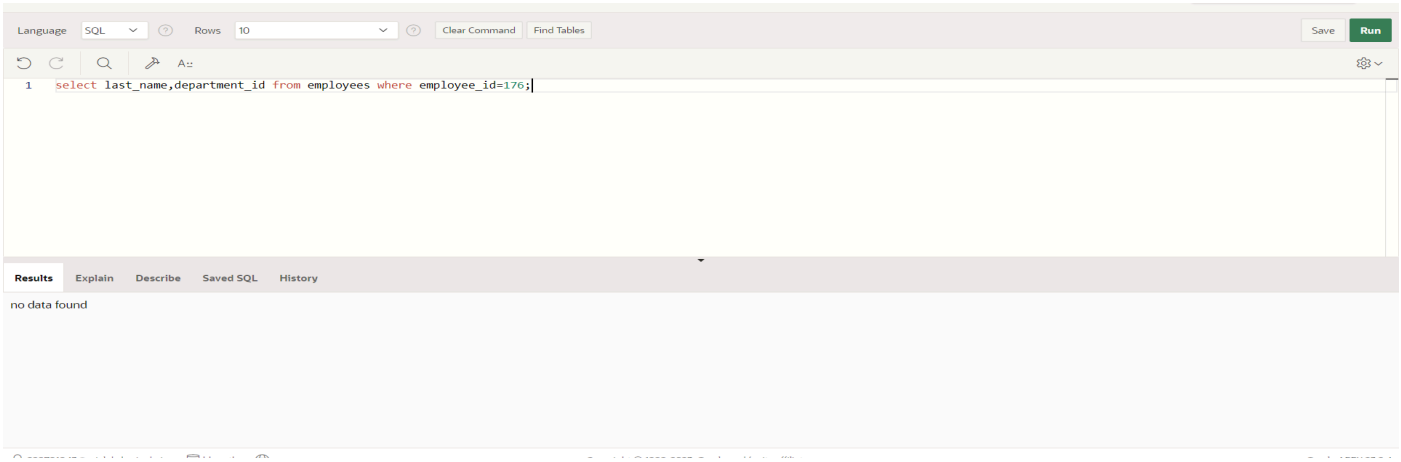
RESULT:
The query is executed successfully.

2. Create a query to display the employee last name and department number for employee number 176.

QUERY:

Select last_name,department_id from employees where employee_id=176;

OUTPUT:



RESULT:

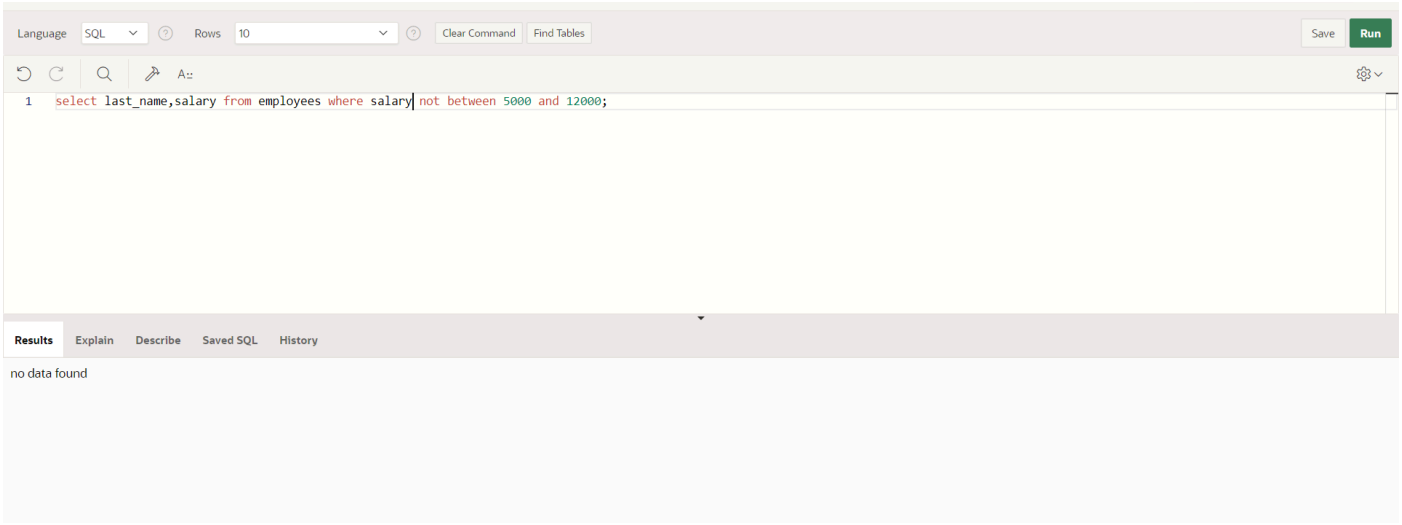
The query is executed successfully.

3. Create a query to display the last name and salary of employees whose salary is not in the range of 5000 and 12000. (hints: not between)

QUERY:

select last_name,salary from employees where salary not between 5000 and 12000;

OUTPUT:



RESULT:
The query is executed successfully.

4. Display the employee last name, job ID, and start date of employees hired between February 20,1998 and May 1,1998.order the query in ascending order by start date.(hints: between)

QUERY:

Select last_name,job_id,hire_date from employees where hire_date between 'February,20,1998' and 'May,1,1998';

OUTPUT:

RESULT:
The query is executed successfully.

5. Display the last name and department number of all employees in departments 20 and 50 in alphabetical order by name.(hints: in, orderby)

QUERY:

select last_name,department_id from employees where department_id in(20,50) order by last_name;

OUTPUT:

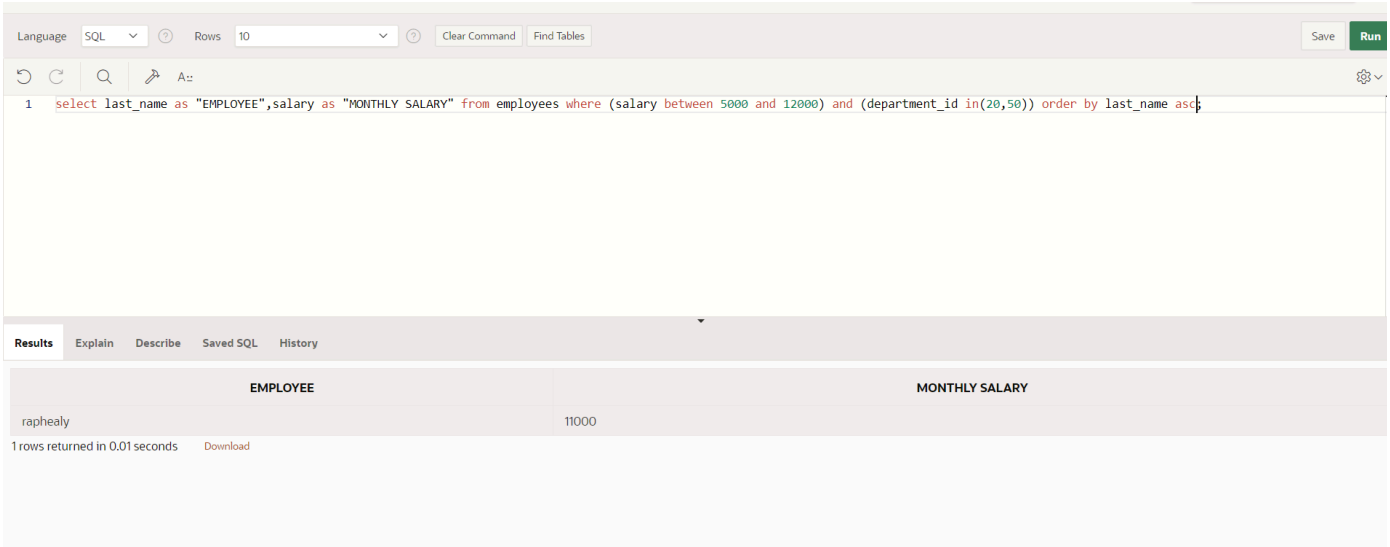
RESULT:
The query is executed successfully.

6. Display the last name and salary of all employees who earn between 5000 and 12000 and are in departments 20 and 50 in alphabetical order by name. Label the columns EMPLOYEE, MONTHLY SALARY respectively.(hints: between, in)

QUERY:

select last_name as "EMPLOYEE",salary as "MONTHLY SALARY" from employees where (salary between 5000 and 12000) and (department_id in(20,50)) order by last_name asc;

OUTPUT:



RESULT:
The query is executed successfully.

7. Display the last name and hire date of every employee who was hired in 1994.(hints: like)

QUERY:

select last_name,hire_date from employees where hire_date like '1994';

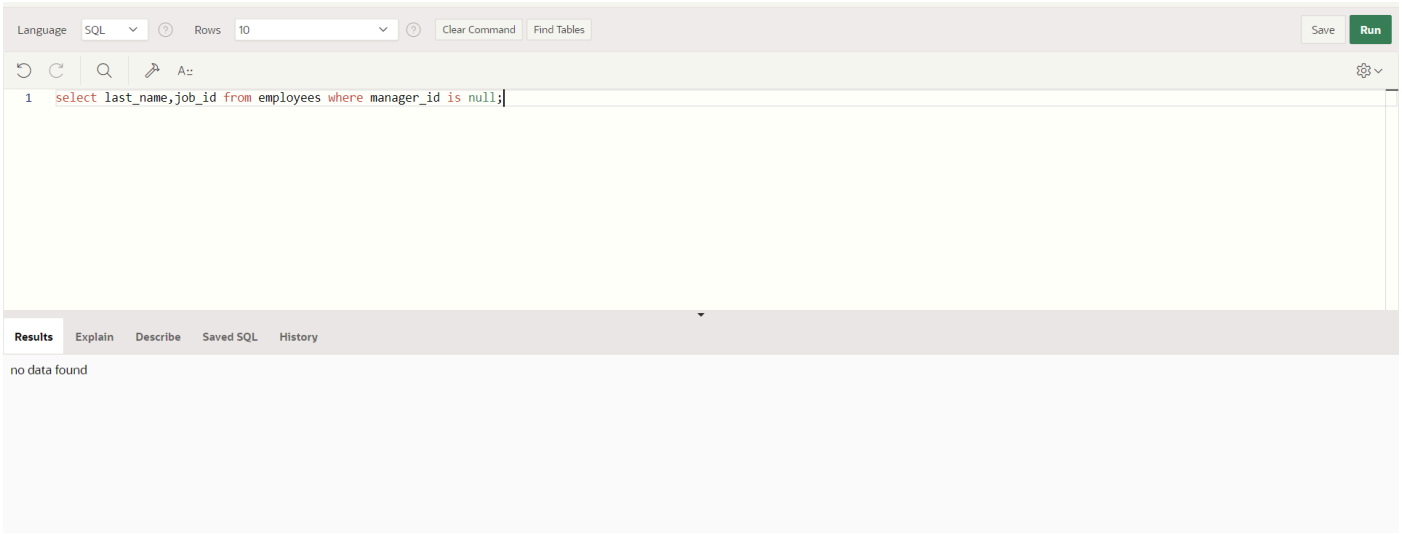
OUTPUT:

RESULT: The query is executed successfully.
8. Display the last name and job title of all employees who do not have a manager.(hints: is null)

QUERY:

select last_name,job_id from employees where manager_id is null;

OUTPUT:



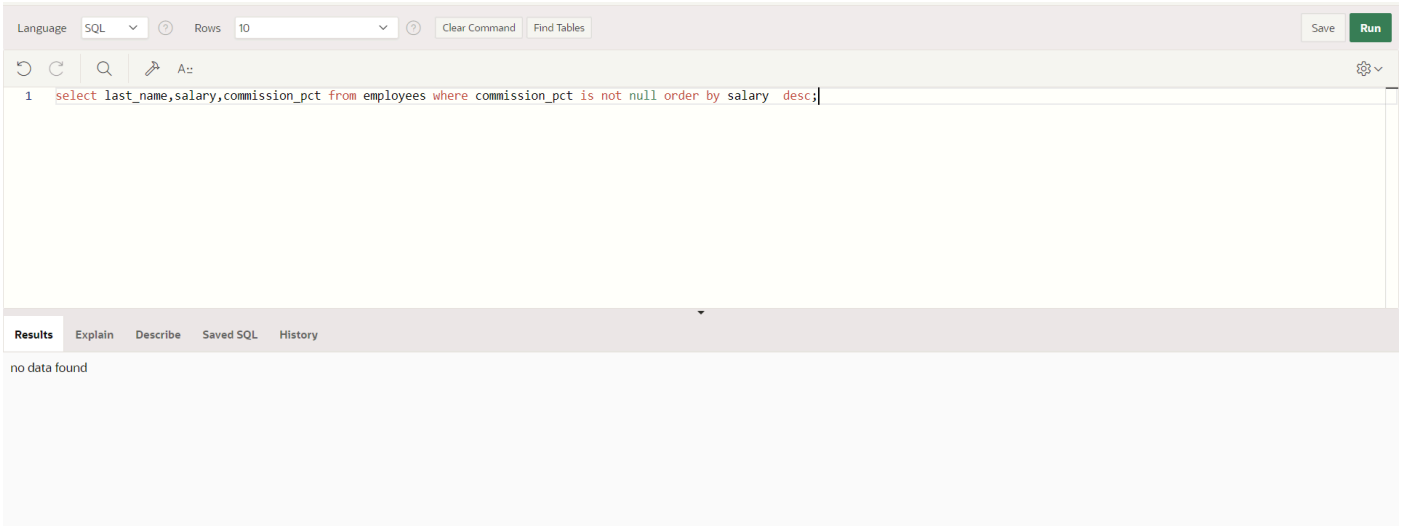
RESULT:
The query is executed successfully.

9. Display the last name, salary, and commission for all employees who earn commissions. Sort data in descending order of salary and commissions.(hints: is not nul,orderby)

QUERY:

select last_name,salary,commission_pct from employees where commission_pct is not null order by salary desc;

OUTPUT:



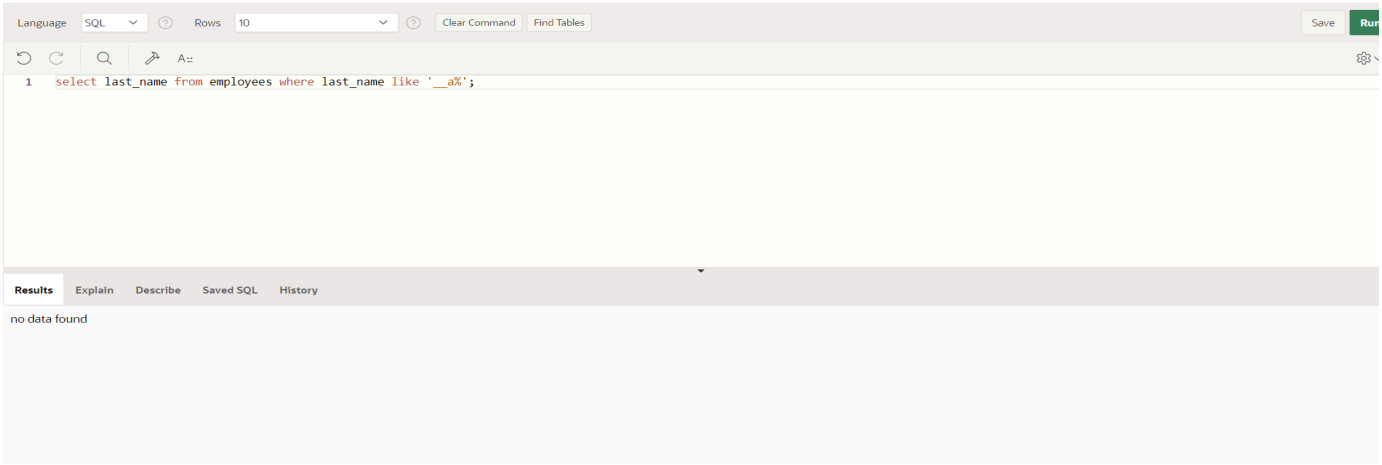
RESULT:
The query is executed successfully.

10. Display the last name of all employees where the third letter of the name is ***a***.(hints:like)

QUERY:

select last_name from employees where last_name like '__a%';

OUTPUT:



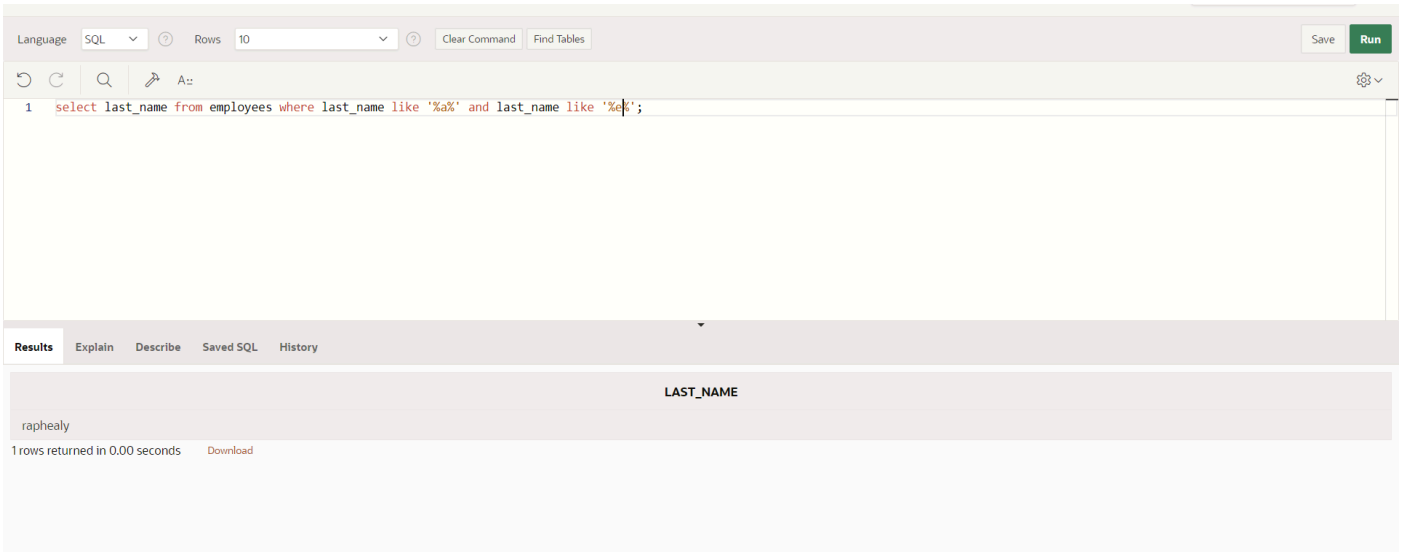
RESULT:
The query is executed successfully.

11. Display the last name of all employees who have an a and an ***e*** in their last name.(hints: like)

QUERY:

select last_name from employees where last_name like '%a%' and last_name like '%e%';

OUTPUT:



RESULT:
The query is executed successfully.

12. Display the last name and job and salary for all employees whose job is sales representative or stock clerk and whose salary is not equal to 2500 ,3500 or 7000.(hints:in,not in)

QUERY:

select last_name,job_id,salary from employees where job_id in ('sales representative','stock clerk') and salary not in(2500,3500,7000);

OUTPUT:

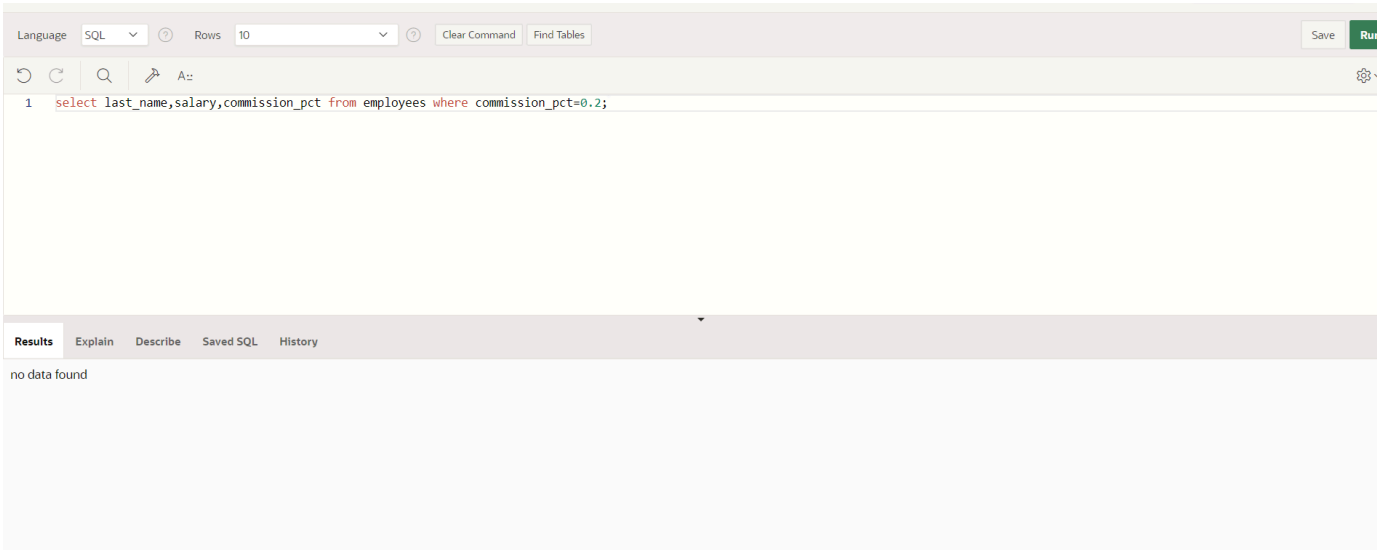
RESULT:
The query is executed successfully.

13. Display the last name, salary, and commission for all employees whose commission amount is 20%.(hints:use predicate logic)

QUERY:

select last_name,salary,commission_pct from employees where commission_pct=0.2;

OUTPUT:



RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

SINGLE ROW FUNCTIONS

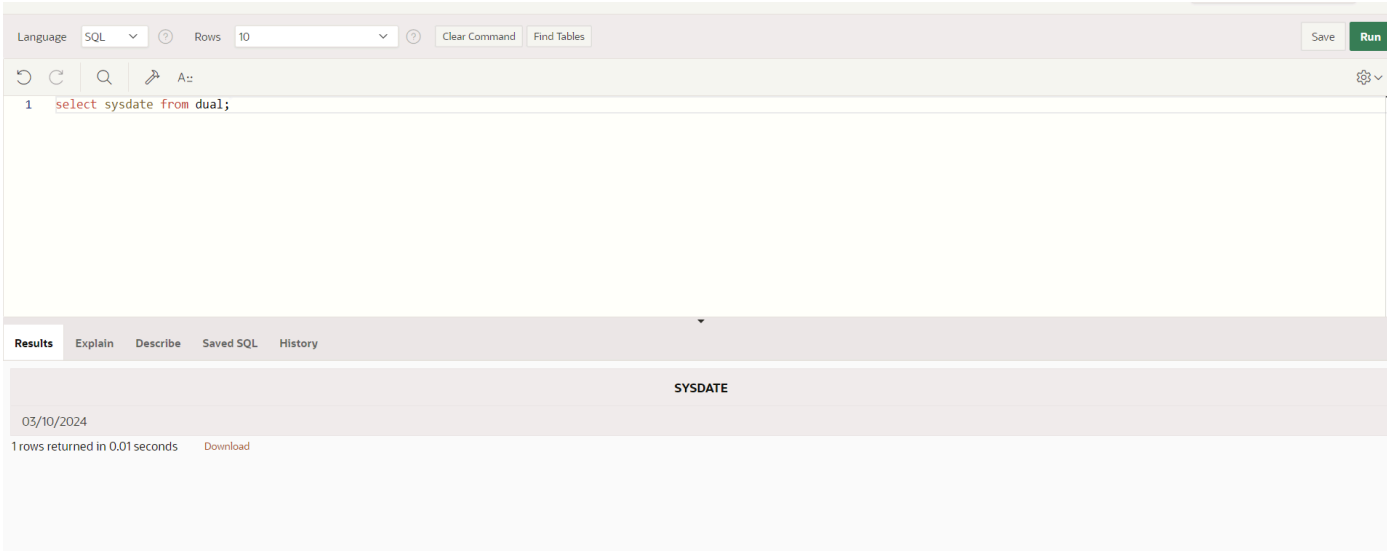
EX_NO:6 **DATE:13.03.2024**

1.Write a query to display the current date. Label the column Date.

QUERY:

select sysdate from dual;

OUTPUT:



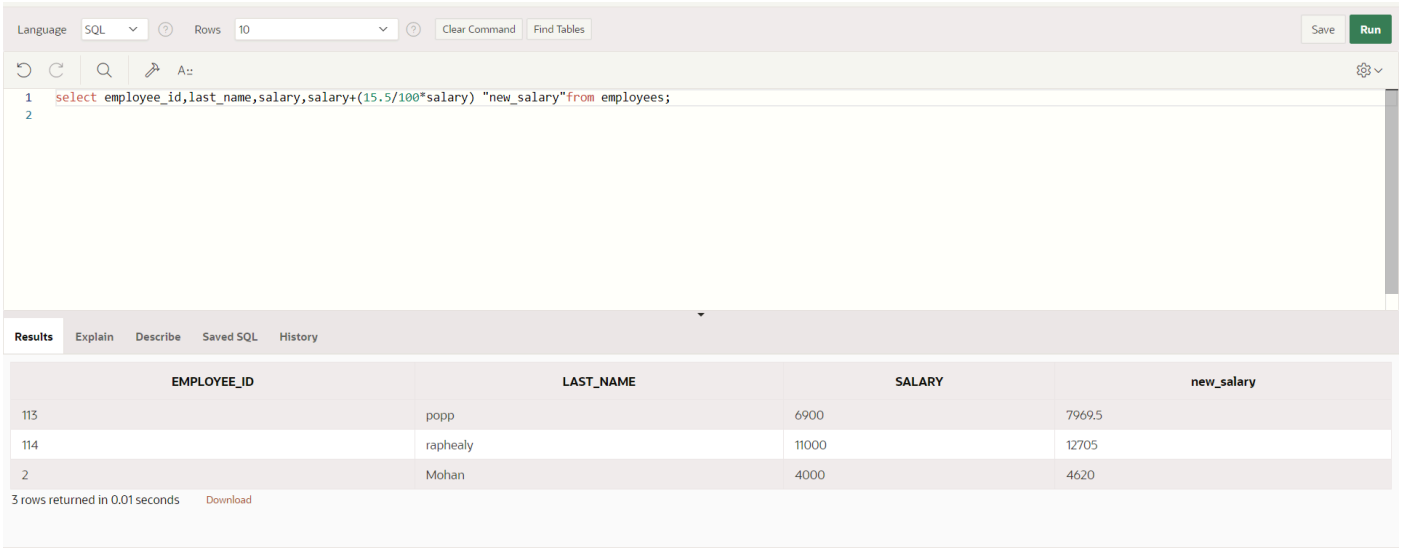
RESULT:
The query is executed successfully.

2.The HR department needs a report to display the employee number, last name, salary, and increased by 15.5% (expressed as a whole number) for each employee. Label the column New Salary.

QUERY:

select employee_id,last_name,salary,salary+(15.5/100*salary) "new_salary"from employees;

OUTPUT:



RESULT:
The query is executed successfully.

3. Modify your query lab_03_02.sql to add a column that subtracts the old salary from the new salary. Label the column Increase.

QUERY:

select employee_id,last_name,salary,salary+(15.5/100*salary) "new_salary",new_salary-salary as "Increase" from employees;

OUTPUT:

RESULT:
The query is executed successfully.

4. Write a query that displays the last name (with the first letter uppercase and all other letters lowercase) and the length of the last name for all employees whose name starts with the letters J, A, or M. Give each column an appropriate label. Sort the results by the employees' last names.

QUERY:

```
select initcap(last_name),length(last_name) as "Length_of_last_name" from employees where last_name like 'J%' or last_name like 'A%' or last_name like 'M%' order by last_name asc;
```

OUTPUT:

RESULT:
The query is executed successfully.

5. Rewrite the query so that the user is prompted to enter a letter that starts the last name. For example, if the user enters H when prompted for a letter, then the output should show all employees whose last name starts with the letter H.

QUERY:

```
select initcap(last_name) "Name",length(last_name) "Length of last name" from employees where last_name like 'H%' order by last_name;
```

OUTPUT:

RESULT:
The query is executed successfully.

6. The HR department wants to find the length of employment for each employee. For each employee, display the last name and calculate the number of months between today and the date on which the employee was hired. Label the column MONTHS_WORKED. Order your results by the number of months employed. Round the number of months up to the closest whole number.

QUERY:

select last_name,round((sysdate-hire_date)/30,0) as "MONTHS_WORKED" from employees order by round((sysdate-hire_date)/30,0) asc;

OUTPUT:

RESULT:
The query is executed successfully.

7. Create a report that produces the following for each employee:

<employee last name> earns<salary>monthly but wants <3 times salary>.Label the column Dream Salaries.

QUERY:

select last_name||' earns '||salary||' monthly but wants '||salary*3 as "DREAM_SALARIES" from employees;

OUTPUT:

RESULT:

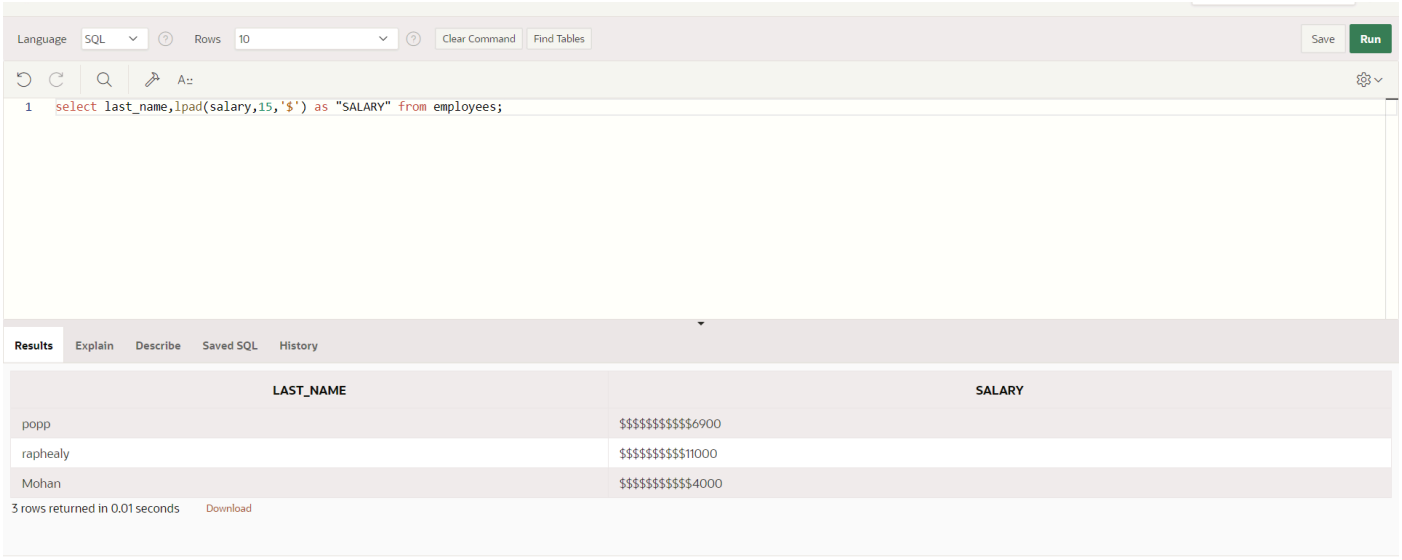
The query is executed successfully.

8. Create a query to display the last name and salary for all employees. Format the salary to be 15 characters long, left-padded with the $ symbol. Label the column SALARY.

QUERY:

select last_name,lpad(salary,15,'$') as "SALARY" from employees;

OUTPUT:



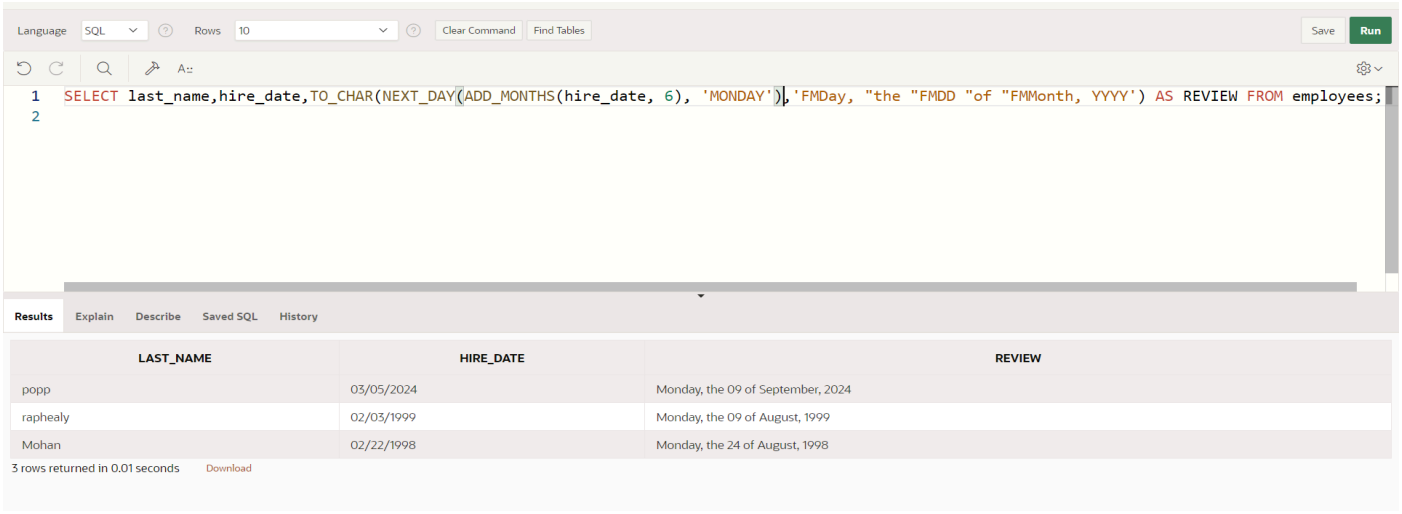
RESULT:
The query is executed successfully.

9. Display each employee's last name, hire date, and salary review date, which is the first Monday after six months of service. Label the column REVIEW. Format the dates to appear in the format similar to "Monday, the Thirty-First of July, 2000."

QUERY:

SELECT last_name,hire_date,TO_CHAR(NEXT_DAY(ADD_MONTHS(hire_date, 6), 'MONDAY'),'FMDay, "the "FMDD "of "FMMonth, YYYY') AS REVIEW FROM employees;

OUTPUT:



RESULT:

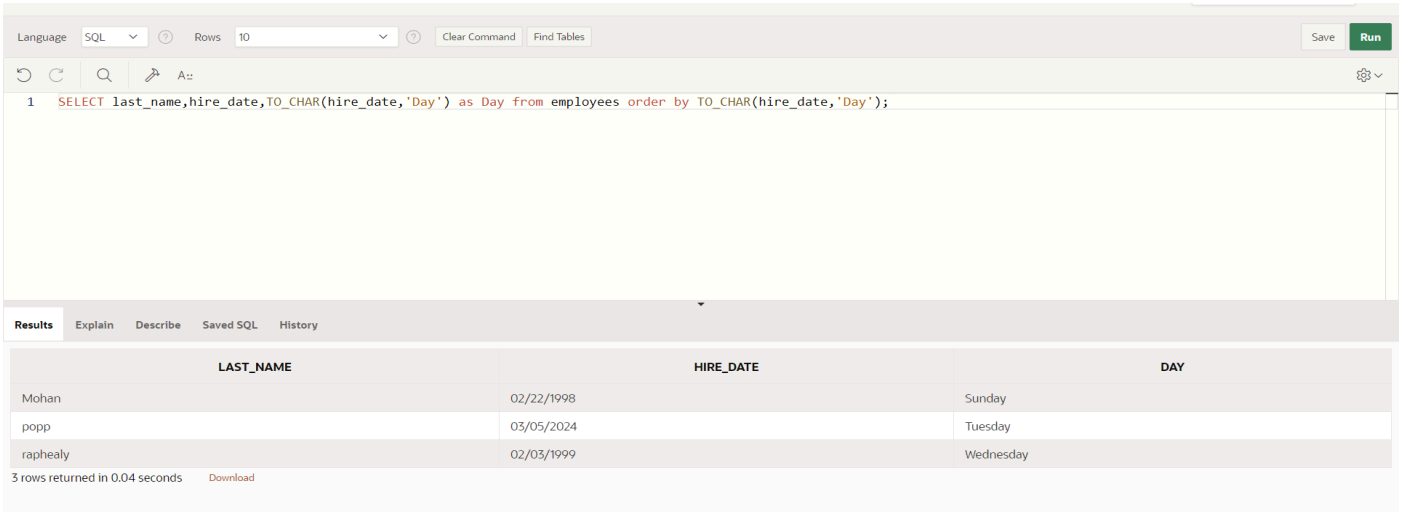
The query is executed successfully.

10. Display the last name, hire date, and day of the week on which the employee started. Label the column DAY. Order the results by the day of the week, starting with Monday.

QUERY:

SELECT last_name,hire_date,TO_CHAR(hire_date,'Day') as Day from employees order by TO_CHAR(hire_date,'Day');

OUTPUT:



RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

DISPLAYING DATA FROM MULTIPLE TABLES

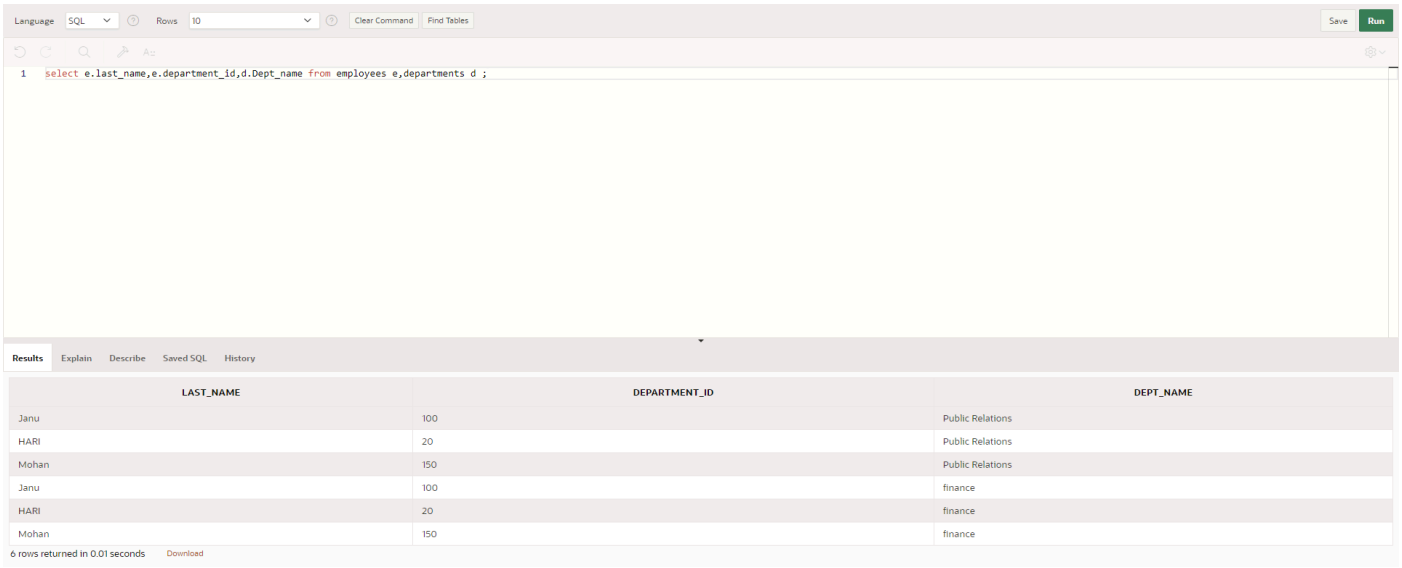
EX_NO:7 **DATE:16.3.24**

1.Write a query to display the last name, department number, and department name for all employees.

QUERY:

Select e.last_name,e.department_number,d.dept_id from employees e,departments d where e.department_number=d.dept_id;

OUTPUT:



RESULT:

The query is executed successfully.

2.Create a unique listing of all jobs that are in department 80. Include the location of the department in the output.

QUERY:

select distinct job_id,loc_id from employees e,departments d where e.department_number=d.dept_id and e.department_number=80;

OUTPUT:

RESULT:

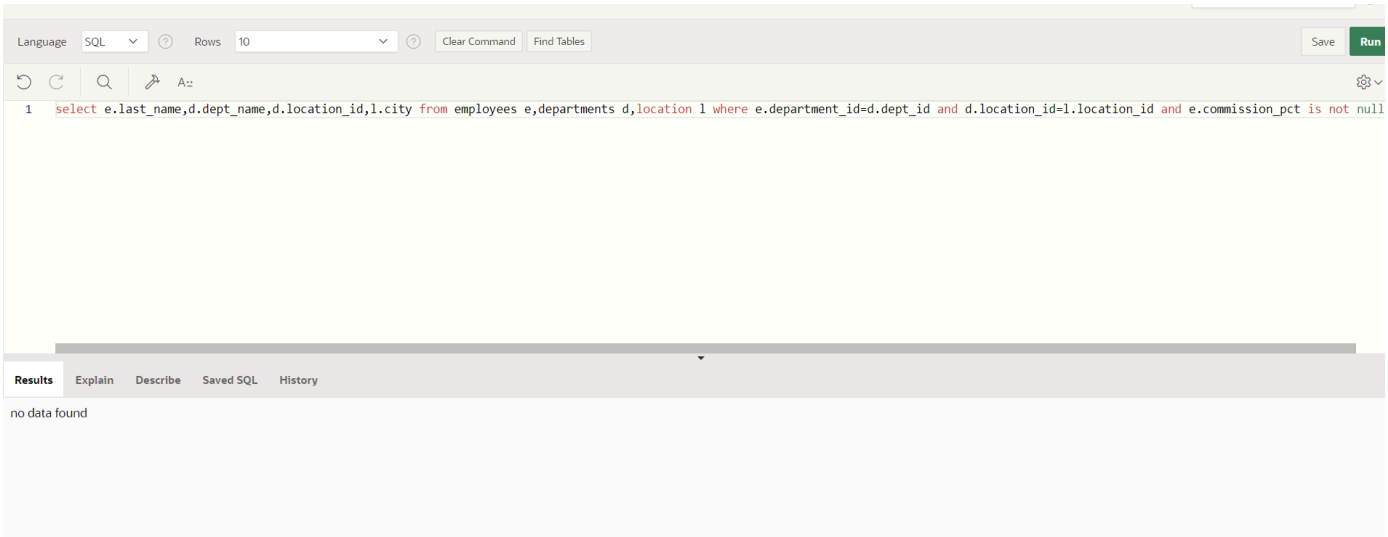
The query is executed successfully.

3.Write a query to display the employee last name, department name, location ID, and city of all employees who earn a commission

QUERY:

Select e.last_name,e.department_number,d.dept_name,d.loc_id,l.city from employees e,departments d,location l where e.department_number=d.dept_id and d.loc_id=l.location_id and e.commission_pct is not null;

OUTPUT:



RESULT:

The query is executed successfully.

4. Display the employee last name and department name for all employees who have an a(lowercase) in their last names.

QUERY:

Select employees.last_name,departments.dept_name from employees,departmentswhere employees.department_number=departments.dept_id and last_name like ‘%a%’;

OUTPUT:

RESULT:

The query is executed successfully.

5. Write a query to display the last name, job, department number, and department name for all employees who work in Toronto.

QUERY:

Select e.last_name,e.department_number,e.job_id,d.dept_name from employees e join dept d on(e.department_number=d.dept_id) join location on (d.location_id=location.location_id)__ where lower(location.city)=’toronto’;

OUTPUT:

RESULT:

The query is executed successfully.

6.Display the employee last name and employee number along with their manager's last name and manager number. Label the columns Employee, Emp#, Manager, and Mgr#, Respectively

QUERY:

Select w.last_name "Employee",w.emp_id "emp#",m.last_name 'manager",m.emp_id "Mgr#" from employees m on (w.manager_id=m.emp_id);

OUTPUT:

RESULT:

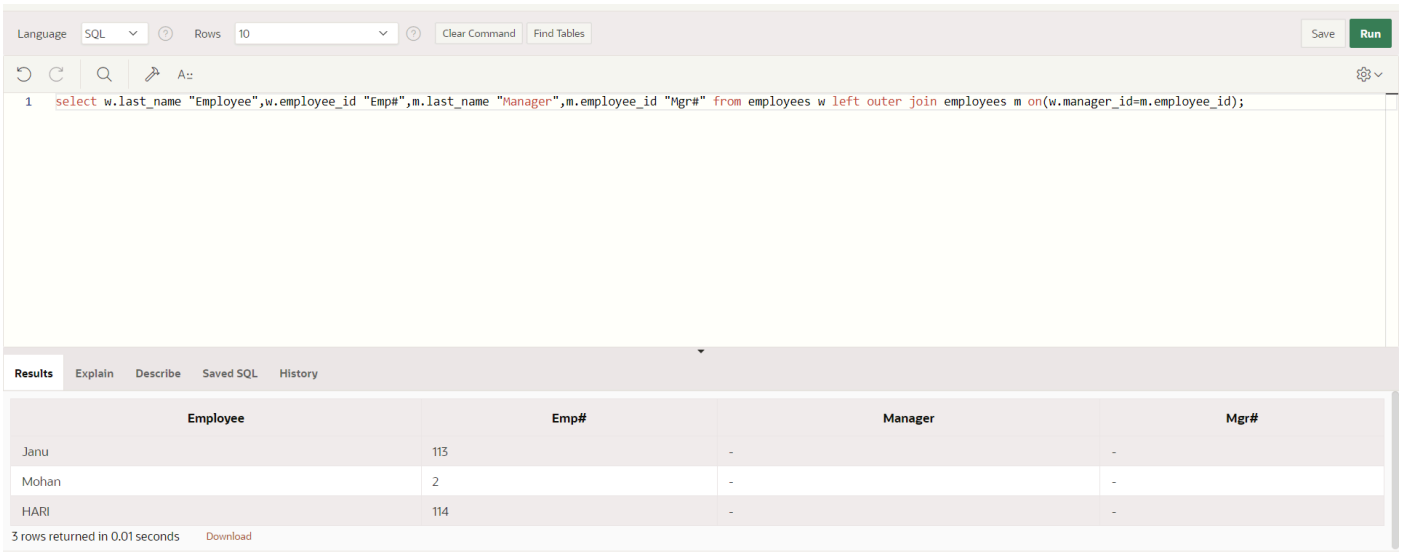
The query is executed successfully.

7. Modify lab4_6.sql to display all employees including King, who has no manager. Order the results by the employee number.

QUERY:

Select w.last_name “Employee”,w.emp_id “emp#”,m.last_name ‘manager”,m.emp_id “Mgr#” from employees w left outer join employees m on (w.manager_id=m.emp_id);

OUTPUT:



RESULT:

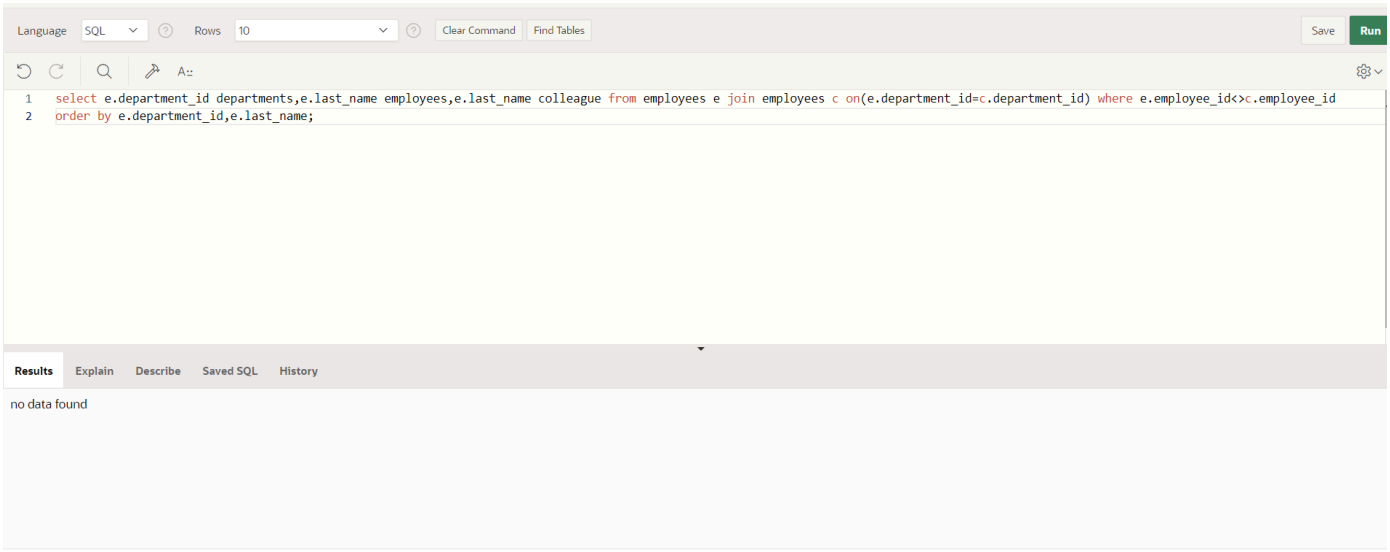
The query is executed successfully.

8.Create a query that displays employee last names, department numbers, and all the employees who work in the same department as a given employee. Give each column an appropriate label

QUERY:

select e.department_number departments,e.last_name colleague from employees e join employees c on (e.department_number=c.department_number) where e.emp_id <> c.emp_id order by e.department_number,e.last_name,c.last_name;

OUTPUT:



RESULT:

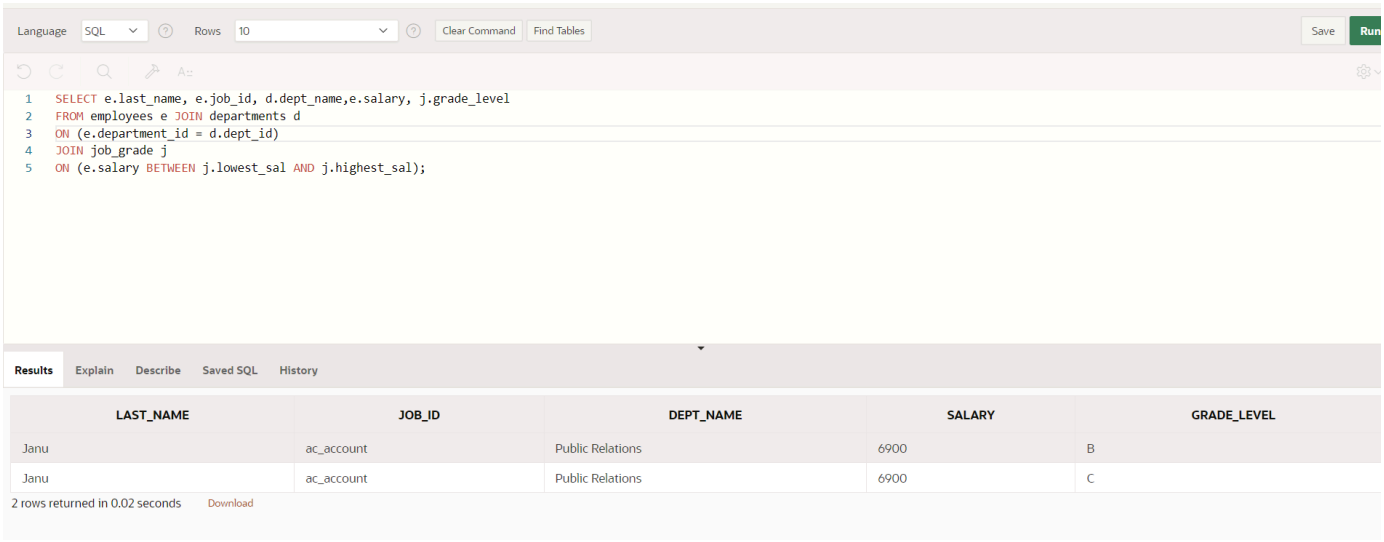
The query is executed successfully.

9.Show the structure of the JOB_GRADES table. Create a query that displays the name, job, department name, salary, and grade for all employees

QUERY:

```
SELECT e.last_name, e. job_id, d.dept_name,e.salary, j• grade_level
FROM emp18 e JOIN dept18 d
ON (e.department_id = d. dept_id)
JOIN job_grade j
ON (e.salary BETWEEN j. lowest_ sal AND j.highest_sal);
```

OUTPUT:



RESULT:

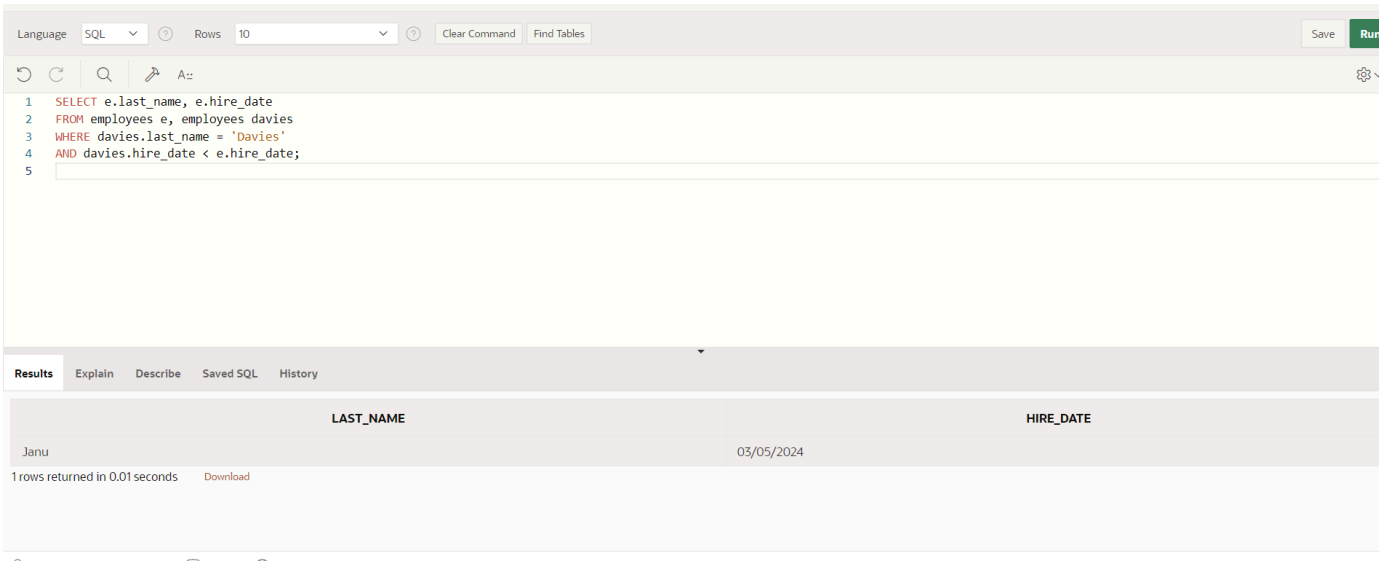
The query is executed successfully.

10.Create a query to display the name and hire date of any employee hired after employee Davies.

QUERY:

```
SELECT e. last_name, e. hire_date FROM emp18 e, emp18 davies
WHERE davies.last name = 'Davies'
AND davies.hire_date ‹ e.hire_date;
```

OUTPUT:



RESULT:

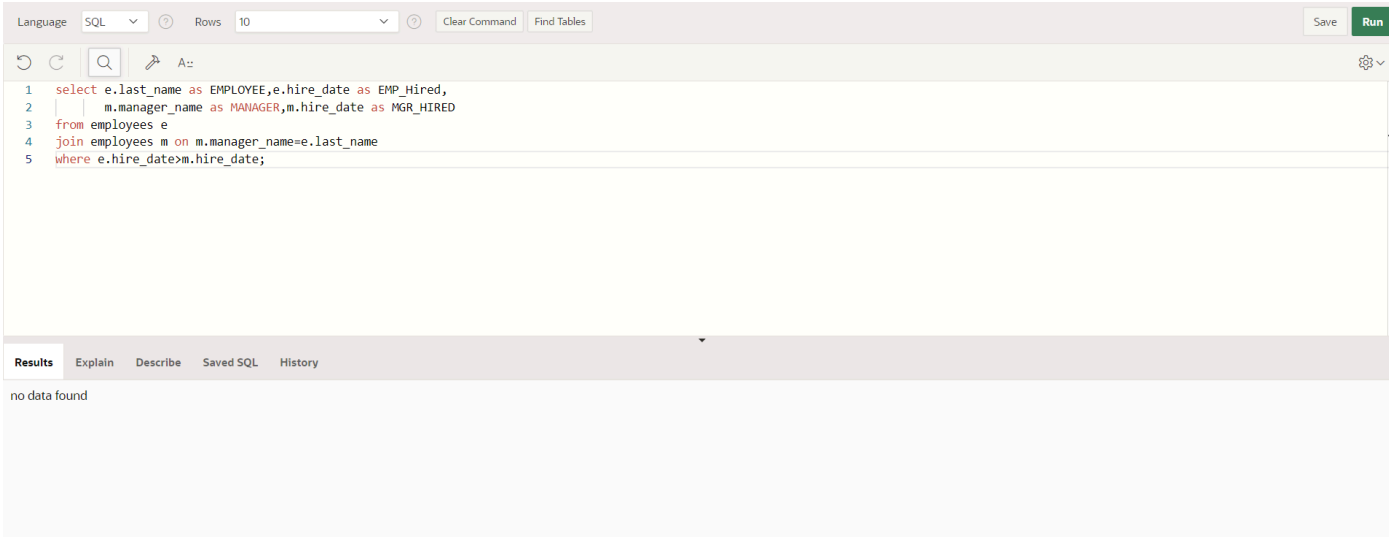
The query is executed successfully.

11.Display the names and hire dates for all employees who were hired before their managers,
along with their manager's names and hire dates. Label the columns Employee, Emp Hired, Manager, and Mgr Hired, respectively.

QUERY:

SELECT e. last_name AS Employee, e.hire_date AS Emp_Hired,
e. manager_name AS Manager, m.hire_date AS Mgr_Hired
FROM emp18 e
JOIN emp18|m ON e-manager _name = m. last_name
WHERE e.hire_date ‹ m.hire_date;

OUTPUT:



RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

AGGREGATING DATA USING GROUP FUNCTIONS

EX_NO : 8 **DATE: 23.3.24**

1.Group functions work across many rows to produce one result per group.
True/False

TRUE

2.Group functions include nulls in calculations.
True/False

FALSE

3.The WHERE clause restricts rows prior to inclusion in a group calculation.
True/False

FALSE

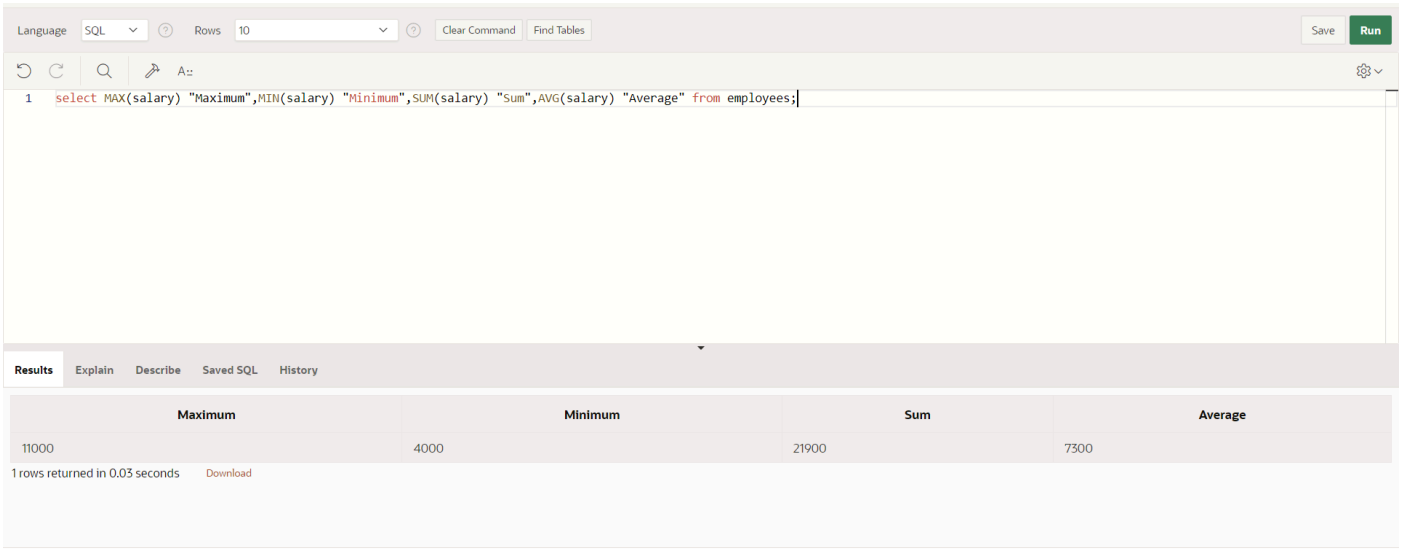
4.Find the highest, lowest, sum, and average salary of all employees. Label the columns Maximum, Minimum, Sum, and Average, respectively. Round your results to the nearest whole number

QUERY:

select Round(Max (salary),0)"Maximum", Round (Min (salary),0) "Minimum",

round(sum(salary),0)"sum", round (avg(salary),0) "Average" from EMPLOYEES;

OUTPUT:



RESULT:

The query is executed successfully.

5.Modify the above query to display the minimum, maximum, sum, and average salary for each job type.

QUERY:

select job_id ,Round(MAX(salary),0) "MAXIMUM",Round (Min(salary),0)"Minimum",Round (SUM(Salary),0)"sum" ,Round (AVg (salary),0)"average" from EMPLOYEES group by job_id;

OUTPUT:

RESULT:

The query is executed successfully.

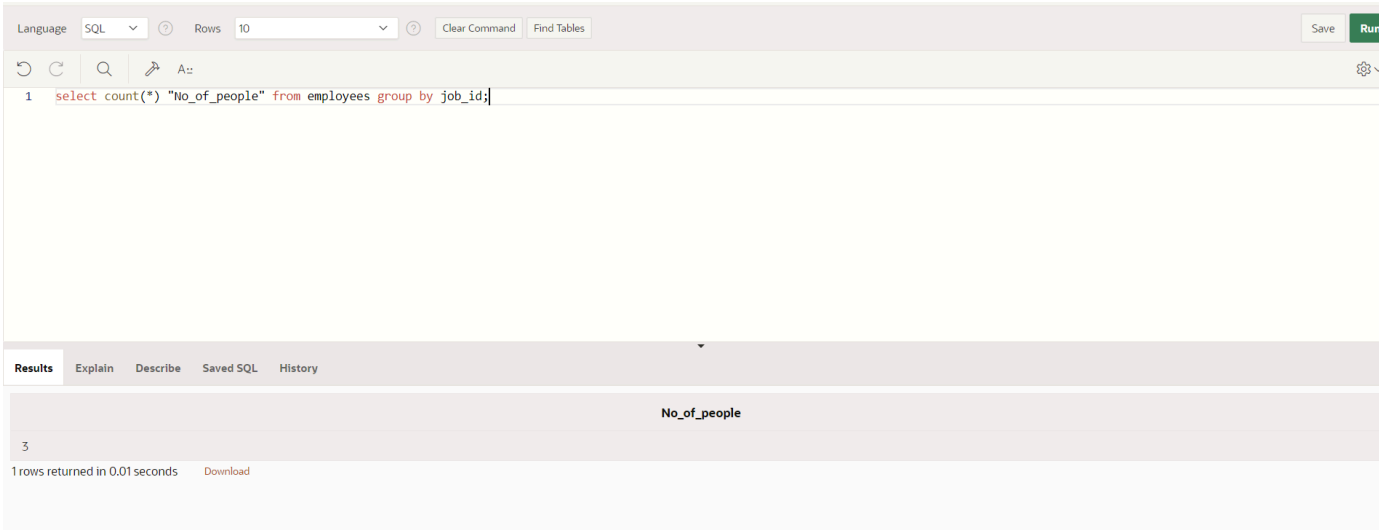
6.Write a query to display the number of people with the same job. Generalize the query so that the user in the HR department is prompted for a job title.

QUERY:

select job_id, count(*) from EMPLOYEES group by job_id ;

select job_id, count(*) from EMPLOYEES where job_id='47' group by job_id ;

OUTPUT:



RESULT:

The query is executed successfully.

7.Determine the number of managers without listing them. Label the column Number of Managers. Hint: Use the MANAGER_ID column to determine the number of managers.

QUERY:

select count(distinct manager_id)"Number of managers" from employees;

OUTPUT:

RESULT:

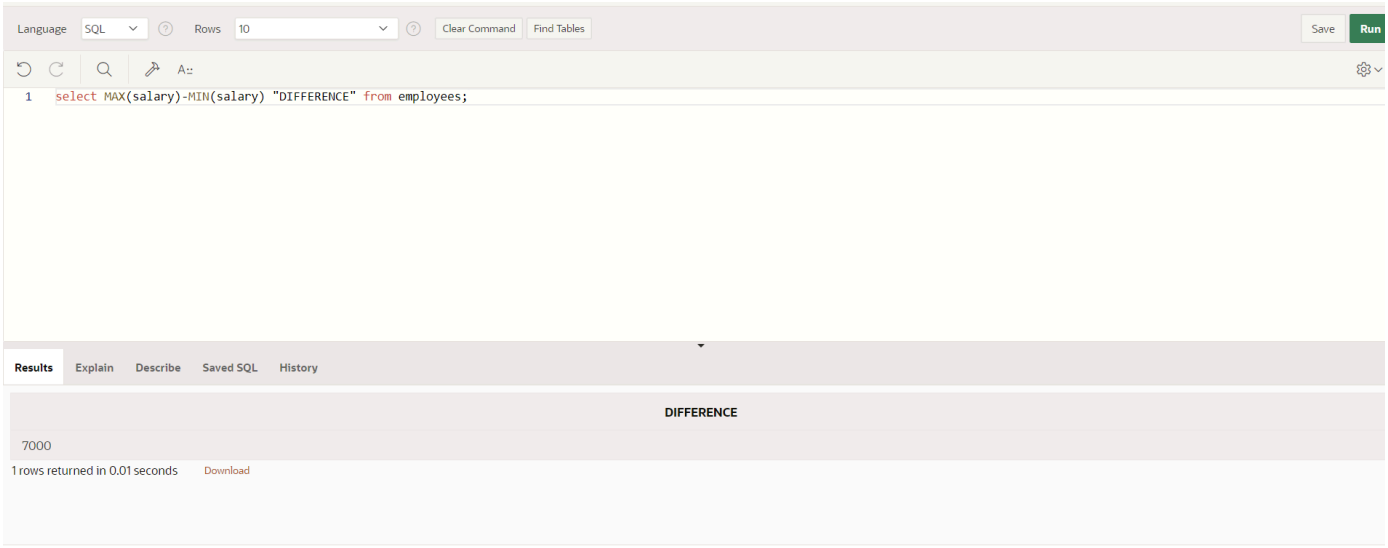
The query is executed successfully.

8.Find the difference between the highest and lowest salaries. Label the column DIFFERENCE

QUERY:

select max(salary)-min(salary) difference from employees;

OUTPUT:



RESULT:

The query is executed successfully.

9.Create a report to display the manager number and the salary of the lowest-paid employee for that manager. Exclude anyone whose manager is not known. Exclude any groups where the minimum salary is $6,000 or less. Sort the output in descending order of salary.

QUERY:

select manager_id ,MIN(salary) from employees where manager_id is not null group by manager_id having min(salary) >6000 order by min(salary) desc;

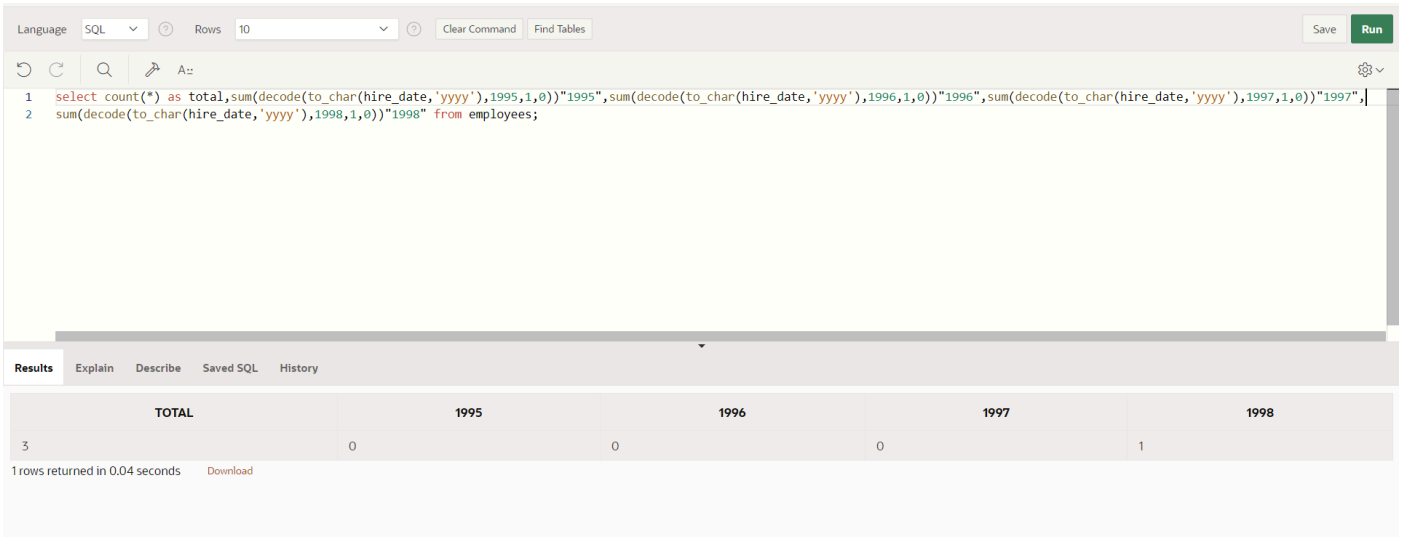
OUTPUT:

10.Create a query to display the total number of employees and, of that total, the number of employees hired in 1995, 1996, 1997, and 1998. Create appropriate column headings

QUERY:

Selectcount(*)total,sum(decode(to_char(hire_date,'YYYY'),1995,1,0))"1995",sum(decode(to_char(hire_date,'YYYY'),1996,1,0))"1996",sum(decode(to_char(hire_date,'YYYY'),1997,1,0))"1997",sum(decode(to_char(hire_date,'YYYY'),1998,1,0)) "1998" from employees;

OUTPUT:



RESULT:

The query is executed successfully.

11.Create a matrix query to display the job, the salary for that job based on department number, and the total salary for that job, for departments 20, 50, 80, and 90, giving each column an appropriate heading

QUERY:

```
SELECT DISTINCT job,
        SUM(CASE deptno WHEN  20 THEN  sal  END)  "Dept 20",
        SUM(CASE deptno WHEN  50 THEN  sal  END)  "Dept 50",
        SUM(CASE deptno WHEN  80 THEN  sal  END)  "Dept 80",
        SUM(sal)  "Total"
FROM emp
GROUP BY job;
```

OUTPUT:

RESULT:

The query is executed successfully.

12. Write a query to display each department‘s name, location, number of employees, and the average salary for all the employees in that department. Label the column name-Location, Number of people, and salary respectively. Round the average salary to two decimal places.

QUERY:

select d.dept_name as "dept_name",d.loc as "department location", count(*) "Number of people",round(avg(salary),2) "salary" from departments d inner join employees e on(d.dpet_id =e.department_id) group by d.dept_name ,d.loc;

OUTPUT:

RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

SUB QUERIES

EX_NO:9 **DATE:2.4.24**

1.)The HR department needs a query that prompts the user for an employee's last name. The query then displays the last name and hire date of any employee in the same department as the employee whose name they supply (excluding that employee). For example, if the user enters Zlotkey, find all employees who work with Zlotkey (excluding Zlotkey).

QUERY:

```
select last_name,hire_date from employees where department_id=(select department_id from employees where last_name='Janu') and last_name not in('Janu');
```

OUTPUT:

RESULT:

The query is executed successfully.

2.) Create a report that displays the employee number, last name, and salary of all employees who earn more than the average salary. Sort the results in order of ascending salary.

QUERY:

select employee_id,last_name,salary from employees where salary>(select avg(salary) from employees) order by salary;

OUTPUT:

RESULT:

The query is executed successfully.

3.) Write a query that displays the employee number and last name of all employees who work in a department with any employee whose last name contains a u.

QUERY:

```
select employee_id,last_name from employees where department_id=(select department_id from employees where last_name like'%u%' );
```

OUTPUT:

RESULT:

The query is executed successfully.

4.) The HR department needs a report that displays the last name, department number, and job ID of all employees whose department location ID is 1700.

QUERY:

```
select last_name,department_id,job_id from employees where department_id=(select dept_id from departments where location_id=1700);
```

OUTPUT:

RESULT:

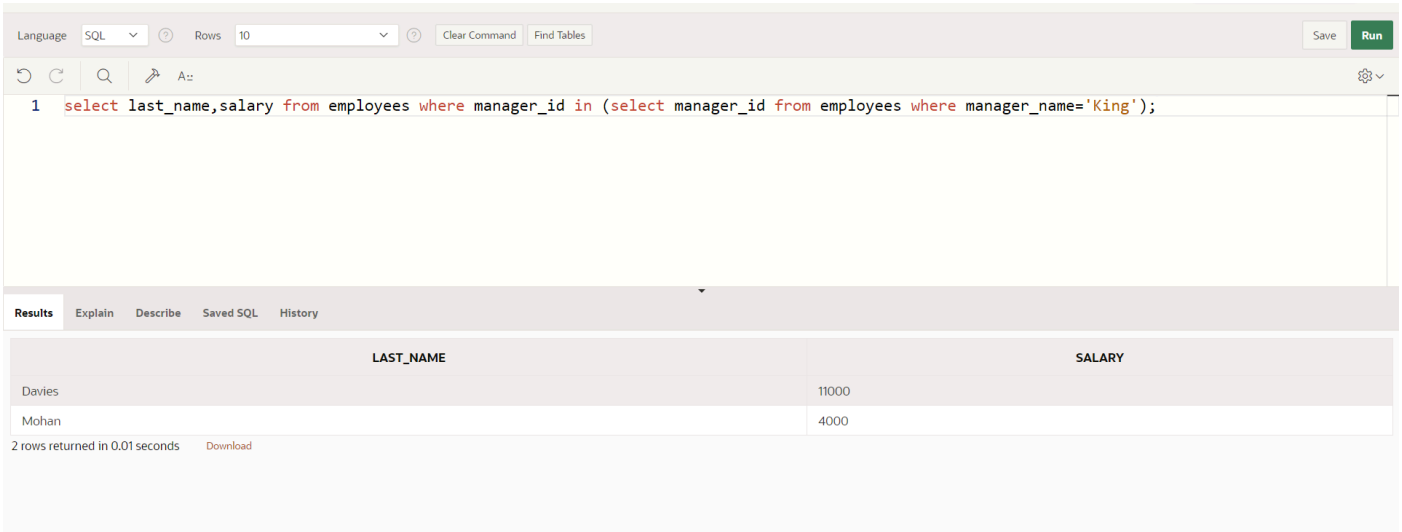
The query is executed successfully.

5. Create a report for HR that displays the last name and salary of every employee who reports to King.

QUERY:

select last_name,salary from employees where manager_id=(select manager_id from employees where manager_name='King');

OUTPUT:



RESULT:

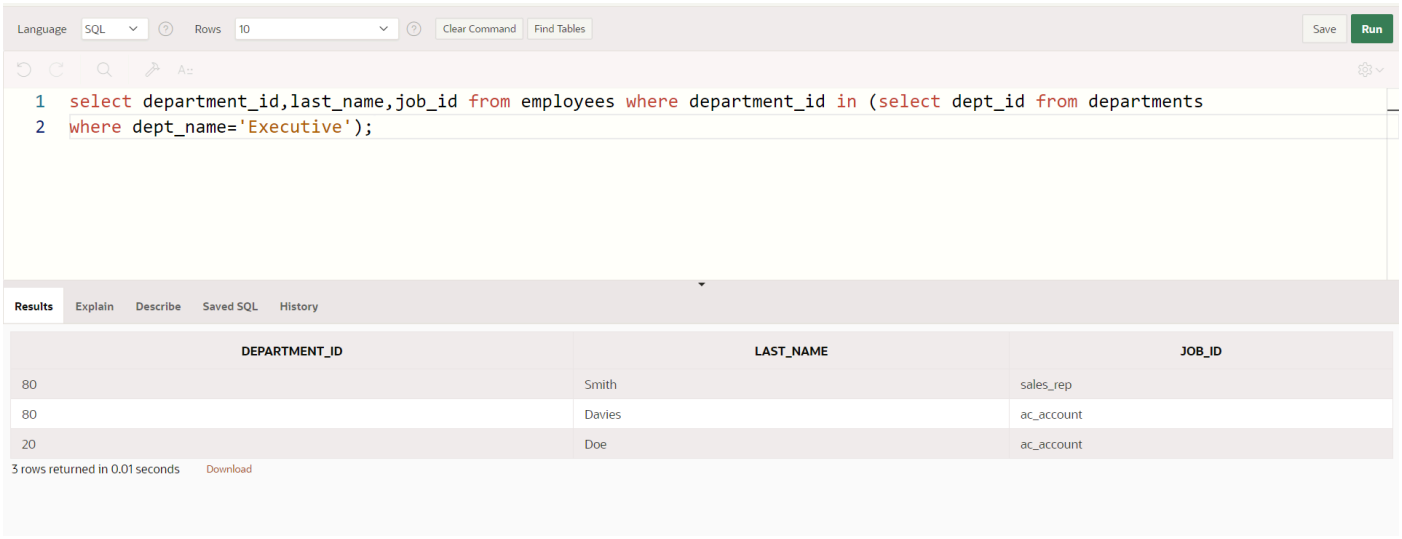
The query is executed successfully.

6. Create a report for HR that displays the department number, last name, and job ID for every employee in the Executive department.

QUERY:

select department_id,last_name,job_id from employees where department_id in (select dept_id from departments where dept_name='Executive');

OUTPUT:



RESULT:

The query is executed successfully.

7. Modify the query 3 to display the employee number, last name, and salary of all employees who earn more than the average salary and who work in a department with any employee whose last name contains a u.

QUERY:

select employee_id,last_name,salary from employees where salary>(select avg(salary) from employees where last_name like '%u%');

OUTPUT:

RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

USING THE SET OPERATORS

EX_NO:10 **DATE:9.4.24**

1.)The HR department needs a list of department IDs for departments that do not contain the job ID ST_CLERK. Use set operators to create this report.

QUERY:

```
select department_id from employees minus select department_id from employees where job_id='st_clerk';
```

OUTPUT:

RESULT:

The query is executed successfully.

2.)The HR department needs a list of countries that have no departments located in them. Display the country ID and the name of the countries. Use set operators to create this report.

QUERY:

```
select country_id,state_province from location minus select country_id,state_province from location,departments where location.location_id=departments.location_id;
```

OUTPUT:

RESULT:

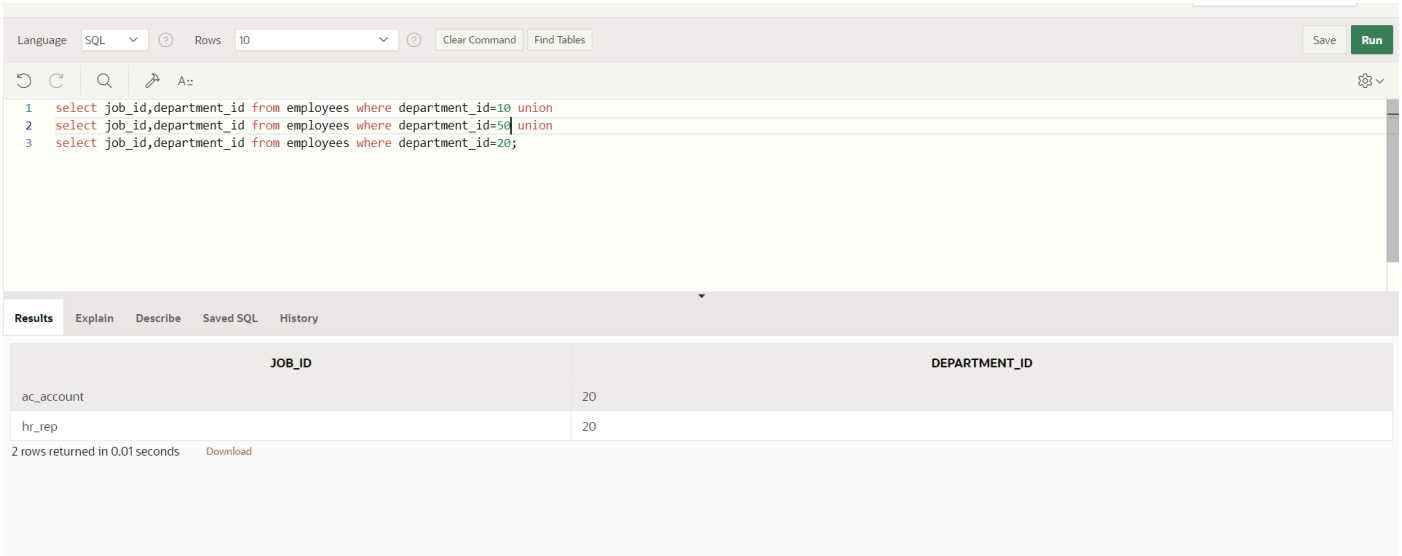
The query is executed successfully.

3.) Produce a list of jobs for departments 10, 50, and 20, in that order. Display job ID and department ID using set operators.

QUERY:

```
select job_id,department_id from employees where department_id=10 union
select job_id,department_id from employees where department_id=50 union
select job_id,department_id from employees where department_id=20;
```

OUTPUT:



RESULT:

The query is executed successfully.

4.) Create a report that lists the employee IDs and job IDs of those employees who currently have a job title that is the same as their job title when they were initially hired by the company (that is, they changed jobs but have now gone back to doing their original job).

QUERY:

select job_id,employee_id from employees intersect select e.job_id,e.employee_id from employees e,job_history j where e.job_id=j.old_job_id;

OUTPUT:

RESULT:

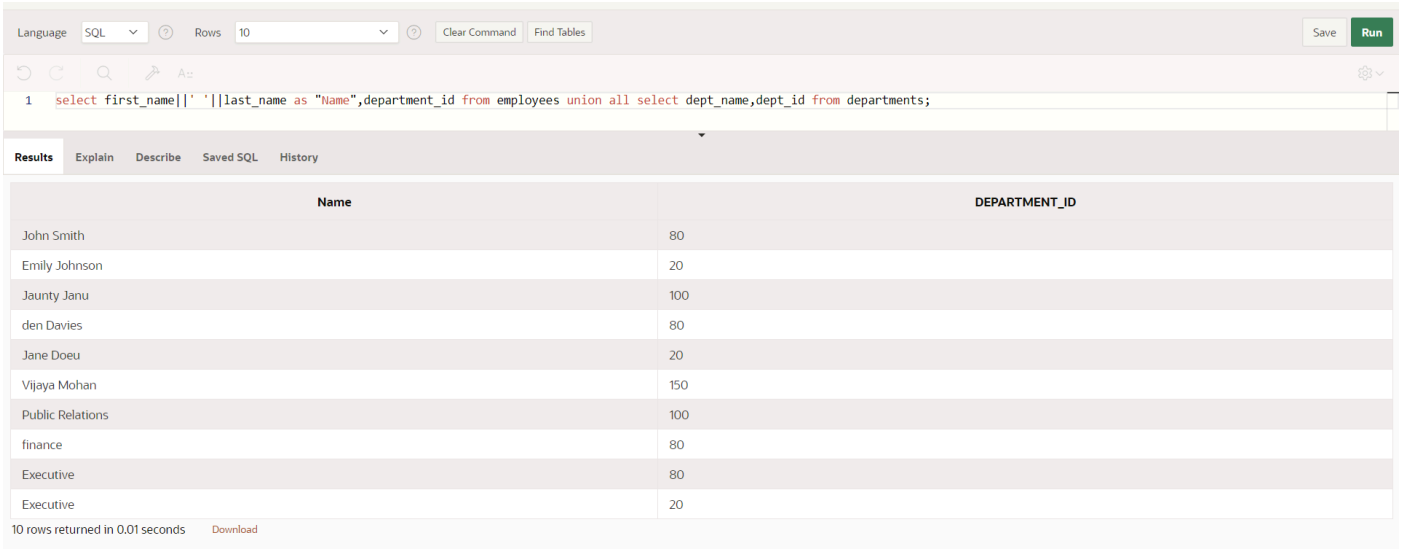
The query is executed successfully.

5.)The HR department needs a report with the following specifications: - Last name and department ID of all the employees from the EMPLOYEES table, regardless of whether or not they belong to a department. - Department ID and department name of all the departments from the DEPARTMENTS table, regardless of whether or not they have employees working in them Write a compound query to accomplish this.

QUERY:

select first_name||' '||last_name as "Name",department_id from employees union all select dept_name,dept_id from departments;

OUTPUT:



RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

CREATING VIEWS

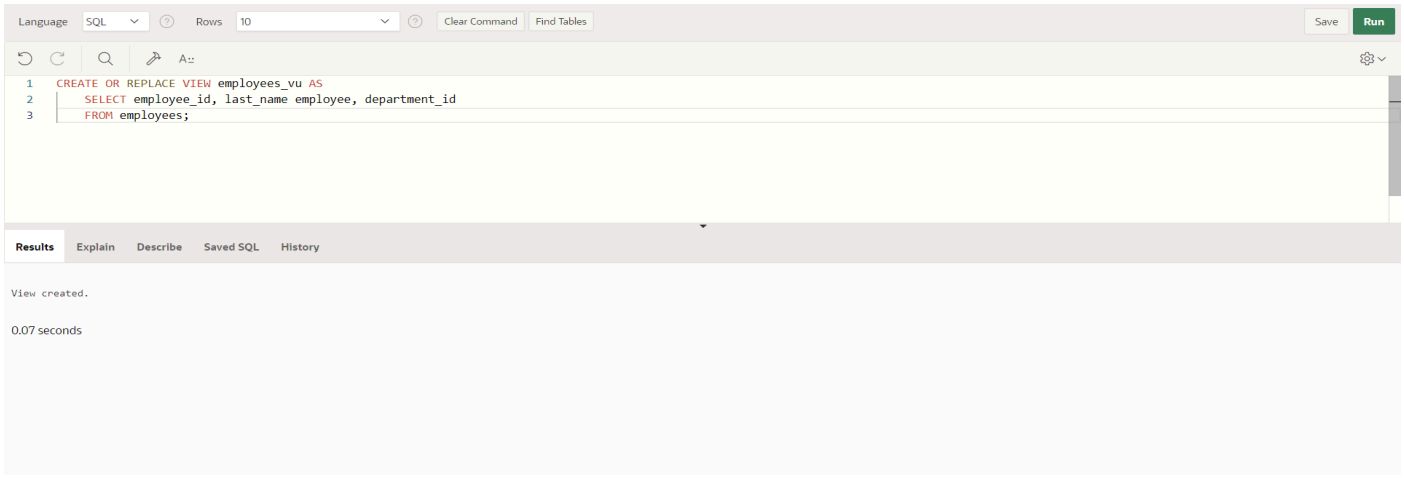
EX_NO:11 **DATE:20.4.24**

1.)Create a view called EMPLOYEE_VU based on the employee numbers, employee names and department numbers from the EMPLOYEES table. Change the heading for the employee name to EMPLOYEE.

QUERY:

CREATE OR REPLACE VIEW employees_vu AS SELECT employee_id, last_name employee, department_id FROM employees;

OUTPUT:



RESULT:

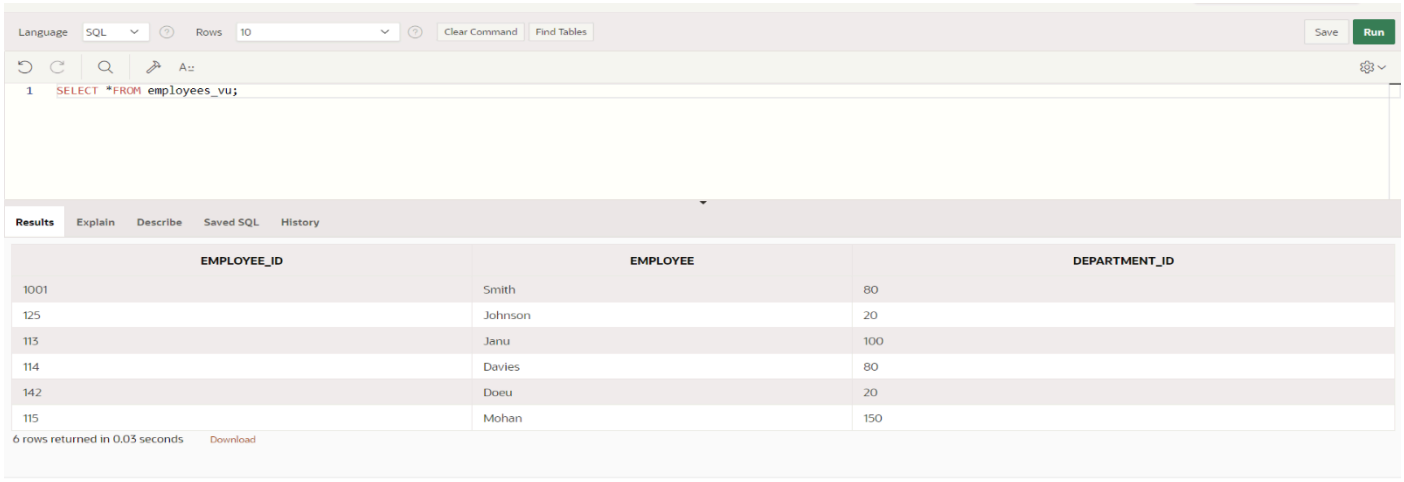
The query is executed successfully.

2.) Display the contents of the EMPLOYEES_VU view.

QUERY:

select * from employees_vu;

OUTPUT:



RESULT:

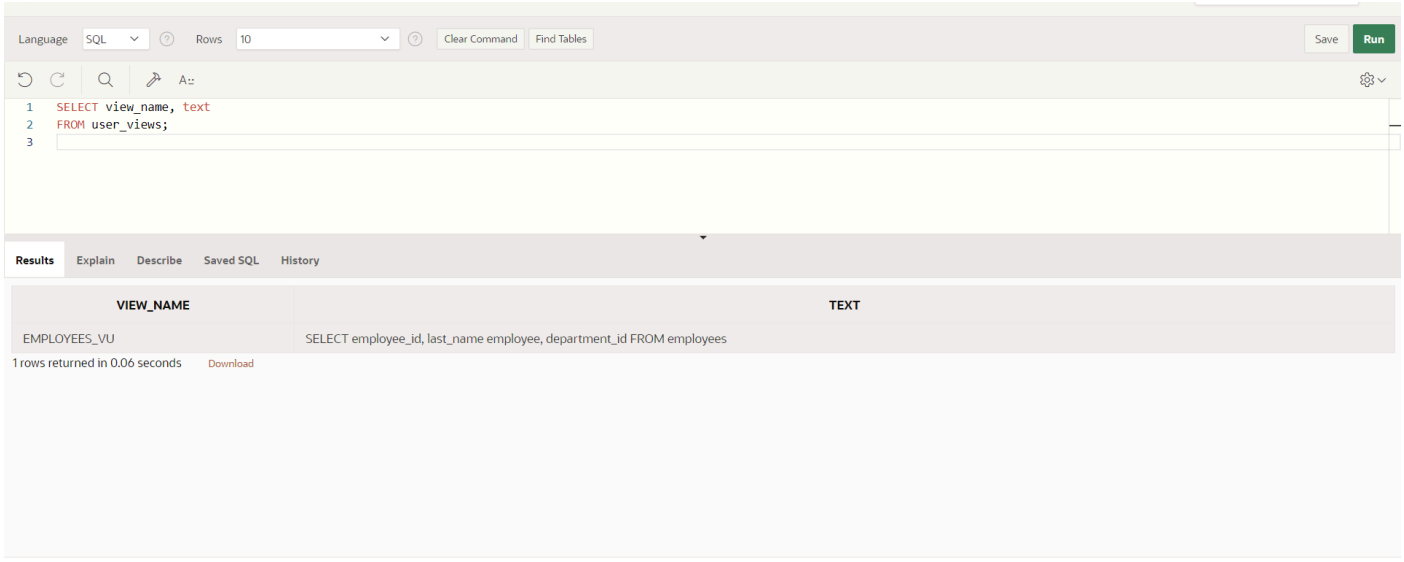
The query is executed successfully.

3.)Select the view name and text from the USER_VIEWS data dictionary views

QUERY:

SELECT view_name, text FROM user_views;

OUTPUT:



RESULT:

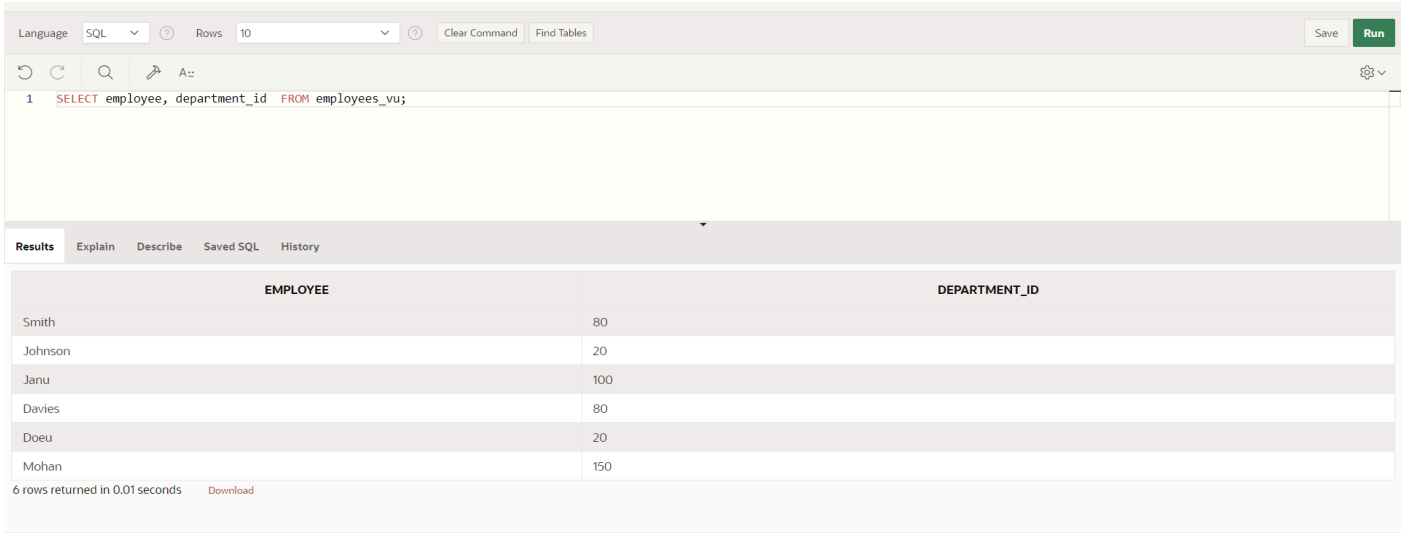
The query is executed successfully.

4.)Using your EMPLOYEES_VU view, enter a query to display all employees names and department

QUERY:

SELECT employee, department_id FROM employees_vu;

OUTPUT:



RESULT:

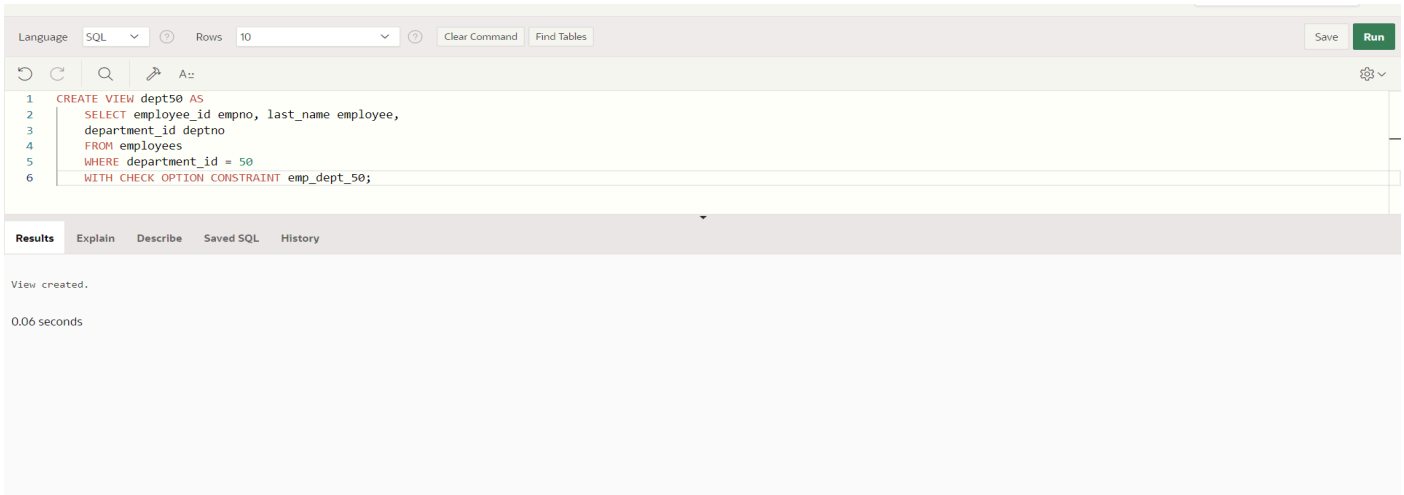
The query is executed successfully.

5.)Create a view named DEPT50 that contains the employee number, employee last names and department numbers for all employees in department 50.Label the view columns EMPNO, EMPLOYEE and DEPTNO. Do not allow an employee to be reassigned to another department through the view.

QUERY:

CREATE VIEW dept50 AS SELECT employee_id empno, last_name employee, department_id deptno FROM employees WHERE department_id = 50 WITH CHECK OPTION CONSTRAINT emp_dept_50;

OUTPUT:



RESULT:

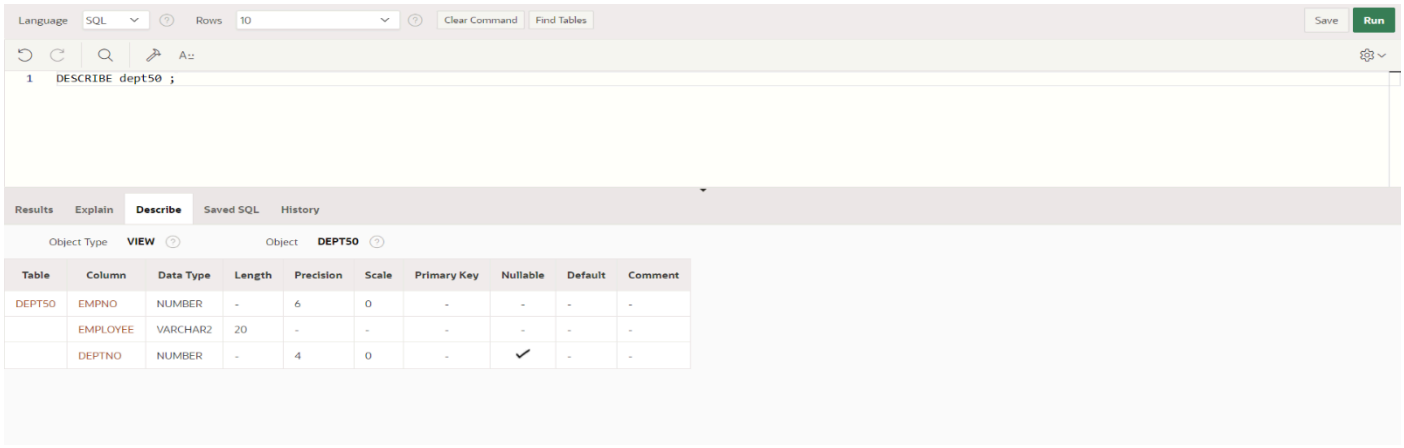
The query is executed successfully.

6.) Display the structure and contents of the DEPT50 view.

QUERY:

Describe dept50;

OUTPUT:



RESULT:

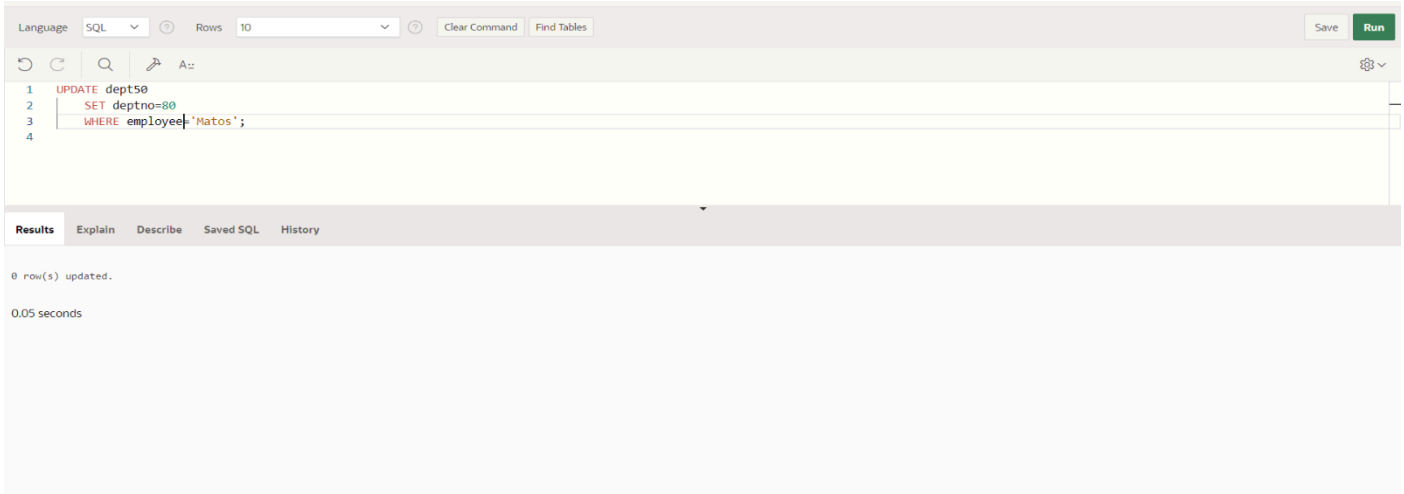
The query is executed successfully.

7.) Attempt to reassign Matos to department 80

QUERY:

UPDATE dept50 SET deptno=80 WHERE employee='Matos';

OUTPUT:



RESULT:

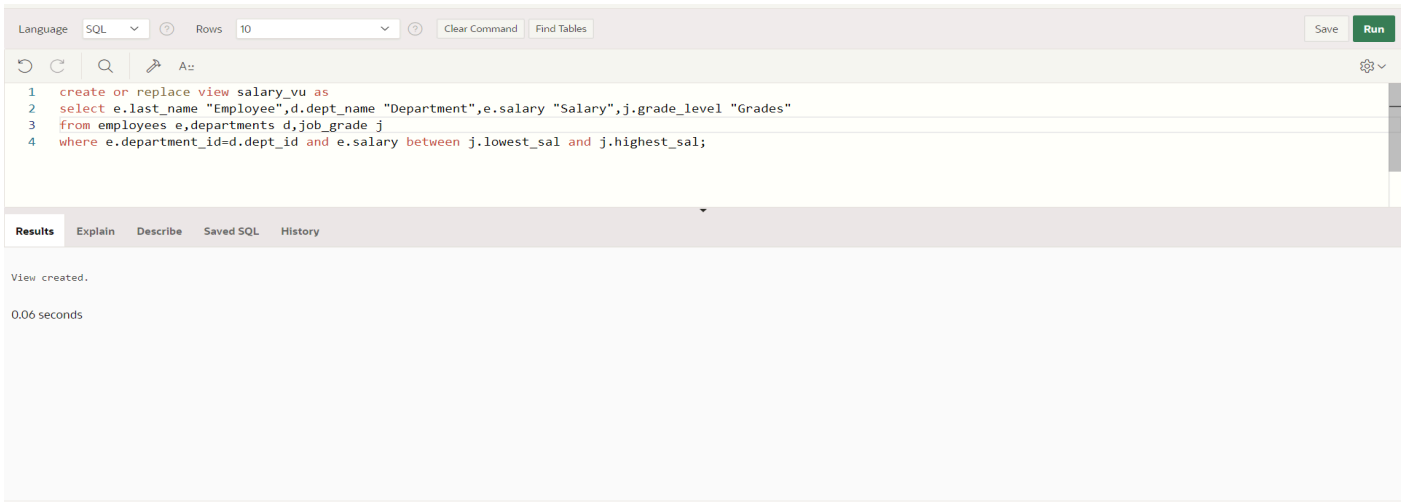
The query is executed successfully.

8.) Create a view called SALARY_VU based on the employee last names, department names, salaries, and salary grades for all employees. Use the Employees, DEPARTMENTS and JOB_GRADE tables. Label the column Employee, Department, salary, and Grade respectively.

QUERY:

```
create or replace view salary_vu as select e.last_name "Employee",d.dept_name Department, e.salary "Salary",j.grade_level "Grades" from employees e,departments d,job_grade j where e.department_id=d.dept_id and e.salary between j.lowest_sal and j.highest_sal;
```

OUTPUT:



RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

EXERCISE 12
PRACTICE QUESTIONS

Intro to Constraints; NOT NULL and UNIQUE Constraints

Global Fast Foods has been very successful this past year and has opened several new stores. They need to add a table to their database to store information about each of their store's locations. The owners want to make sure that all entries have an identification number, date opened, address, and city and that no other entry in the table can have the same email address. Based on this information, answer the following questions about the global_locations table. Use the table for your answers.

Global Fast Foods global_locations Table						
NAME	**TYPE**	**LENGTH**	**PRECISION**	**SCALE**	**NULLABLE**	**DEFAULT**
Id						
name						
date_opened						
address						
city						
zip/postal code						

phone						
email						
manager_id						
Emergency contact						

1. What is a “constraint” as it relates to data integrity?

   Database can be as reliable as the data in it, and database rules are implemented as constraints to maintain data integrity.

2. What are the limitations of constraints that may be applied at the column level and at the table level?

   - Constraints referring to more than one column are defined at Table Level
   - NOT NULL constraint must be defined at column level as per ANSI/ISO SQL standard.

3. Why is it important to give meaningful names to constraints?

   - If a constraint is violated in a SQL statement execution, it is easy to identify the cause with user-named constraints.
   - It is easy to alter names/drop constraints.

4. Based on the information provided by the owners, choose a data type for each column. Indicate the length, precision, and scale for each NUMBER datatype.

Global Fast Foods global_locations Table						
NAME	TYPE	DataType	LENGTH	PRECISION	SCALE	NULLABLE
id	pk	NUMBER	6	0		No
name		VARCHAR2	50			
date_opened		DATE				No
address		VARCHAR2	50			No
city		VARCHAR2	30			No
zip_postal_code		VARCHAR2	12			
phone		VARCHAR2	20			
email	uk	VARCHAR2	75			
manager_id		NUMBER	6	0		
emergency_contact		VARCHAR2	20			

5. Use “(nullable)” to indicate those columns that can have null values.

Global Fast Foods global_locations Table						
NAME	TYPE	DataType	LENGTH	PRECISION	SCALE	NULLABLE
id	pk	NUMBER	6	0		**No**
name		VARCHAR2	50			**Yes**

date_opened		DATE				No
address		VARCHAR2	50			**No**
city		VARCHAR2	30			**No**
zip_postal_code		VARCHAR2	12			**Yes**
phone		VARCHAR2	20			**Yes**
email	uk	VARCHAR2	75			**Yes**
manager_id		NUMBER	6	0		**Yes**
emergency_contact		VARCHAR2	20			**Yes**

6. Write the CREATE TABLE statement for the Global Fast Foods locations table to define the constraints at the column level.

```
CREATE TABLE  f_global_locations
( id NUMBER(6,0) CONSTRAINT f_gln_id_pk PRIMARY KEY ,
name VARCHAR2(50),
date_opened DATE CONSTRAINT f_gln_dt_opened_nn NOT NULL ENABLE,
address VARCHAR2(50) CONSTRAINT f_gln_add_nn NOT NULL ENABLE,
city VARCHAR2(30)  CONSTRAINT f_gln_city_nn NOT NULL ENABLE,
zip_postal_code VARCHAR2(12),
phone VARCHAR2(20),
email VARCHAR2(75) CONSTRAINT f_gln_email_uk UNIQUE,
manager_id NUMBER(6,0),
emergency_contact VARCHAR2(20)
);
```

7. Execute the CREATE TABLE statement in Oracle Application Express.

Table Created.

8. Execute a DESCRIBE command to view the Table Summary information.

DESCRIBE f_global_locations;

9. Rewrite the CREATE TABLE statement for the Global Fast Foods locations table to define the UNIQUE constraints at the table level. Do not execute this statement.

NAME	TYPE	LENGTH	PRECISION	SCALE	NULLABLE	DEFAULT
id	number	4				
loc_name	varchar2	20			X	
	date					
address	varchar2	30				
city	varchar2	20				
zip_postal	varchar2	20			X	
phone	varchar2	15			X	
email	varchar2	80			X	
manager_id	number	4			X	
contact	varchar2	40			X	

```
CREATE TABLE  f_global_locations
```

```
( id NUMBER(6,0) CONSTRAINT f_gln_id_pk PRIMARY KEY ,
name VARCHAR2(50),
date_opened DATE CONSTRAINT f_gln_dt_opened_nn NOT NULL ENABLE,
address VARCHAR2(50) CONSTRAINT f_gln_add_nn NOT NULL ENABLE,
city VARCHAR2(30)  CONSTRAINT f_gln_city_nn NOT NULL ENABLE,
zip_postal_code VARCHAR2(12),
phone VARCHAR2(20),
email VARCHAR2(75) ,
manager_id NUMBER(6,0),
emergency_contact VARCHAR2(20),
 CONSTRAINT f_gln_email_uk UNIQUE(email)
);
```

RESULT:

The query is executed successfully.

PRIMARY KEY, FOREIGN KEY, and CHECK Constraints

1. What is the purpose of a
- PRIMARY KEY
- FOREIGN KEY
- CHECK CONSTRAINT

a. PRIMARY KEY

Uniquely identify each row in the table.

b. FOREIGN KEY

Referential integrity constraint links back the parent table's primary/unique key to the child table's column.

c. CHECK CONSTRAINT

Explicitly define conditions to be met by each row's fields. This condition must be returned as true or unknown.

2. Using the column information for the animals table below, name constraints where applicable at the table level, otherwise name them at the column level. Define the primary key (animal_id). The license_tag_number must be unique. The admit_date and vaccination_date columns cannot contain null values.

animal_id NUMBER(6) - **PRIMARY KEY**
name VARCHAR2(25)
license_tag_number NUMBER(10) - **UNIQUE**
admit_date DATE **-NOT NULL**
adoption_id NUMBER(5),
vaccination_date DATE **-NOT NULL**

3. Create the animals table. Write the syntax you will use to create the table.

```
CREATE TABLE  animals
( animal_id  NUMBER(6,0) CONSTRAINT anl_anl_id_pk PRIMARY KEY ,
name VARCHAR2(25),
license_tag_number NUMBER(10,0) CONSTRAINT anl_l_tag_num_uk UNIQUE,
admit_date  DATE CONSTRAINT anl_adt_dat_nn NOT NULL ENABLE,
adoption_id   NUMBER(5,0),
vaccination_date  DATE CONSTRAINT anl_vcc_dat_nn NOT NULL ENABLE
);
```

4. Enter one row into the table. Execute a SELECT * statement to verify your input. Refer to the graphic below for input.

ANIMAL_ID	NAME	LICENSE_TAG_NUMBER	ADMIT_DATE	ADOPTION_ID	VACCINATION_DATE
101	Spot	35540	10-Oct-2004	205	12-Oct-2004

```
INSERT INTO animals (animal_id, name, license_tag_number, admit_date, adoption_id, vaccination_date)
VALUES( 101, 'Spot', 35540, TO_DATE('10-Oct-2004', 'DD-Mon-YYYY'), 205, TO_DATE('12-Oct-2004',
'DD-Mon-YYYY'));
```

SELECT * FROM animals;

5. Write the syntax to create a foreign key (adoption_id) in the animals table that has a corresponding primary-key reference in the adoptions table. Show both the column-level and table-level syntax. Note that because you have not actually created an adoptions table, no adoption_id primary key exists, so the foreign key cannot be added to the animals table.

COLUMN LEVEL STATEMENT:

```
ALTER TABLE animals
MODIFY ( adoption_id   NUMBER(5,0) CONSTRAINT anl_adopt_id_fk  REFERENCES adoptions(id)
ENABLE );
```

TABLE LEVEL STATEMENT:

```
ALTER TABLE  animals ADD CONSTRAINT anl_adopt_id_fk  FOREIGN KEY (adoption_id)
REFERENCES  adoptions(id) ENABLE;
```

6. What is the effect of setting the foreign key in the ANIMAL table as:

a. ON DELETE CASCADE

```
ALTER TABLE  animals
ADD CONSTRAINT anl_adopt_id_fk  FOREIGN KEY (adoption_id)
REFERENCES  adoptions(id) ON DELETE CASCADE  ENABLE ;
```

b. ON DELETE SET NULL

```
ALTER TABLE  animals
ADD CONSTRAINT anl_adopt_id_fk  FOREIGN KEY (adoption_id)
REFERENCES  adoptions(id) ON DELETE SET NULL  ENABLE ;
```

7. What are the restrictions on defining a CHECK constraint?

- I cannot specify check constraint for a view however in this case I could use WITH CHECK OPTION clause
- I am restricted to columns from the self table and fields in self row.
- I cannot use subqueries and scalar subquery expressions.

RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

PRACTICE PROBLEM
Managing Constraints

Using Oracle Application Express, click the SQL Workshop tab in the menu bar. Click the Object Browser and verify that you have a table named copy_d_clients and a table named copy_d_events. If you don't have these tables in your schema, create them before completing the exercises below. Here is how the original tables are related. The d_clients table has a primary key client_number. This has a primary-key constraint and it is referenced in the foreign-key constraint on the d_events table.

NOTE: The practice exercises use the d_clients and d_events tables in the DJs on Demand database. Students will work with copies of these two tables named copy_d_clients and copy_d_events. Make sure they have new copies of the tables (without changes made from previous exercises). Remember, tables copied using a subquery do not have the integrity constraints as established in the original tables. When using the SELECT statement to view the constraint name, the table names must be all capital letters.

1. What are four functions that an ALTER statement can perform on constraints?

- ADD
- DROP
- ENABLE
- DISABLE

2. Since the tables are copies of the original tables, the integrity rules are not passed onto the new tables; only the column datatype definitions remain. You will need to add a PRIMARY KEY constraint to the copy_d_clients table. Name the primary key copy_d_clients_pk . What is the syntax you used to create the PRIMARY KEY constraint to the copy_d_clients.table?

```
ALTER TABLE copy_d_clients
ADD  CONSTRAINT copy_d_clt_client_number_pk PRIMARY KEY (client_number);
```

3. Create a FOREIGN KEY constraint in the copy_d_events table. Name the foreign key copy_d_events_fk. This key references the copy_d_clients table client_number column. What is the syntax you used to create the FOREIGN KEY constraint in the copy_d_events table?

```
ALTER TABLE  copy_d_events
ADD CONSTRAINT copy_d_eve_client_number_fk FOREIGN KEY (client_number) REFERENCES
copy_d_clients (client_number) ENABLE;
```

4. Use a SELECT statement to verify the constraint names for each of the tables. Note that the tablenames must be capitalized.

```
SELECT constraint_name, constraint_type, table_name
FROM user_constraints
WHERE table_name =  UPPER('copy_d_events') ;
```

a. The constraint name for the primary key in the copy_d_clients table is_____.

COPY_D_CLT_CLIENT_NUMBER_PK

5. Drop the PRIMARY KEY constraint on the copy_d_clients table. Explain your results.

```
ALTER TABLE copy_d_clients
DROP CONSTRAINT COPY_D_CLT_CLIENT_NUMBER_PK CASCADE ;
```

6. Add the following event to the copy_d_events table. Explain your results.

ID	NAME	EVENT_DATE	DESCRIPTION	COST	VENUE_ID	PACKAGE_CODE	THEME_CODE	CLIENT_NUMBER
140	Cline Bas Mitzvah	15-Jul-2004	Church and Private Home formal	4500	105	87	77	7125

```
INSERT INTO copy_d_events(client_number,id,name,event_date,description,cost,venue_id,package_code,theme_code)
VALUES(7125,140,'Cline Bas Mitzvah',TO_DATE('15-Jul-2004','dd-Mon-yyyy'),'Church and Private Home formal',4500,105,87,77);
```

RESULT: ORA-02291: integrity constraint (HKUMAR.COPY_D_EVE_CLIENT_NUMBER_FK) violated - parent key not found

7. Create an ALTER TABLE query to disable the primary key in the copy_d_clients table. Then add the values from #6 to the copy_d_events table. Explain your results.

```
ALTER TABLE copy_d_clients
DISABLE CONSTRAINT COPY_D_CLT_CLIENT_NUMBER_PK CASCADE;
```

8. Repeat question 6: Insert the new values in the copy_d_events table. Explain your results.

```
INSERT INTO
copy_d_events(client_number,id,name,event_date,description,cost,venue_id,package_code,theme_code)
VALUES(7125,140,'Cline Bas Mitzvah',TO_DATE('15-Jul-2004','dd-Mon-yyyy'),'Church and Private Home formal',4500,105,87,77);
```

1 row(s) inserted.

9. Enable the primary-key constraint in the copy_d_clients table. Explain your results.

```
ALTER TABLE copy_d_clients
ENABLE CONSTRAINT COPY_D_CLT_CLIENT_NUMBER_PK ;
```

10. If you wanted to enable the foreign-key column and reestablish the referential integrity between these two tables, what must be done?

```
DELETE FROM copy_d_events WHERE
client_number  NOT IN ( SELECT client_number FROM copy_d_clients);
```

1 row(s) deleted.

```
ALTER TABLE copy_d_events
ENABLE CONSTRAINT COPY_D_EVE_CLIENT_NUMBER_FK;
```

Table altered.

11. Why might you want to disable and then re-enable a constraint?

Generally to make bulk operations fast, where my input data is diligently sanitized and I am sure, it is safe to save some time in this clumsy process.

12. Query the data dictionary for some of the constraints that you have created. How does the data dictionary identify each constraint type?

Queries are the same as in point 2,3, 4 above.

- C - Check constraint
  Sub-case - if I see SEARCH_CONDITION something like "FIRST_NAME" IS NOT NULL , it's a NOT NULL constraint.
- P - Primary key
- R - Referential integrity (fk)
- U - Unique key

RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

EXERCISE 13

Creating Views

1. What are three uses for a view from a DBA's perspective?

- **Restrict access and display selected columns**
- **Reduce complexity of queries from other internal systems. So, providing a way to view same data in a different manner.**
- **Let the app code rely on views and allow the internal implementation of tables to be modified later.**

2. Create a simple view called view_d_songs that contains the ID, title and artist from the DJs on Demand table for each "New Age" type code. In the subquery, use the alias "Song Title" for the title column.

```
CREATE VIEW view_d_songs AS
SELECT d_songs.id, d_songs.title "Song Title", d_songs.artist
from d_songs INNER JOIN d_types ON d_songs.type_code = d_types.code
where d_types.description = 'New Age';
```

3. SELECT * FROM view_d_songs. What was returned?

Results | Explain | Describe | Saved SQL | History

ID	Song Title	ARTIST
47	Hurrah for Today	The Jubilant Trio
49	Lets Celebrate	The Celebrants

2 rows returned in 0.00 seconds Download

4. REPLACE view_d_songs. Add type_code to the column list. Use aliases for all columns.
Or use alias after the CREATE statement as shown.

```
CREATE OR REPLACE VIEW view_d_songs AS
SELECT d_songs.id, d_songs.title "Song Title", d_songs.artist, d_songs.type_code
from d_songs INNER JOIN d_types ON d_songs.type_code = d_types.code
where d_types.description = 'New Age';
```

5. Jason Tsang, the disk jockey for DJs on Demand, needs a list of the past events and those planned for the coming months so he can make arrangements for each event's equipment setup. As the company manager, you do not want him to have access to the price that clients paid for their events. Create a view for Jason to use that displays the name of the event, the event date, and the theme description. Use aliases for each column name.

```
CREATE OR REPLACE VIEW view_d_events_pkgs AS
SELECT evt.name "Name of Event", TO_CHAR(evt.event_date, 'dd-Month-yyyy')  "Event date", thm.description
"Theme description"
FROM  d_events  evt INNER JOIN d_themes  thm  ON evt.theme_code = thm.code
```

WHERE evt.event_date <= ADD_MONTHS(SYSDATE,1);

6. It is company policy that only upper-level management be allowed access to individual employee salaries. The department managers, however, need to know the minimum, maximum, and average salaries, grouped by department. Use the Oracle database to prepare a view that displays the needed information for department managers.

CREATE OR REPLACE VIEW view_min_max_avg_dpt_salary ("Department Id", "Department Name", "Max Salary", "Min Salary", "Average Salary") AS
SELECT dpt.department_id, dpt.department_name, MAX(NVL(emp.salary,0)), MIN(NVL(emp.salary,0)), ROUND(AVG(NVL(emp.salary,0)),2)
FROM departments dpt LEFT OUTER JOIN employees emp ON dpt.department_id = emp.department_id
GROUP BY (dpt.department_id, dpt.department_name);

RESULT:

The query is executed successfully.

DML Operations and Views

Use the DESCRIBE statement to verify that you have tables named copy_d_songs, copy_d_events, copy_d_cds, and copy_d_clients in your schema. If you don't, write a query to create a copy of each.

1. Query the data dictionary USER_UPDATABLE_COLUMNS to make sure the columns in the base tables will allow UPDATE, INSERT, or DELETE. All table names in the data dictionary are stored in uppercase.

```
SELECT owner, table_name, column_name, updatable,insertable, deletable
FROM user_updatable_columns WHERE LOWER(table_name) = 'copy_d_songs';

SELECT owner, table_name, column_name, updatable,insertable, deletable
FROM user_updatable_columns WHERE LOWER(table_name) = 'copy_d_events';

SELECT owner, table_name, column_name, updatable,insertable, deletable
FROM user_updatable_columns WHERE LOWER(table_name) = 'copy_d_cds';
```

2. Use the CREATE or REPLACE option to create a view of *all* the columns in the copy_d_songs table called view_copy_d_songs.

```
CREATE OR REPLACE VIEW view_copy_d_songs  AS
SELECT *
FROM copy_d_songs;
SELECT * FROM view_copy_d_songs;
```

3. Use view_copy_d_songs to INSERT the following data into the underlying copy_d_songs table. Execute a SELECT * from copy_d_songs to verify your DML command. See the graphic.

ID	TITLE	DURATION	ARTIST	TYPE_CODE
88	Mello Jello	2	The What	4

```
INSERT INTO view_copy_d_songs(id,title,duration,artist,type_code)
VALUES(88,'Mello Jello','2 min','The What',4);
```

4. Create a view based on the DJs on Demand COPY_D_CDS table. Name the view read_copy_d_cds. Select all columns to be included in the view. Add a WHERE clause to restrict the year to 2000. Add the WITH READ ONLY option.

```
CREATE OR REPLACE VIEW read_copy_d_cds  AS
SELECT *
FROM copy_d_cds
WHERE year = '2000'
WITH READ ONLY ;
SELECT * FROM read_copy_d_cds;
```

5. Using the read_copy_d_cds view, execute a DELETE FROM read_copy_d_cds WHERE cd_number = 90;

ORA-42399: cannot perform a DML operation on a read-only view

6. Use REPLACE to modify read_copy_d_cds. Replace the READ ONLY option with WITH CHECK OPTION CONSTRAINT ck_read_copy_d_cds. Execute a SELECT * statement to verify that the view exists.

```
CREATE OR REPLACE VIEW read_copy_d_cds  AS
SELECT *
FROM copy_d_cds
WHERE year = '2000'
WITH CHECK OPTION CONSTRAINT ck_read_copy_d_cds;
```

7. Use the read_copy_d_cds view to delete any CD of year 2000 from the underlying copy_d_cds.

```
DELETE FROM read_copy_d_cds
WHERE year = '2000';
```

8. Use the read_copy_d_cds view to delete cd_number 90 from the underlying copy_d_cds table.

```
DELETE FROM read_copy_d_cds
WHERE cd_number = 90;
```

9. Use the read_copy_d_cds view to delete year 2001 records.

```
DELETE FROM read_copy_d_cds
WHERE year = '2001';
```

10. Execute a SELECT * statement for the base table copy_d_cds. What rows were deleted?

Only the one in problem 7 above, not the one in 8 and 9

11.What are the restrictions on modifying data through a view?

DELETE.INSERT,MODIFY restricted if it contains:

Group functions
GROUP BY CLAUSE
DISTINCT
pseudocolumn ROWNUM Keyword

12. What is Moore's Law? Do you consider that it will continue to apply indefinitely? Support your opinion with research from the internet.

It roughly predicted that computing power nearly doubles every year. But Moore also said in 2005 that as per the nature of exponential functions, this trend may not continue forever.

13. What is the "singularity" in terms of computing?

Singularity is the hypothesis that the invention of artificial superintelligence will abruptly trigger runaway technological growth, resulting in unfathomable changes to human civilization

RESULT:

The query is executed successfully.

Managing Views

1. Create a view from the copy_d_songs table called view_copy_d_songs that includes only the title and artist. Execute a SELECT * statement to verify that the view exists.

```
CREATE OR REPLACE VIEW view_copy_d_songs  AS
SELECT title, artist
FROM copy_d_songs;

SELECT * FROM view_copy_d_songs;
```

2. Issue a DROP view_copy_d_songs. Execute a SELECT * statement to verify that the view has been deleted.

```
DROP VIEW view_copy_d_songs;
SELECT * FROM view_copy_d_songs;

ORA-00942: table or view does not exist
```

3. Create a query that selects the last name and salary from the Oracle database. Rank the salaries from highest to lowest for the top three employees.

```
SELECT * FROM
(SELECT last_name, salary FROM employees ORDER BY salary  DESC)
WHERE ROWNUM <= 3;
```

4. Construct an inline view from the Oracle database that lists the last name, salary, department ID, and maximum salary for each department. Hint: One query will need to calculate maximum salary by department ID.

```
SELECT empm.last_name, empm.salary, dptmx.department_id
FROM
(SELECT dpt.department_id, MAX(NVL(emp.salary,0)) max_dpt_sal
FROM departments dpt LEFT OUTER JOIN employees emp ON dpt.department_id = emp.department_id
GROUP BY dpt.department_id) dptmx LEFT OUTER JOIN employees empm ON dptmx.department_id =
empm.department_id
WHERE NVL(empm.salary,0) = dptmx.max_dpt_sal;
```

5. Create a query that will return the staff members of Global Fast Foods ranked by salary from lowest to highest.

```
SELECT ROWNUM,last_name, salary
FROM
(SELECT * FROM f_staffs ORDER BY SALARY);
```

RESULT:

The query is executed successfully.

Indexes and Synonyms

1. What is an index and what is it used for?

Definition: These are schema objects which make retrieval of rows from table faster.

Purpose: An index provides direct and fast access to rows in the table. They provide an indexed path to locate data quickly, thereby reducing the necessity of heavy disk input/output operations.

2. What is a ROWID, and how is it used?

Indexes use ROWID (base 64 string representation of the row address containing block identifier, row location in the block and the database file identifier) which is the fastest way to access any particular row.

3. When will an index be created automatically?

P**rimary key/unique key uses an already existing unique index but if index is not present already, it is created while applying unique/primary key constraint.**

4. Create a non unique index (foreign key) for the DJs on Demand column (cd_number) in the D_TRACK_LISTINGS table. Use the Oracle Application Express SQL Workshop Data Browser to confirm that the index was created.

```
CREATE INDEX d_tlg_cd_number_fk_i
 on d_track_listings (cd_number);
```

5. Use the join statement to display the indexes and uniqueness that exist in the data dictionary for the DJs on Demand D_SONGS table.

```
SELECT ucm.index_name, ucm.column_name, ucm.column_position, uix.uniqueness
FROM user_indexes uix INNER JOIN user_ind_columns ucm ON uix.index_name = ucm.index_name
WHERE ucm.table_name = 'D_SONGS';
```

6. Use a SELECT statement to display the index_name, table_name, and uniqueness from the data dictionary USER_INDEXES for the DJs on Demand D_EVENTS table.

```
SELECT index_name, table_name,uniqueness  FROM user_indexes  where table_name = 'D_EVENTS';
```

7. Write a query to create a synonym called dj_tracks for the DJs on Demand d_track_listings table.

```
CREATE SYNONYM dj_tracks FOR d_track_listings;
```

8. Create a function-based index for the last_name column in DJs on Demand D_PARTNERS table that makes it possible not to have to capitalize the table name for searches. Write a SELECT statement that would use this index.

```
CREATE INDEX d_ptr_last_name_idx
```

ON d_partners(LOWER(last_name));

9. Create a synonym for the D_TRACK_LISTINGS table. Confirm that it has been created by querying the data dictionary.

```
CREATE SYNONYM dj_tracks2 FOR d_track_listings;
SELECT * FROM user_synonyms WHERE table_NAME = UPPER('d_track_listings');
```

10.Drop the synonym that you created in question

```
DROP SYNONYM dj_tracks2;
```

RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

OTHER DATABASE OBJECTS

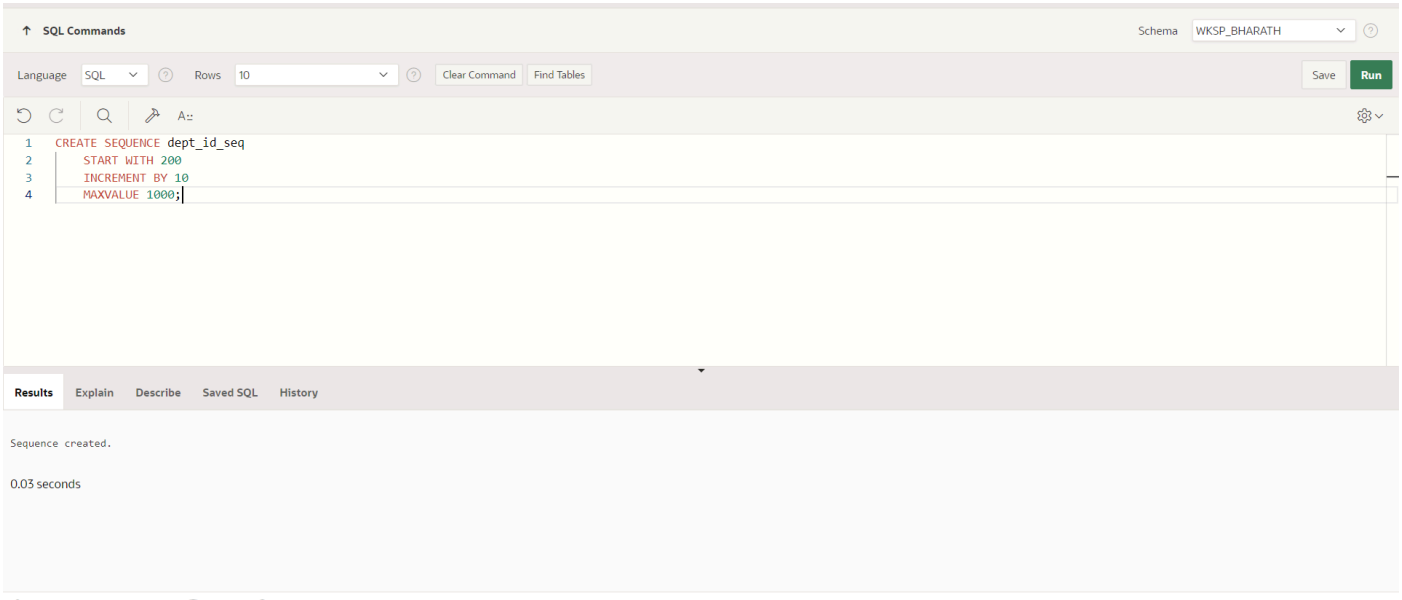
EX_NO:14 **DATE:27.4.24**

1.)Create a sequence to be used with the primary key column of the DEPT table. The sequence should start at 200 and have a maximum value of 1000. Have your sequence increment by ten numbers. Name the sequence DEPT_ID_SEQ

QUERY:

CREATE SEQUENCE dept_id_seq START WITH 200 INCREMENT BY 10 MAXVALUE 1000;

OUTPUT:



RESULT:

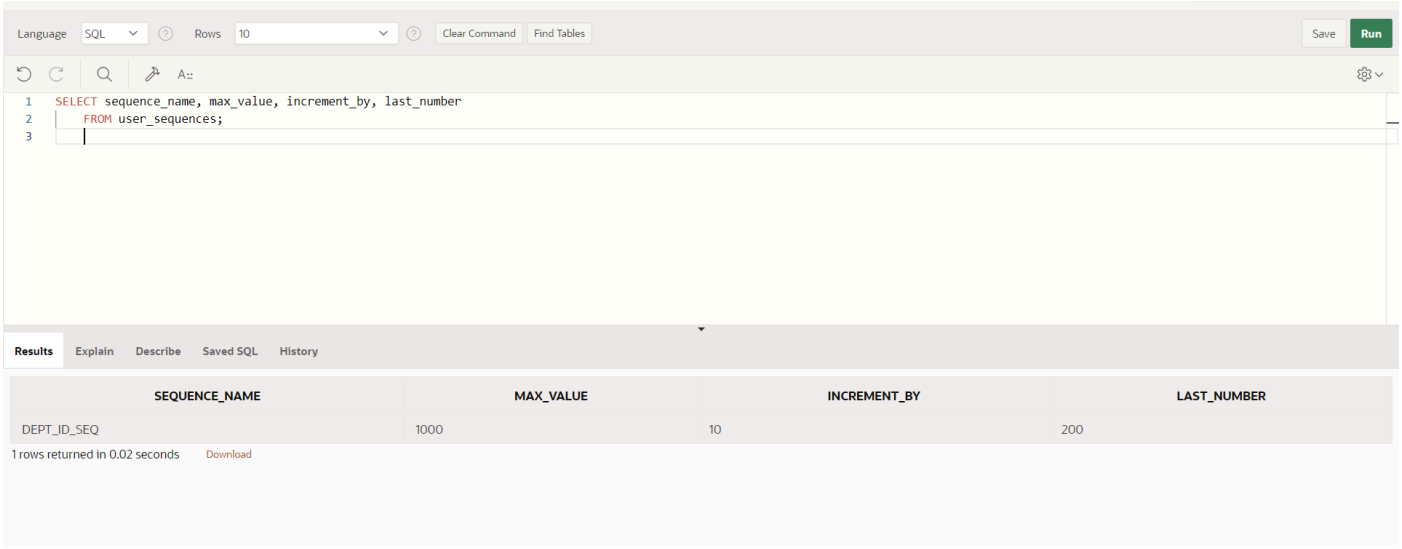
The query is executed successfully.

2.)Write a query in a script to display the following information about your sequences: sequence name, maximum value, increment size, and last number

QUERY:

SELECT sequence_name, max_value, increment_by, last_number FROM user_sequences;

OUTPUT:



RESULT:

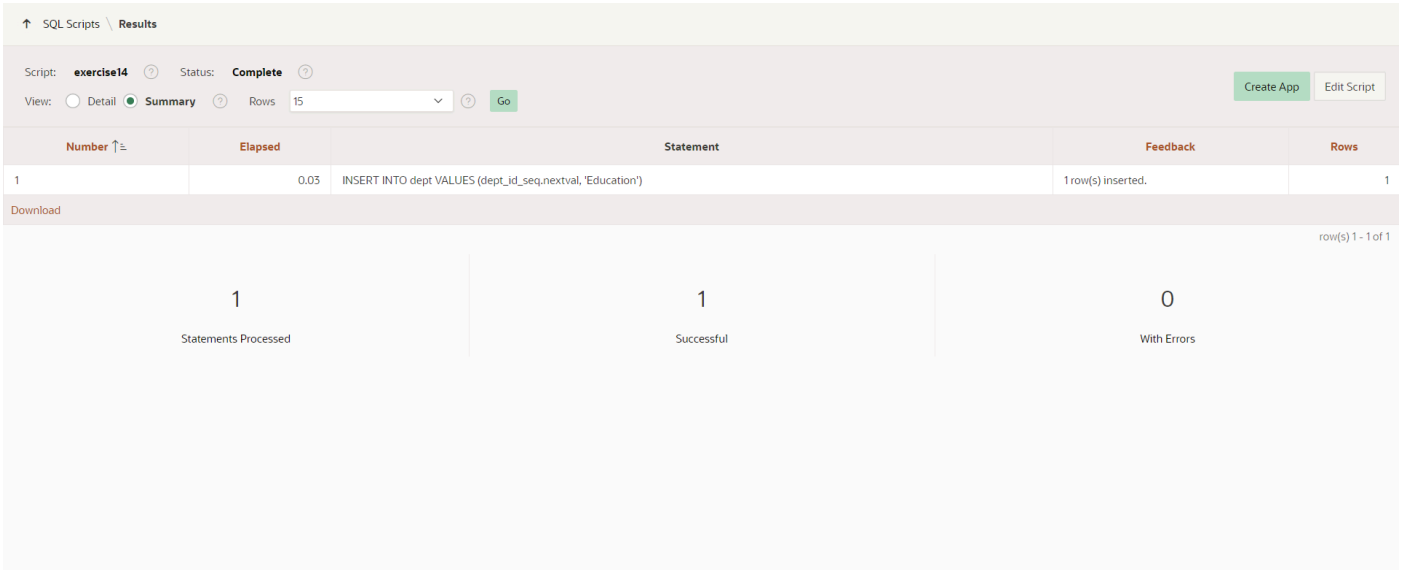
The query is executed successfully.

3.) Write a script to insert two rows into the DEPT table. Name your script lab12_3.sql. Be sure to use the sequence that you created for the ID column. Add two departments named Education and Administration. Confirm your additions. Run the commands in your script.

QUERY:

INSERT INTO dept VALUES (dept_id_seq.nextval, 'Education');

OUTPUT:



RESULT:

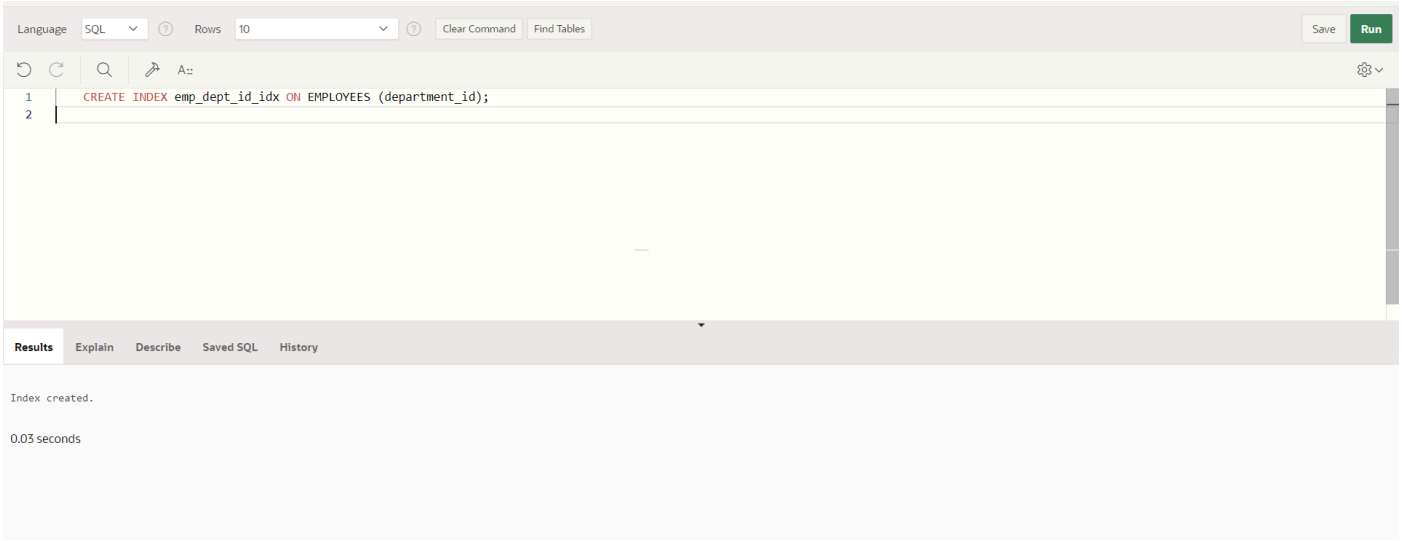
The query is executed successfully.

4.)Create a nonunique index on the foreign key column (DEPT_ID) in the EMP table.

QUERY:

CREATE INDEX emp_dept_id_idx ON EMPLOYEES (department_id);

OUTPUT:



RESULT:

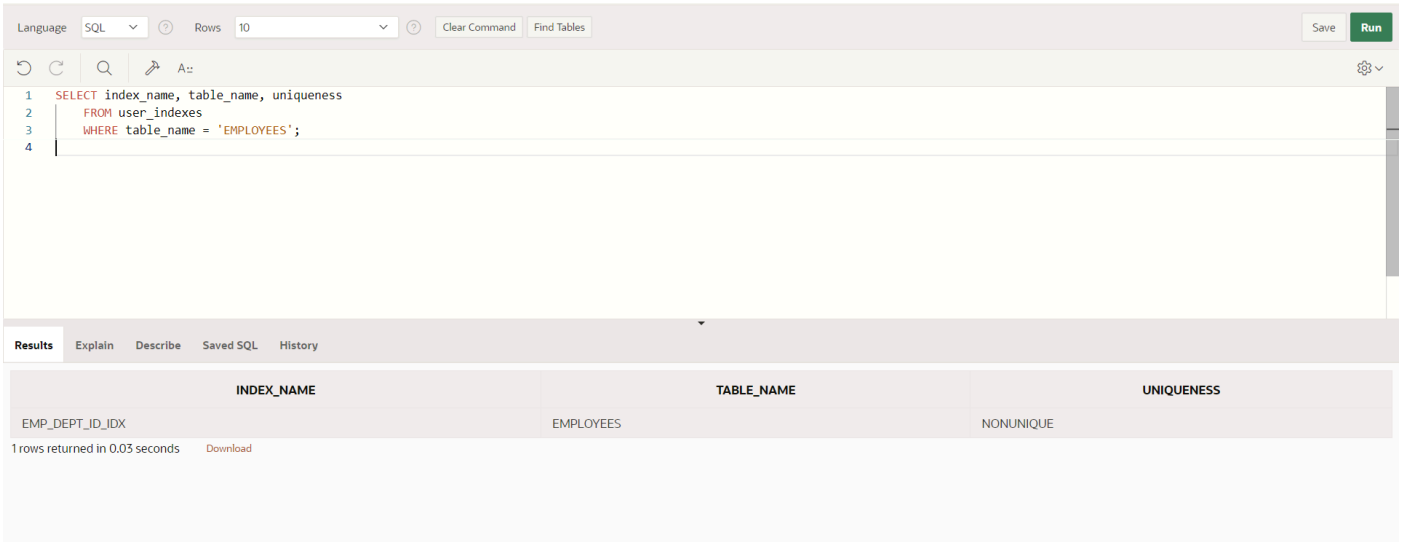
The query is executed successfully.

5.)Display the indexes and uniqueness that exist in the data dictionary for the EMP table.

QUERY:

SELECT index_name,table_name,uniqueness FROM user_indexes WHERE table_name='EMPLOYEES';

OUTPUT:



RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

CONTROLLING USER ACCESS

EX_NO:15 **DATE:4.5.24**

1. What privilege should a user be given to log on to the Oracle Server? Is this a system or an object privilege?

The CREATE SESSION system privilege

2. What privilege should a user be given to create tables?

The CREATE TABLE privilege

3. If you create a table, who can pass along privileges to other users on your table?

You can, or anyone you have given those privileges to by using the WITH GRANT OPTION.

4. You are the DBA. You are creating many users who require the same system privileges. What should you use to make your job easier?

Create a role containing the system privileges and grant the role to the users

5. What command do you use to change your password?

The ALTER USER statement

6. Grant another user access to your DEPARTMENTS table. Have the user grant you query access to his or her DEPARTMENTS table.

Team 2 executes the GRANT statement. GRANT select ON departments TO <user1>;

Team 1 executes the GRANT statement. GRANT select ON departments TO <user2>;

7. Query all the rows in your DEPARTMENTS table.

SELECT * FROM departments;

8. Add a new row to your DEPARTMENTS table. Team 1 should add Education as department number 500. Team 2 should add Human Resources department number 510. Query the other team's table.

Team 1 executes this INSERT statement. INSERT INTO departments(department_id, department_name) VALUES (500, 'Education'); COMMIT;

Team 2 executes this INSERT statement. INSERT INTO departments(department_id, department_name) VALUES (510, 'Administration'); COMMIT;

9. Query the USER_TABLES data dictionary to see information about the tables that you own.

SELECT table_name FROM user_tables;

10. Revoke the SELECT privilege on your table from the other team.

Team 1 revokes the privilege.

```
REVOKE select
ON departments
FROM user2;
```

Team 2 revokes the privilege.

```
REVOKE select
ON departments
FROM user1;
```

11. Remove the row you inserted into the DEPARTMENTS table in step 8 and save the changes.

Team 1 executes this INSERT statement.

```
DELETE FROM departments
WHERE department_id = 500;
COMMIT;
```

Team 2 executes this INSERT statement.

```
DELETE FROM departments
WHERE department_id = 510;
COMMIT;
```

RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Practice Evaluation (5)	
Viva(5)	
Total (10)	
Faculty Signature	

PL/SQL
CONTROL STRUCTURES

EX_NO: 16 **DATE:8.5.24**

1.) Write a PL/SQL block to calculate the incentive of an employee whose ID is 110.

PROCEDURE:

1. **Declare Variables**:

   - `incentive NUMBER(8,2);`

   - A variable named `incentive` is declared to store the calculated incentive amount. The data type `NUMBER(8,2)` means the variable can hold a number with up to 8 digits, 2 of which can be after the decimal point.

2. **Begin Block**:

   - `BEGIN`

   - This marks the start of the executable part of the PL/SQL block.

3. **SQL Query Execution**:

   - `SELECT salary*0.12 INTO incentive FROM employees WHERE employee_id = 110;`

   - This SQL query selects the `salary` of the employee with `employee_id` 110 from the `employees` table.

   - The selected `salary` is multiplied by `0.12` to calculate the incentive, which is 12% of the salary.

   - The result of this calculation is stored in the `incentive` variable.

4. **Output the Result**:

   - `DBMS_OUTPUT.PUT_LINE('Incentive = ' || TO_CHAR(incentive));`

   - This line outputs the calculated incentive using the `DBMS_OUTPUT.PUT_LINE` procedure.

   - `TO_CHAR(incentive)` converts the numeric `incentive` value to a string so it can be concatenated with the text 'Incentive = '.

   - The result is displayed as a message in the output.

5. **End Block**:

   - `END;`

- This marks the end of the PL/SQL block.

Written Procedure

1. **Declare a Variable**:

   - Define a variable `incentive` to store the calculated incentive.

2. **Start the Executable Section**:

   - Begin the PL/SQL block with `BEGIN`.

3. **Perform a SQL Query to Calculate Incentive**:

   - Execute a SQL `SELECT` statement to retrieve the `salary` of the employee with `employee_id` 110 from the `employees` table.

   - Multiply the retrieved `salary` by 12% (0.12) to calculate the incentive.

   - Store the result of this calculation in the `incentive` variable.

4. **Output the Calculated Incentive**:

   - Use the `DBMS_OUTPUT.PUT_LINE` procedure to output the incentive amount.

   - Convert the numeric `incentive` value to a string format for output.

5. **End the Block**:

   - Conclude the PL/SQL block with `END;`.

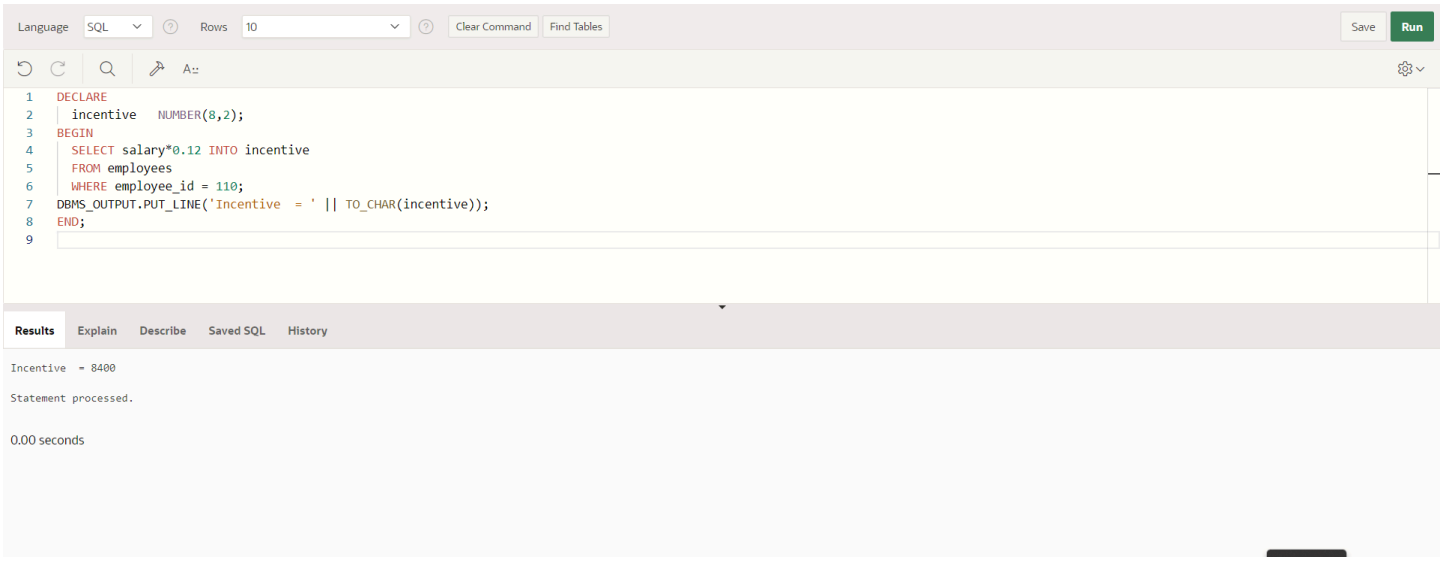
This step-by-step explanation should give you a clear understanding of what each part of the provided PL/SQL block does and how it calculates and outputs the incentive for the employee with ID 110.

QUERY:

```
 DECLARE
 incentive   NUMBER(8,2);
BEGIN
 SELECT salary*0.12 INTO incentive
 FROM employees
 WHERE employee_id = 110;
DBMS_OUTPUT.PUT_LINE('Incentive  = ' || TO_CHAR(incentive));
```

END;

OUTPUT:



RESULT:

The program is executed successfully.

2.) Write a PL/SQL block to show an invalid case-insensitive reference to a quoted and without quoted user-defined identifier

PROCEDURE:

The procedure outlined in the code can be explained in these steps:

1. **Variable Declaration:** It creates a variable named "WELCOME" that can store text up to 10 characters long. This variable is then assigned the value "welcome".
2. **Printing the Message:** The code then instructs the program to print something to the console. It uses the `DBMS_OUTPUT.Put_Line` command to achieve this. However, there's a minor error in the original code.

Correction: The `DBMS_OUTPUT.Put_Line` command should be outside the `DECLARE` block. This is because the `DECLARE` block is meant to define variables, and the printing happens after the variable is set.

Here's the corrected procedure in words:

1. Define a variable named "WELCOME" that can hold text (up to 10 characters).

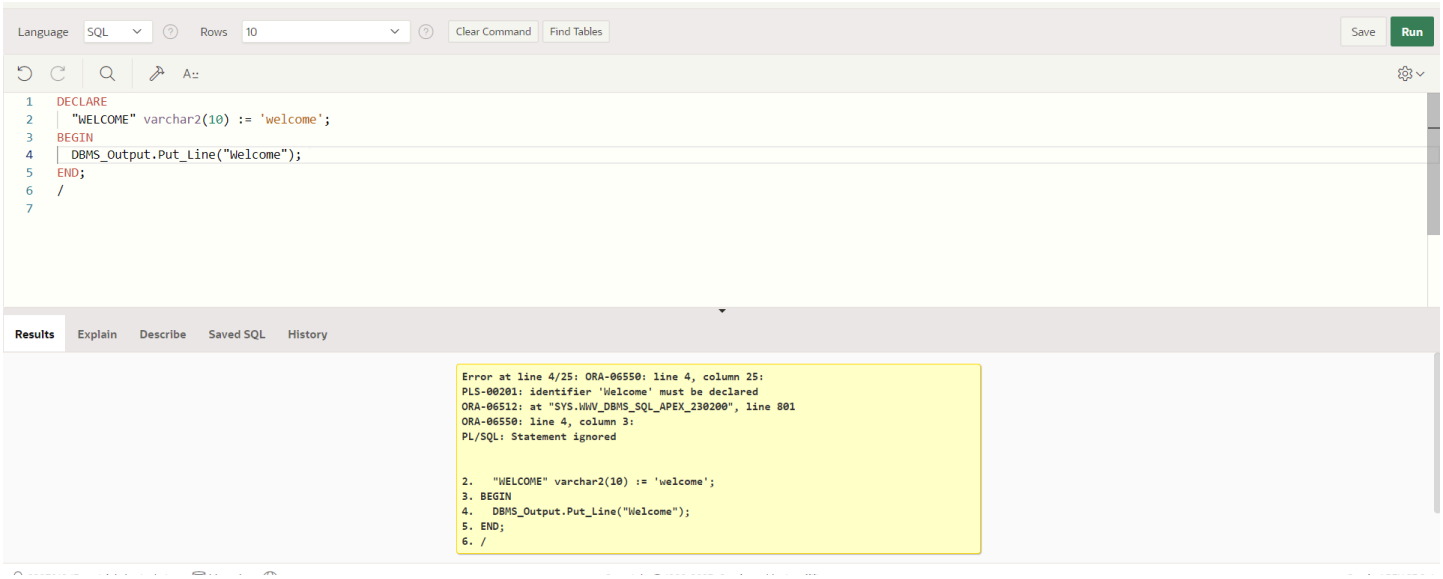
2. Set the value of "WELCOME" to the text "welcome".
3. Print the value of the "WELCOME" variable to the console.

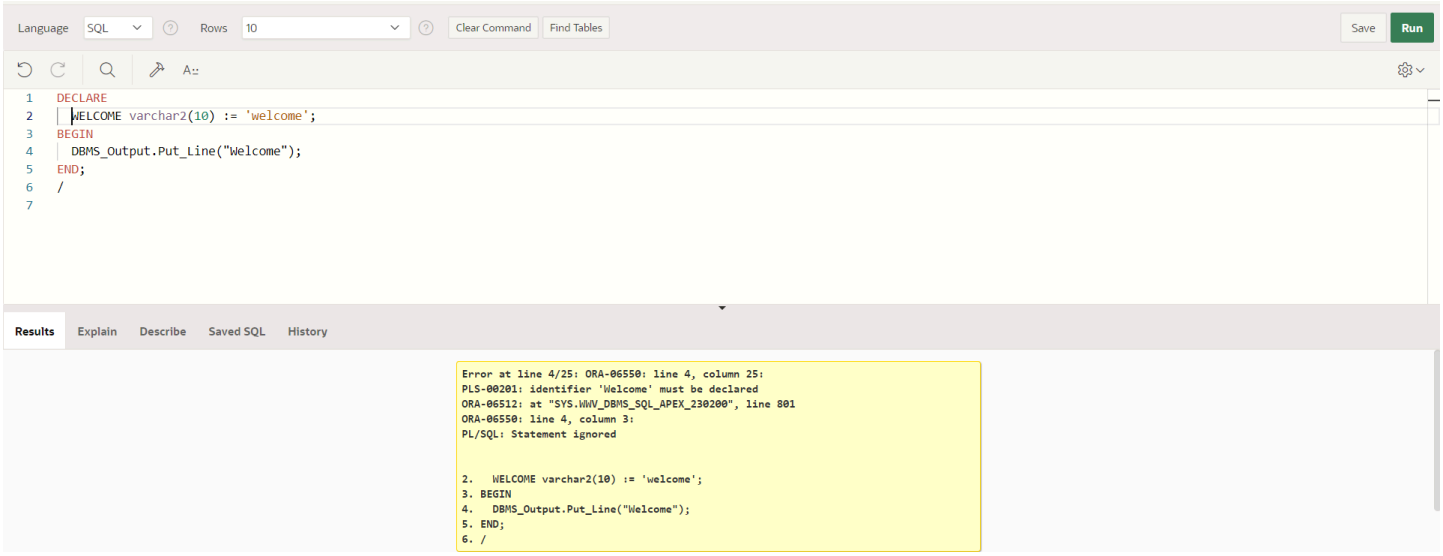
QUERY:

```
DECLARE
WELCOME varchar2(10) := 'welcome';
BEGIN
DBMS_Output.Put_Line("Welcome");
END;
/
```

```
DECLARE
 WELCOME varchar2(10) := 'welcome';
 BEGIN
 DBMS_Output.Put_Line("Welcome");
 END;
 /
```

OUTPUT:





RESULT:

The program is executed successfully.

3.) Write a PL/SQL block to adjust the salary of the employee whose ID 122.

PROCEDURE:

The procedure simulates a salary increase for an employee but doesn't modify the actual data in the database. Here's how it works in words:

1. Setting Up:
    - A variable named `salary_of_emp` is created to store an employee's salary with two decimal places.
2. Salary Increase Procedure:
    - A procedure named `approx_salary` is defined. This procedure takes three inputs:
        - An employee ID (unused in this example).
        - A reference to the employee's salary (`empsal`). This allows the procedure to modify the salary value.
        - An amount to be added to the salary (`addless`).
    - Inside the procedure, the value stored in `empsal` (which represents the current salary) is directly increased by adding the `addless` value.
3. Simulating Salary Increase:
    - The main program block retrieves the current salary of an employee with ID 122 (assuming it exists in the `employees` table).
    - It prints the current salary to the console.
    - The `approx_salary` procedure is called with:
        - Employee ID set to 100 (ignored in the current logic).
        - The `salary_of_emp` variable as the reference to the salary (`empsal`).
        - An amount of 1000 to be added (`addless`).
    - After the procedure call, the updated salary (which reflects the increase) is printed.

Important Note:

- This procedure only modifies a copy of the salary value within the program, not the actual employee data in the database. To permanently update the salary, a separate SQL statement like `UPDATE` would be needed.

QUERY:

```
DECLARE
 salary_of_emp  NUMBER(8,2);
 PROCEDURE approx_salary (
  emp        NUMBER,
  empsal IN OUT NUMBER,
  addless     NUMBER
 ) IS
 BEGIN
  empsal := empsal + addless;
 END;

BEGIN
 SELECT salary INTO salary_of_emp
 FROM employees
 WHERE employee_id = 122;
 DBMS_OUTPUT.PUT_LINE
  ('Before invoking procedure, salary_of_emp: ' || salary_of_emp);
 approx_salary (100, salary_of_emp, 1000);
 DBMS_OUTPUT.PUT_LINE
  ('After invoking procedure, salary_of_emp: ' || salary_of_emp);
END;
/
```

OUTPUT:

RESULT:

The procedure is executed successfully.

4.) Write a PL/SQL block to create a procedure using the "IS [NOT] NULL Operator" and show AND operator returns TRUE if and only if both operands are TRUE.

PROCEDURE:

The procedure you provided can be explained in words as follows:

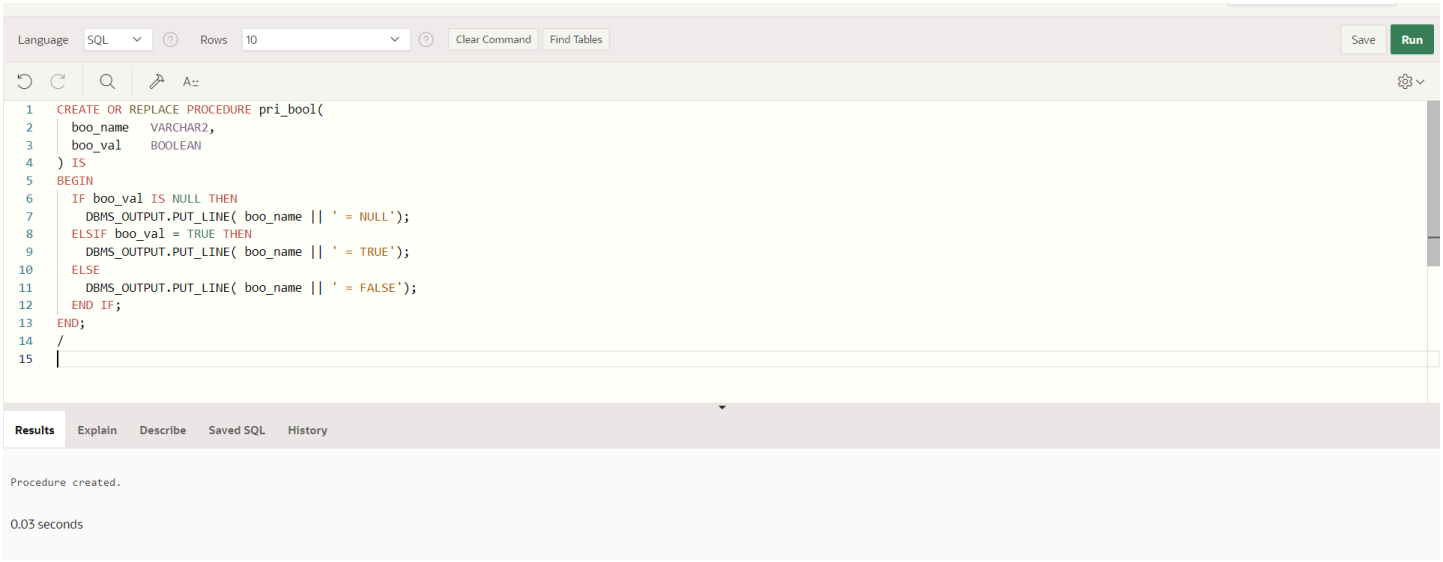
1. Setting Up:
    - It defines a procedure named `pri_bool` that takes two inputs:
        - A string (`boo_name`) that represents the name of a boolean variable.
        - A boolean variable itself (`boo_val`).
2. Checking the Boolean Value:
    - The procedure uses an `IF` statement to check the value of `boo_val`:
        - If `boo_val` is NULL, it means the boolean variable doesn't have a clear TRUE or FALSE value assigned. In this case, the procedure prints a message stating "`boo_name` is NULL".
        - If `boo_val` is TRUE, it indicates a positive or affirmative condition. The procedure then prints a message stating "`boo_name` is TRUE".
        - If neither of the above conditions is true (meaning `boo_val` must be FALSE), it represents a negative or inactive condition. The procedure prints a message stating "`boo_name` is FALSE".

3. Purpose:
    - This procedure is designed to make your code more readable and understandable. By providing the variable's name (`boo_name`) in the output message, it clarifies what boolean value is being checked.

QUERY:

```
CREATE OR REPLACE PROCEDURE pri_bool(
 boo_name   VARCHAR2,
 boo_val    BOOLEAN
) IS
BEGIN
 IF boo_val IS NULL THEN
  DBMS_OUTPUT.PUT_LINE( boo_name || ' = NULL');
 ELSIF boo_val = TRUE THEN
  DBMS_OUTPUT.PUT_LINE( boo_name || ' = TRUE');
 ELSE
  DBMS_OUTPUT.PUT_LINE( boo_name || ' = FALSE');
 END IF;
END;
/
```

OUTPUT:



RESULT:

The procedure is executed successfully.

5.) Write a PL/SQL block to describe the usage of LIKE operators including wildcard characters and escape characters.

PROCEDURE:

The algorithm for the provided PL/SQL code can be described as follows:

Procedure: pat_match

1. **Inputs:**
    - `test_string`: String to be matched against the pattern.
    - `pattern`: String containing wildcard characters for matching.
2. **Matching Logic:**
    - Use the `LIKE` operator to compare `test_string` with `pattern`.
        - The `LIKE` operator performs pattern matching based on wildcards:
            - `%`: Matches any sequence of characters (including zero characters).
            - `_`: Matches a single character.
    - If `test_string` LIKE `pattern`:
        - The strings match the pattern.
        - Return TRUE (indicate a match).
    - Else:
        - The strings don't match the pattern.
        - Return FALSE (indicate no match).

Overall Algorithm:

1. Define the `pat_match` procedure with the specified inputs (`test_string` and `pattern`).
2. Inside the procedure:
    - Use the `IF` statement and the `LIKE` operator to check if `test_string` matches `pattern`.
    - If there's a match, print "TRUE" using `DBMS_OUTPUT.PUT_LINE`.
    - If there's no match, print "FALSE".
3. In the main program block:
    - Call the `pat_match` procedure with different test strings and patterns to perform the matching checks.

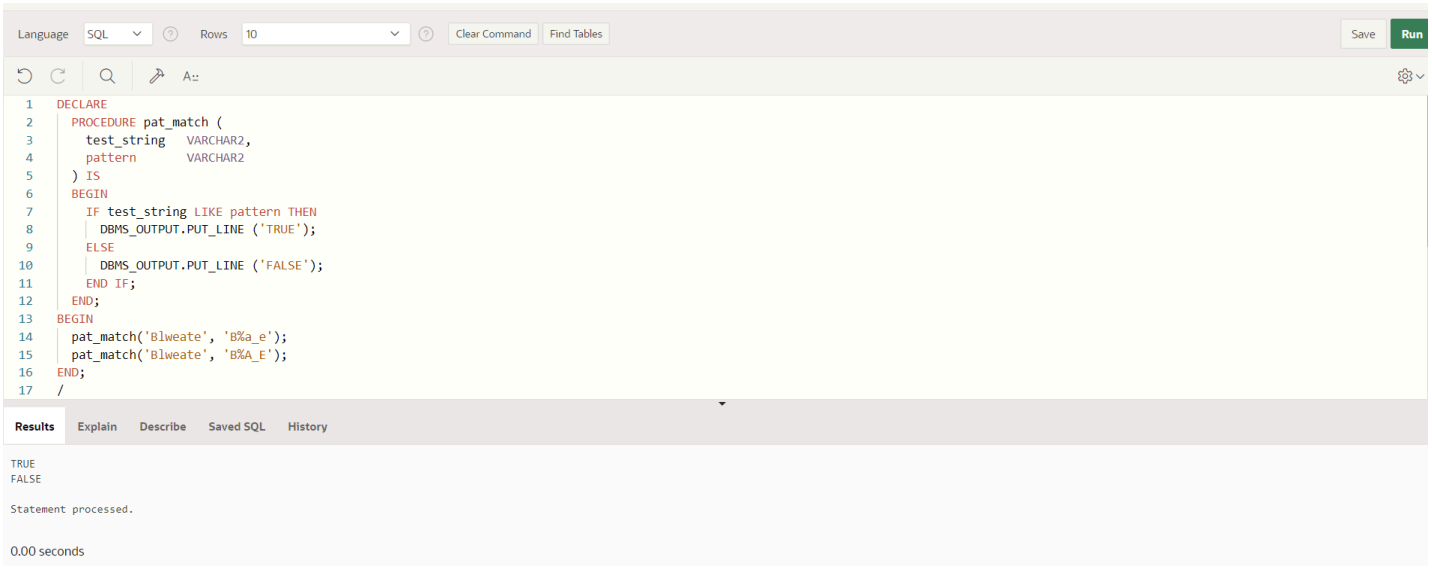
Time Complexity:

The time complexity of this algorithm depends on the complexity of the pattern and the length of the string. In most cases, the `LIKE` operator performs the matching efficiently. However, patterns with many wildcards or very long strings could potentially take longer to compare.

QUERY:

```
DECLARE
 PROCEDURE pat_match (
  test_string   VARCHAR2,
  pattern       VARCHAR2
 ) IS
 BEGIN
  IF test_string LIKE pattern THEN
   DBMS_OUTPUT.PUT_LINE ('TRUE');
  ELSE
   DBMS_OUTPUT.PUT_LINE ('FALSE');
  END IF;
 END;
BEGIN
 pat_match('Blweate', 'B%a_e');
 pat_match('Blweate', 'B%A_E');
END;
/
```

OUTPUT:



RESULT:

The procedure is executed successfully.

6.) Write a PL/SQL program to arrange the number of two variable in such a way that the small number will store in num_small variable and large number will store in num_large variable

PROCEDURE

The algorithm for the provided PL/SQL code snippet can be described as follows:

1. Variable Initialization:

- Declare three numeric variables:
  - `num_small`: Assigned a starting value (here, 8).
  - `num_large`: Assigned a starting value (here, 5).
  - `num_temp` (temporary variable): Used to hold a value during the swap (initially not assigned a value).

2. Swapping Condition Check:

- Use an `IF` statement to check if `num_small` is greater than `num_large`.

3. Swapping Logic (if condition is true):

- If the condition is true (meaning `num_small` is larger):
  - Assign the current value of `num_small` to the temporary variable `num_temp`.
  - Assign the current value of `num_large` to `num_small`.
  - Assign the value stored in `num_temp` (which was originally the value of `num_small`) to `num_large`. This effectively swaps the contents of `num_small` and `num_large`.

4. Printing Results (always executed):

- Regardless of whether the swapping condition was true or false, use `DBMS_OUTPUT.PUT_LINE` statements to print the final values of both `num_small` and `num_large` to the console.

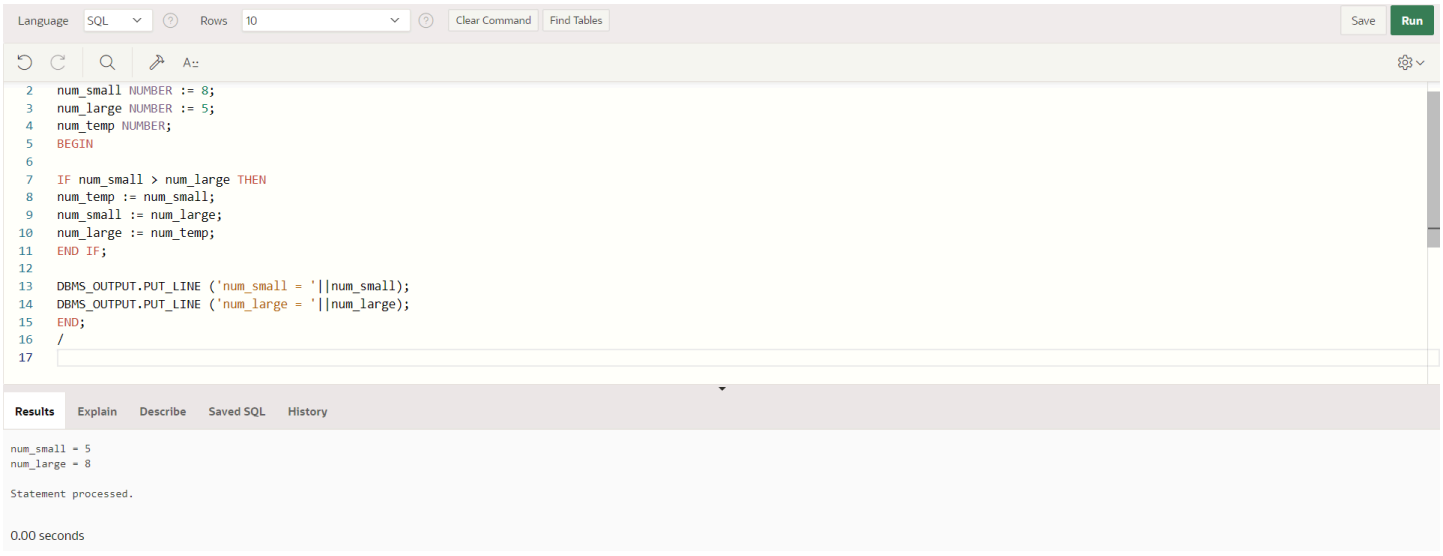
Time Complexity:

This algorithm has a time complexity of O(1), which is considered constant time. This is because the number of operations performed (variable assignments and comparisons) is constant and independent of the input values.

QUERY:

```
DECLARE
num_small NUMBER := 8;
num_large NUMBER := 5;
num_temp NUMBER;
BEGIN

IF num_small > num_large THEN
num_temp := num_small;
num_small := num_large;
num_large := num_temp;
END IF;

DBMS_OUTPUT.PUT_LINE ('num_small = '||num_small);
DBMS_OUTPUT.PUT_LINE ('num_large = '||num_large);
END;
/
```

OUTPUT:



RESULT:

The program is executed successfully..

7.) Write a PL/SQL procedure to calculate the incentive on a target achieved and display the message whether the record is updated or not.

PROCEDURE

The procedure named `test1` simulates a scenario where an employee might receive a sales incentive.

Here's how it works in words:

1. Setting Up:
    - The procedure takes three inputs:
        - `sal_achieve`: The employee's achieved sales amount (number).
        - `target_qty`: The target sales quantity for the employee (number).
        - `emp_id`: The employee's ID number.
2. Incentive Calculation (if target exceeded):
    - The procedure checks if the achieved sales (`sal_achieve`) are greater than the target sales (`target_qty`) by at least 200.
    - If the condition is met (employee exceeded the target), an incentive amount is calculated.
        - The incentive is calculated by subtracting the target quantity from the achieved sales and then dividing the result by 4.
3. Updating Employee Salary (if applicable):
    - If an incentive was calculated (meaning the employee exceeded the target by enough), the procedure attempts to update the employee's salary in a table named `employees`.
        - It assumes a table named `employees` exists with a `salary` field for each employee identified by an `employee_id`.
        - The update would increase the employee's salary by the calculated incentive amount.
4. Note: This code snippet might not directly update the database due to potential permission limitations within the PL/SQL environment. A separate mechanism to commit the changes might be required.
5. Keeping Track of Updates:
    - A variable named `updated` (initially 'No') is used to track whether the update happened.
    - If the update is successful (assuming proper permissions exist), the variable is changed to 'Yes'.
6. Printing Information:

- Regardless of whether an incentive was applied or not, the procedure prints information to the console, including:
  - Whether the employee table was updated (based on the `updated` variable).
  - The amount of incentive calculated (might be 0 if the target wasn't met).

In essence, this procedure acts like a simulation of calculating and potentially applying a sales incentive to an employee based on their performance. It interacts with a hypothetical `employees` table to update the salary but might require additional steps to commit those changes permanently.

QUERY:

```
DECLARE
 PROCEDURE test1 (
  sal_achieve  NUMBER,
  target_qty  NUMBER,
  emp_id NUMBER
 )
 IS
  incentive   NUMBER := 0;
  updated  VARCHAR2(3) := 'No';
 BEGIN
  IF sal_achieve > (target_qty + 200) THEN
   incentive := (sal_achieve - target_qty)/4;
   UPDATE employees
   SET salary = salary + incentive
   WHERE employee_id = emp_id;
   updated := 'Yes';
  END IF;
  DBMS_OUTPUT.PUT_LINE (
   'Table updated?  ' || updated || ', ' ||
   'incentive = ' || incentive || '.'
  );
 END test1;
BEGIN
 test1(2300, 2000, 144);
 test1(3600, 3000, 145);
END;
```

/

OUTPUT:

RESULT:

The procedure is executed successfully.

8.) Write a PL/SQL procedure to calculate incentive achieved according to the specific sale limit

PROCEDURE

The procedure named `test1` calculates a sales incentive for an employee based on their achieved sales amount. Here's how it works in words:

1. Setting Up:
    - The procedure takes one input: `sal_achieve`, which is a number representing the employee's total sales achieved.
2. Incentive Calculation:
    - The procedure uses an `IF-ELSIF-ELSE` statement to determine the incentive amount based on different sales thresholds:
        - If the `sal_achieve` is greater than 44000 (highest threshold), the incentive is set to 1800 (highest incentive).
        - Else if the `sal_achieve` is greater than 32000 (but not more than 44000), the incentive is set to 800 (medium incentive).
        - Else (if neither of the above conditions are met, meaning sales are below 32000), the incentive is set to 500 (default incentive).
3. Printing Information:
    - The procedure prints a message to the console that shows:

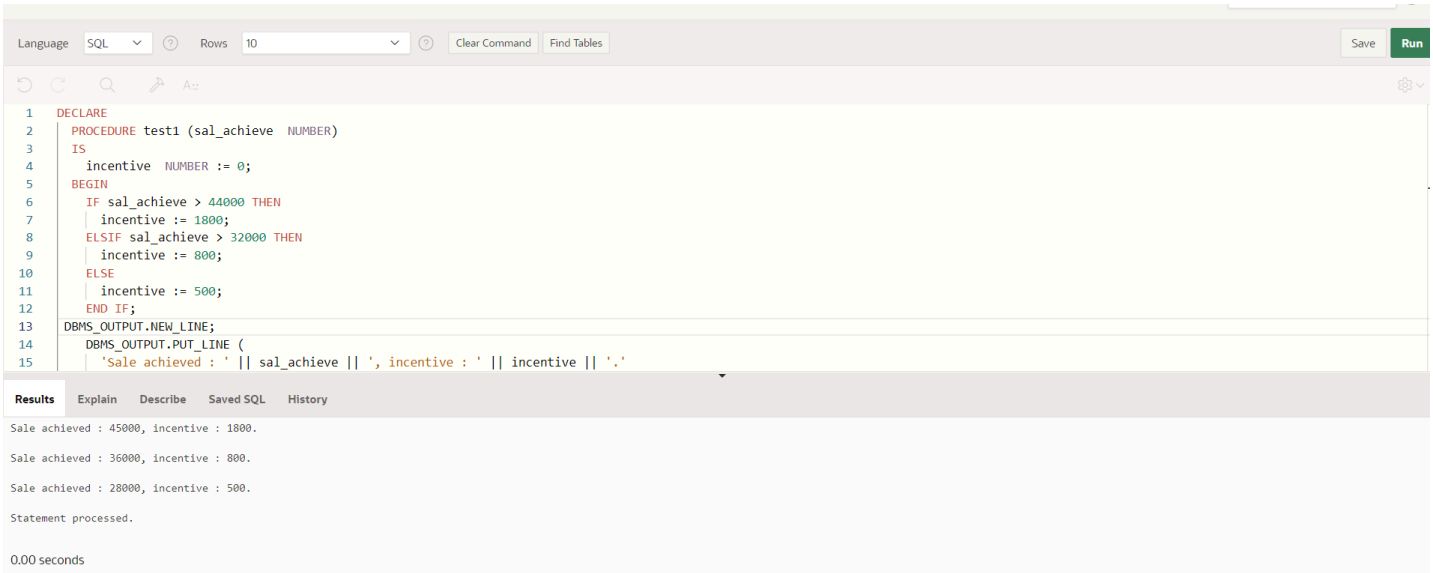
- The employee's achieved sales amount (`sal_achieve`).
- The calculated incentive amount (`incentive`) based on the achieved sales.

Overall:

- This procedure defines a simple incentive structure with three tiers based on achieved sales performance.
- It calculates the incentive amount based on these tiers and displays the results along with the achieved sales figure.

QUERY:

```
DECLARE
  PROCEDURE test1 (sal_achieve  NUMBER)
  IS
    incentive  NUMBER := 0;
  BEGIN
    IF sal_achieve > 44000 THEN
      incentive := 1800;
    ELSIF sal_achieve > 32000 THEN
      incentive := 800;
    ELSE
      incentive := 500;
    END IF;
 DBMS_OUTPUT.NEW_LINE;
    DBMS_OUTPUT.PUT_LINE (
      'Sale achieved : ' || sal_achieve || ', incentive : ' || incentive || '.'
    );
  END test1;
BEGIN
  test1(45000);
  test1(36000);
  test1(28000);
END;
/
```



RESULT:

The program is executed successfully.

9.) Write a PL/SQL program to count the number of employees in department 50 and check whether this department has any vacancies or not. There are 45 vacancies in this department.

PROCEDURE

The provided code doesn't define a procedure, but rather a code block that calculates and displays department vacancies. Here's how it works in words:

1. **Enabling Output:**
    - It starts by turning on server output using `SET SERVEROUTPUT ON`. This allows the code to display messages on the console.
2. **Setting Up Variables:**
    - Two numeric variables are declared:
        - `tot_emp`: This variable will store the total number of employees retrieved from a database query.
        - `get_dep_id`: This variable stores the department ID (set to 80 in this case) for which we want to calculate vacancies.
3. **Counting Employees in Department:**
    - A `SELECT` statement is used to query the database and count the number of employees in a specific department:
        - It counts all employees (`COUNT(*)`) from the `employees` table (aliased as `e`).

        - It joins the `employees` table with the `departments` table (aliased as `d`) based on the `department_id` column. This ensures we only count employees who belong to the specified department.
        - It filters the results using a `WHERE` clause to include only employees whose `department_id` matches the value stored in `get_dep_id` (which is 80 by default).
    - The total count is then stored in the `tot_emp` variable.
4. **Displaying Employee Count:**
    - The code uses `DBMS_OUTPUT.PUT_LINE` to print a message to the console. This message shows the total number of employees found in the department with the ID stored in `get_dep_id`. It converts the number retrieved from the database to a string for display using `TO_CHAR`.
5. **Checking for Vacancies:**
    - An `IF` statement checks if the total number of employees (`tot_emp`) is greater than or equal to 45 (assuming a maximum capacity of 45 employees for this department).
        - If the department is full (condition is true), another message is printed indicating there are no vacancies in that department.
    - If the `IF` condition is false (meaning there are less than 45 employees), it calculates the number of vacancies:
        - It subtracts the total number of employees (`tot_emp`) from the assumed maximum capacity (45).
        - It converts the vacancy count to a string using `TO_CHAR`.
    - Finally, it prints a message to the console indicating the number of vacancies in the department with the ID stored in `get_dep_id`.

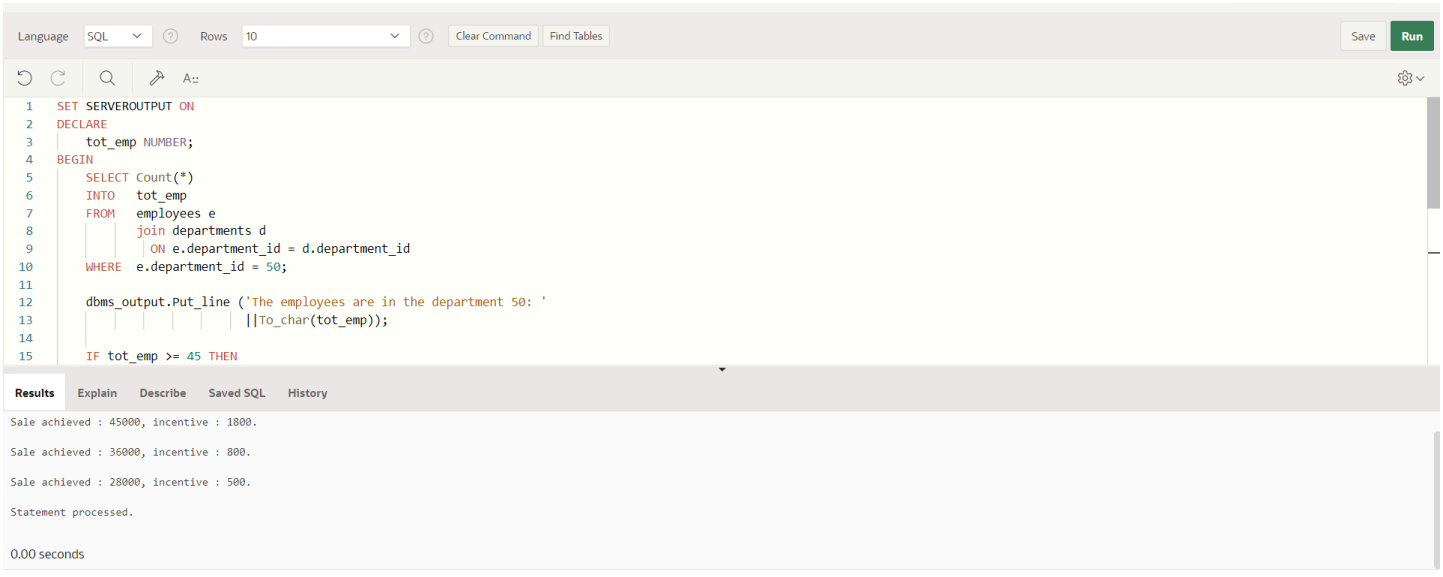
In essence:

This code snippet simulates a scenario where you want to check how many openings (vacancies) are available in a specific department of a company. It retrieves employee data, calculates vacancies based on a predefined maximum capacity, and displays the results.

QUERY:

```
SET SERVEROUTPUT ON
DECLARE
   tot_emp NUMBER;
         get_dep_id NUMBER;

BEGIN
   get_dep_id := 80;
   SELECT Count(*)
   INTO   tot_emp
   FROM   employees e
         join departments d
          ON e.department_id = d.department_id
   WHERE  e.department_id = get_dep_id;
   dbms_output.Put_line ('The employees are in the department '||get_dep_id||' is: '
                    ||To_char(tot_emp));
   IF tot_emp >= 45 THEN
    dbms_output.Put_line ('There are no vacancies in the department '||get_dep_id);
   ELSE
    dbms_output.Put_line ('There are '||to_char(45-tot_emp)||' vacancies in department '|| get_dep_id
);
   END IF;
END;
/
```

OUTPUT:



RESULT:

The program is executed successfully.

10.) Write a PL/SQL program to count the number of employees in a specific department and check whether this department has any vacancies or not. If any vacancies, how many vacancies are in that department.

PROCEDURE

The algorithm for the provided PL/SQL code can be described as follows:

1. Initialization:

- Enable server output for displaying messages (`SET SERVEROUTPUT ON`).
- Declare two numeric variables:
  - `get_dep_id`: Stores the department ID to check for vacancies (default value 80).
  - `tot_emp`: Stores the total number of employees retrieved from the database query.

2. Counting Employees in Department:

- Construct a `SELECT` statement:
  - Use `COUNT(*)` to count the number of rows (employees) in the result set.
  - Specify the `FROM` clause to retrieve data from the `employees` table (aliased as `e`).
  - Use a `JOIN` operation to combine data from the `employees` table with the `departments` table (aliased as `d`) based on the matching `department_id` columns.
  - Add a `WHERE` clause to filter the results and include only employees whose `department_id` in the `employees` table matches the value stored in the `get_dep_id` variable.

3. Displaying Employee Count:

- Use `DBMS_OUTPUT.PUT_LINE` to print a message to the console.
- The message includes:
  - Text indicating the department ID (`get_dep_id`).
  - The total number of employees (`tot_emp`) retrieved from the database query. Convert the number to a string using `TO_CHAR` for display.

4. Checking for Vacancies:

- Use an `IF` statement to check if the total number of employees (`tot_emp`) is greater than or equal to 45 (assuming a maximum capacity of 45 for this department).
    - If the condition is true (department is full):
        - Use `DBMS_OUTPUT.PUT_LINE` to print a message indicating there are no vacancies in that department.
- Else (department is not full):
    - Calculate the number of vacancies by subtracting the total number of employees (`tot_emp`) from the assumed maximum capacity (45).
    - Use `DBMS_OUTPUT.PUT_LINE` to print a message indicating the number of vacancies in the department with the ID stored in `get_dep_id`. Convert the vacancy count to a string using `TO_CHAR` for display.

5. Termination:

- The `BEGIN` and `END` keywords mark the beginning and end of the code block, respectively.

Time Complexity:

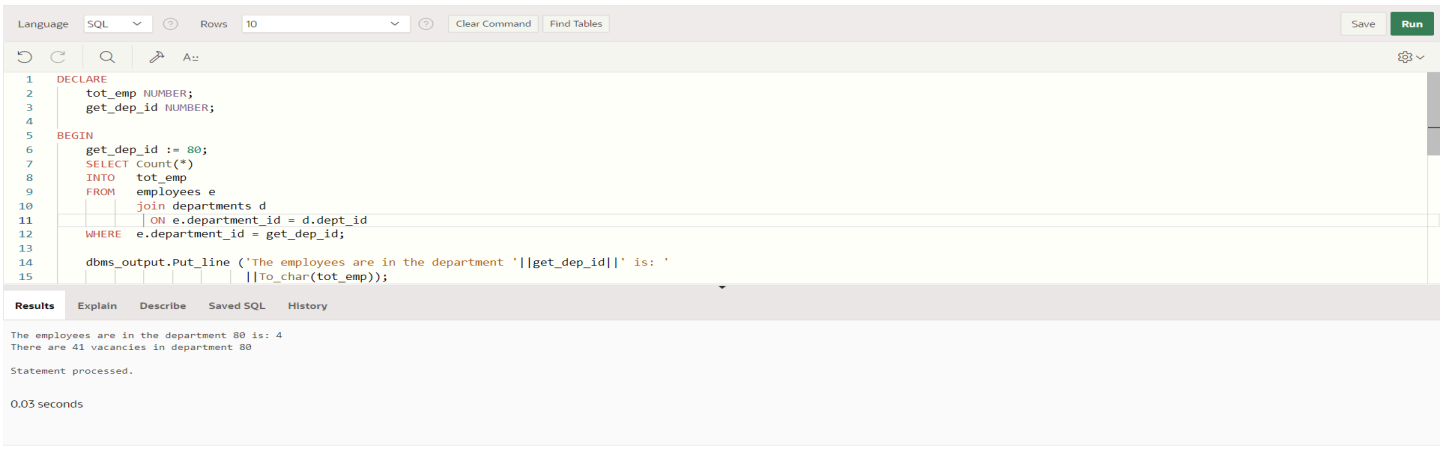
This algorithm has a time complexity of O(1) because the number of operations performed (variable assignments, comparisons, and the database query) is constant and independent of the input value (department ID). The database query itself might have its own time complexity depending on the database engine and table size, but in the context of this algorithm, it's considered constant.

QUERY:

```
DECLARE
  tot_emp NUMBER;
       get_dep_id NUMBER;

BEGIN
  get_dep_id := 80;
  SELECT Count(*)
  INTO   tot_emp
  FROM   employees e
```

```
        join departments d
          ON e.department_id = d.dept_id
   WHERE  e.department_id = get_dep_id;

   dbms_output.Put_line ('The employees are in the department '||get_dep_id||' is: '
                        ||To_char(tot_emp));

   IF tot_emp >= 45 THEN
    dbms_output.Put_line ('There are no vacancies in the department '||get_dep_id);
   ELSE
    dbms_output.Put_line ('There are '||to_char(45-tot_emp)||' vacancies in department '|| get_dep_id
);
   END IF;
END;
/
```

OUTPUT:



RESULT:

The program is executed successfully.

11.) Write a PL/SQL program to display the employee IDs, names, job titles, hire dates, and salaries of all employees

PROCEDURE

Here's the algorithm for the provided PL/SQL code that retrieves and displays employee information:

1. Variable Initialization:

- Declare several variables with data types matching the corresponding columns in the `employees` table:

    - `v_employee_id`: Stores an employee ID (NUMBER).
    - `v_full_name`: Stores an employee's full name (VARCHAR2).
    - `v_job_id`: Stores an employee's job ID (VARCHAR2).
    - `v_hire_date`: Stores an employee's hire date (DATE).
    - `v_salary`: Stores an employee's salary (NUMBER).

2. Cursor Declaration:

- Declare a cursor named `c_employees`. This cursor acts as a pointer to navigate through the result set of a database query.

3. Cursor Definition:

- Define the SQL statement associated with the cursor (`c_employees`). This statement:
    - Selects specific columns from the `employees` table:
        - `employee_id`
        - `first_name`
        - `last_name` (concatenated with `first_name` using `||` to create the full name)
        - `job_id`
        - `hire_date`
        - `salary`

4. Printing Header:

- Use `DBMS_OUTPUT.PUT_LINE` to print a header row to the console displaying labels for each employee attribute.
- Use `DBMS_OUTPUT.PUT_LINE` again to print a separator line.

5. Opening the Cursor:

- Use the `OPEN` statement to establish the cursor for reading data from the database.

6. Fetching Data (Loop):

- Use a `FETCH` statement within a `WHILE` loop to retrieve data from the cursor row by row.

    - The `FETCH` statement assigns the retrieved values to the declared variables:
        - `v_employee_id`
        - `v_full_name`
        - `v_job_id`
        - `v_hire_date`
        - `v_salary`
- The `WHILE` loop continues as long as data can be fetched using `c_employees%FOUND` (cursor's "found" attribute).

7. Displaying Employee Information:

- Within the `WHILE` loop, use `DBMS_OUTPUT.PUT_LINE` to print a formatted line displaying the retrieved employee information for each row. It uses the values stored in the variables:
    - `v_employee_id`
    - `v_full_name`
    - `v_job_id`
    - `v_hire_date`
    - `v_salary`

8. Closing the Cursor:

- After the loop exits (no more data to fetch), use the `CLOSE` statement to release resources associated with the cursor.

9. Termination:

- The `BEGIN` and `END` keywords mark the beginning and end of the code block, respectively.

Time Complexity:

This algorithm has a time complexity of O(N), where N is the number of employees in the `employees` table. This is because the `WHILE` loop iterates through each row of data retrieved from the database. The database query itself might have its own time complexity depending on the database engine and table size, but in the context of this algorithm, it's considered part of the loop's processing.

QUERY:

```
DECLARE
v_employee_id employees.employee_id%TYPE;
v_full_name employees.first_name%TYPE;
v_job_id employees.job_id%TYPE;
v_hire_date employees.hire_date%TYPE;
v_salary employees.salary%TYPE;
 CURSOR c_employees IS
  SELECT employee_id, first_name || ' ' || last_name AS full_name, job_id, hire_date, salary
  FROM employees;
BEGIN
 DBMS_OUTPUT.PUT_LINE('Employee ID | Full Name | Job Title | Hire Date | Salary');
 DBMS_OUTPUT.PUT_LINE('-----------------------------------------------------------------');
 OPEN c_employees;
 FETCH c_employees INTO v_employee_id, v_full_name, v_job_id, v_hire_date, v_salary;
 WHILE c_employees%FOUND LOOP
  DBMS_OUTPUT.PUT_LINE(v_employee_id || '       | ' || v_full_name || ' | ' || v_job_id || ' | ' ||
v_hire_date || ' | ' || v_salary);
  FETCH c_employees INTO v_employee_id, v_full_name, v_job_id, v_hire_date, v_salary;
 END LOOP;
 CLOSE c_employees;
END;
/
```

OUTPUT:

RESULT:

The program is executed successfully.

12.) Write a PL/SQL program to display the employee IDs, names, and department names of all employees.

PROCEDURE

Here's the algorithm for the provided PL/SQL code that retrieves and displays employee information including their manager's name:

1. Cursor Declaration:

- Declare a cursor named `emp_cursor`. This cursor will act as a pointer to navigate through the result set of a database query.

2. Cursor Definition:

- Define the SQL statement associated with the cursor (`emp_cursor`). This statement:
    - Uses a `SELECT` clause to retrieve data from two tables:
        - `employees` table (aliased as `e`): Selects `employee_id` and `first_name` (employee's name).
        - `employees` table again (aliased as `m`): Selects `first_name` of the manager.
    - Uses a `LEFT JOIN` to connect the `employees` table with itself. This joins rows in `e` with rows in `m` based on matching `manager_id` (in `e`) and `employee_id` (in `m`). This enables retrieving manager names for employees who have managers.

3. Record Variable Declaration:

- Declare a variable named `emp_record` with a data type that matches the structure of a row retrieved by the cursor (`emp_cursor%ROWTYPE`). This variable will store the fetched data for each employee.

4. Opening the Cursor:

- Use the `OPEN` statement to establish the cursor and prepare it to retrieve data from the database.

5. Fetching Data (Loop):

- Use a `WHILE` loop to iterate through the data fetched by the cursor:
    - Inside the loop, use a `FETCH` statement to retrieve data from the cursor and assign it to the `emp_record` variable. This variable now holds information about the current employee.
    - The `WHILE` loop continues as long as there is data to be fetched using the `emp_cursor%FOUND` attribute (cursor's "found" status).

6. Displaying Employee Information:

- Within the `WHILE` loop, use `DBMS_OUTPUT.PUT_LINE` statements to print the following details for each employee retrieved from `emp_record`:
    - Employee ID
    - Employee Name (first name)
    - Manager Name (first name of the manager, or `NULL` if no manager is assigned)
- Print a separator line after displaying information for each employee.

7. Closing the Cursor:

- After the loop exits (no more data to fetch), use the `CLOSE` statement to release resources associated with the cursor.

8. Termination:

- The `BEGIN` and `END` keywords mark the beginning and end of the code block, respectively.

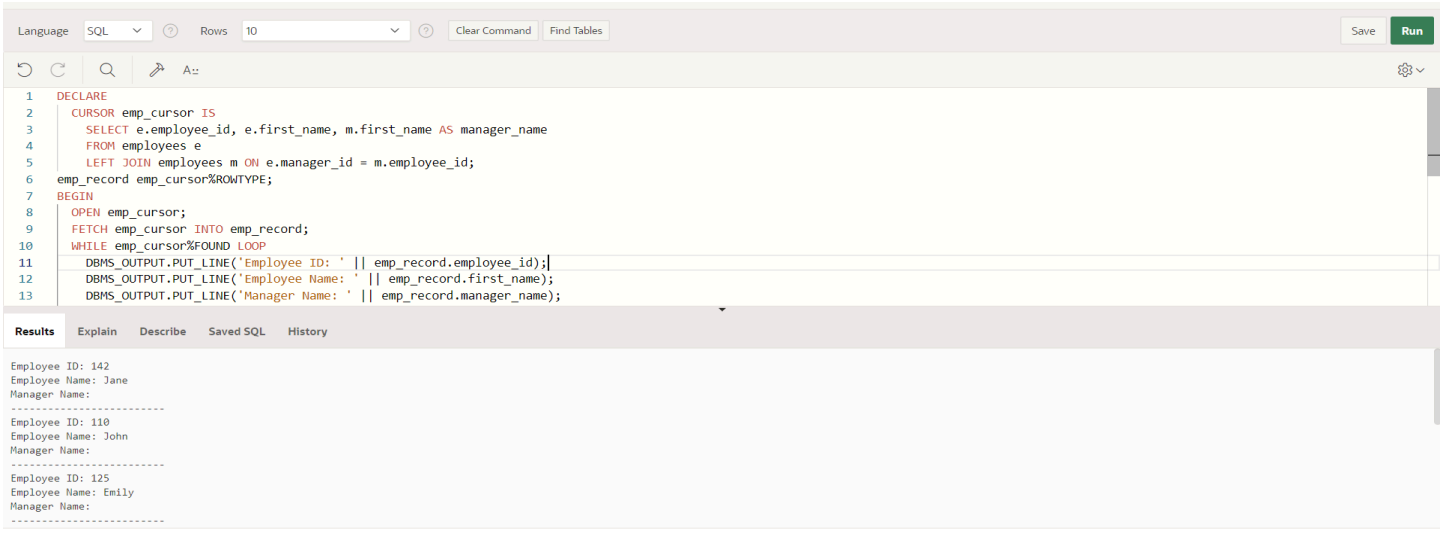
Time Complexity:

This algorithm has a time complexity of O(N), where N is the number of employees in the `employees` table. This is because the `WHILE` loop iterates through each row of data retrieved from the database using the cursor. The database query itself might have its own time complexity depending on the database engine and table size, but in the context of this algorithm, it's considered part of the loop's processing.

QUERY:

```
DECLARE
  CURSOR emp_cursor IS
    SELECT e.employee_id, e.first_name, m.first_name AS manager_name
    FROM employees e
    LEFT JOIN employees m ON e.manager_id = m.employee_id;
emp_record emp_cursor%ROWTYPE;
BEGIN
  OPEN emp_cursor;
  FETCH emp_cursor INTO emp_record;
  WHILE emp_cursor%FOUND LOOP
    DBMS_OUTPUT.PUT_LINE('Employee ID: ' || emp_record.employee_id);
    DBMS_OUTPUT.PUT_LINE('Employee Name: ' || emp_record.first_name);
    DBMS_OUTPUT.PUT_LINE('Manager Name: ' || emp_record.manager_name);
    DBMS_OUTPUT.PUT_LINE('-------------------------');
    FETCH emp_cursor INTO emp_record;
  END LOOP;
  CLOSE emp_cursor;
END;
/
```

OUTPUT:



RESULT:

The query is executed successfully.

13.) Write a PL/SQL program to display the job IDs, titles, and minimum salaries of all jobs

PROCEDURE

The provided PL/SQL code snippet retrieves minimum salary information associated with job IDs, but it might contain an error in the table join. Here's a breakdown of the algorithm assuming the `employees` table is not relevant to minimum salaries and was joined unintentionally:

1. Cursor Declaration:

- Declare a cursor named `job_cursor`. This cursor acts as a pointer to navigate through the result set of a database query.

2. Cursor Definition (Assuming Error in Join):

- Define the SQL statement associated with the cursor (`job_cursor`). This statement (assuming the `employees` table is not relevant):
    - Uses a `SELECT` clause to retrieve data from one table:
        - `job_grade` table (aliased as `j`): Selects the `job_id` and `lowest_sal` (assumed minimum salary for the job grade).
- Correction: Remove the reference to the `employees` table (aliased as `e`) from the `FROM` clause. This is likely a mistake as the `employees` table doesn't seem to provide relevant data for minimum salaries based on job grades.

3. Record Variable Declaration:

- Declare a variable named `job_record` with a data type that matches the structure of a row retrieved by the cursor (`job_cursor%ROWTYPE`). This variable will store the fetched data for each job.

4. Opening the Cursor:

- Use the `OPEN` statement to establish the cursor and prepare it to retrieve data from the database.

5. Fetching Data (Loop):

- Use a `WHILE` loop to iterate through the data fetched by the cursor:
    - Inside the loop, use a `FETCH` statement to retrieve data from the cursor and assign it to the `job_record` variable. This variable now holds information about the current job grade (including `job_id` and minimum salary).
    - The `WHILE` loop continues as long as there is data to be fetched using the `job_cursor%FOUND` attribute (cursor's "found" status).

6. Displaying Job Information:

- Within the `WHILE` loop, use `DBMS_OUTPUT.PUT_LINE` statements to print the following details for each job retrieved from `job_record`:
    - Job ID
    - Minimum Salary (from the `lowest_sal` column)
- Print a separator line after displaying information for each job grade.

7. Closing the Cursor:

- After the loop exits (no more data to fetch), use the `CLOSE` statement to release resources associated with the cursor.

8. Termination:

- The `BEGIN` and `END` keywords mark the beginning and end of the code block, respectively.

Time Complexity:

This algorithm has a time complexity of O(J), where J is the number of job grades in the `job_grade` table. This is because the `WHILE` loop iterates through each row of data retrieved from the database using the cursor. The database query itself might have its own time complexity depending on the database engine and table size, but in the context of this algorithm, it's considered part of the loop's processing.

Note: If the `employees` table is actually intended to be part of the query and relevant to minimum salaries, the logic and cursor definition would need to be adjusted to incorporate the join condition between the tables.

QUERY:

```
DECLARE
  CURSOR job_cursor IS
    SELECT e.job_id, j.lowest_sal
    FROM job_grade j,employees e;
job_record job_cursor%ROWTYPE;
BEGIN
  OPEN job_cursor;
  FETCH job_cursor INTO job_record;
  WHILE job_cursor%FOUND LOOP
    DBMS_OUTPUT.PUT_LINE('Job ID: ' || job_record.job_id);
    DBMS_OUTPUT.PUT_LINE('Minimum Salary: ' || job_record.lowest_sal);
    DBMS_OUTPUT.PUT_LINE('-------------------------');
    FETCH job_cursor INTO job_record;
  END LOOP;
  CLOSE job_cursor;
END;
/
```

OUTPUT:

RESULT:

The program is executed successfully.

14.) Write a PL/SQL program to display the employee IDs, names, and job history start dates of all employees.

PROCEDURE

Here's the algorithm for the provided PL/SQL procedure `Get_Employee_Start_Dates` that retrieves employee information and displays the most recent start date for each employee:

1. Procedure Declaration:

- Declare a procedure named `Get_Employee_Start_Dates`. This procedure encapsulates the logic for retrieving and displaying employee data.

2. Cursor Definition:

- Define a cursor named `employees_cur` to iterate through employee records. This cursor leverages a window function for efficiency.
- The `SELECT` statement within the cursor definition uses an `INNER JOIN` to combine data from the `employees` and `job_history` tables based on the matching `employee_id`.
- It retrieves the following data for each employee:
    - `employee_id`
    - `last_name`
    - `job_id`
    - `start_date` (from the `employees` table)
- A window function `MAX` is used with `PARTITION BY e.employee_id` and `ORDER BY jh.end_date DESC` within the subquery. This calculates the maximum `end_date` (potentially representing the end date of the previous job) from the `job_history` table for each employee group.
- The result of the window function is aliased as `prev_end_date`.

3. Printing Header Row:

- Use `DBMS_OUTPUT.PUT_LINE` statements to print a formatted header row displaying labels for each employee attribute:
    - Employee ID
    - Last Name
    - Job ID
    - Start Date

4. Looping through Employees:

- A `FOR` loop iterates through each row retrieved by the cursor and assigns the data to a record variable named `emp_record`.

5. Determining Start Date:

- Inside the loop, an `IF` statement checks if `emp_record.prev_end_date` is `NULL`:
    - If `NULL` (meaning no previous job history was found for the employee), the `start_date` retrieved from the cursor (`emp_record.start_date`) is used for the employee.
- Otherwise, the `prev_end_date` (most recent end date from job history) is incremented by 1 (assuming a one-day gap between jobs) and used as the start date.

6. Displaying Employee Information:

- Use `DBMS_OUTPUT.PUT_LINE` to print a formatted line with the following details for each employee:
    - `emp_record.employee_id` (padded for right alignment)
    - `emp_record.last_name` (padded for right alignment)
    - `emp_record.job_id` (padded for right alignment)
    - The `start_date` converted to a readable format using `TO_CHAR` (either the initial `start_date` or the incremented `prev_end_date`).

7. Loop Termination:

- The `FOR` loop continues iterating until all rows from the cursor have been processed.

8. Procedure Termination:

- The `END Get_Employee_Start_Dates;` statement marks the end of the procedure.

Time Complexity:

This algorithm has a time complexity of O(N), where N is the number of employees in the `employees` table. This is because the cursor iterates through each employee record retrieved from the database using the window function within the cursor definition, which is typically optimized for efficiency. The database query itself might have its own time complexity depending on the database engine and table size, but in the context of this algorithm, it's considered part of the loop's processing.

QUERY:

```
DECLARE
   CURSOR employees_cur IS
     SELECT employee_id,last_name, job_id,start_date
     FROM   employees NATURAL join job_history;
   emp_start_date DATE;
BEGIN
   dbms_output.Put_line(Rpad('Employee ID', 15)||Rpad('Last Name', 25)|| Rpad('Job Id', 35)
||'Start Date');
dbms_output.Put_line('---------------------------------------------------------------------------------------------');
FOR emp_sal_rec IN employees_cur LOOP
   -- find out most recent end_date in job_history
   SELECT Max(end_date) + 1
   INTO   emp_start_date
   FROM   job_history
   WHERE  employee_id = emp_sal_rec.employee_id;
   IF emp_start_date IS NULL THEN
     emp_start_date := emp_sal_rec.start_date;
   END IF;
   dbms_output.Put_line(Rpad(emp_sal_rec.employee_id, 15)
                    ||Rpad(emp_sal_rec.last_name, 25)
                    || Rpad(emp_sal_rec.job_id, 35)
                    || To_char(emp_start_date, 'dd-mon-yyyy'));
END LOOP;
END;
```

OUTPUT:

RESULT:

The program is executed successfully.

15.) Write a PL/SQL program to display the employee IDs, names, and job history end dates of all employees.

PROCEDURE

Here's the algorithm for the provided PL/SQL code that retrieves and displays employee information with their most recent end date:

1. Variable Declaration:

- Declare three variables to hold data fetched from the database:
  - `v_employee_id`: Stores an employee ID (type: `employees.employee_id%TYPE`).
  - `v_first_name`: Stores an employee's first name (type: `employees.last_name%TYPE` - note the potential typo). This should likely be `e.first_name` to retrieve the first name based on the query.
  - `v_end_date`: Stores the end date of a job (type: `job_history.end_date%TYPE`).

2. Cursor Declaration:

- Declare a cursor named `c_employees` to iterate through employee records.

3. Cursor Definition:

- Define the SQL statement associated with the cursor (`c_employees`). This statement:
    - Uses a `JOIN` to combine data from two tables:
        - `employees` table (aliased as `e`): Selects `employee_id` and `first_name`.
        - `job_history` table (aliased as `jh`): Selects the most recent `end_date` for each employee using a join condition (`e.employee_id = jh.employee_id`). This likely retrieves the end date of the most recent job for each employee.
- Note: The cursor definition assumes the `job_history` table has an `end_date` column representing the end date of an employment period.

4. Opening the Cursor:

- Use the `OPEN` statement to prepare the cursor for fetching data from the database.

5. Fetching Data (Loop):

- Use a `WHILE` loop to iterate through the data retrieved by the cursor:
    - Inside the loop, use a `FETCH` statement to retrieve data from the cursor and assign it to the previously declared variables:
        - `v_employee_id`
        - `v_first_name`
        - `v_end_date`
    - The `WHILE` loop continues as long as there is data to be fetched using the `c_employees%FOUND` attribute (cursor's "found" status).

6. Displaying Employee Information:

- Inside the `WHILE` loop, use `DBMS_OUTPUT.PUT_LINE` statements to print the following details for each employee:
    - Employee ID (using `v_employee_id`)
    - Employee Name (using `v_first_name`)
    - End Date (using `v_end_date`)
- Print a separator line after displaying information for each employee.

7. Closing the Cursor:

- After the loop finishes iterating (no more data to fetch), use the `CLOSE` statement to release resources associated with the cursor.

8. Termination:

- The `BEGIN` and `END` keywords mark the beginning and end of the code block, respectively.

Time Complexity:

This algorithm has a time complexity of O(N), where N is the number of employees in the `employees` table. This is because the `WHILE` loop iterates through each row of data retrieved from the database using the cursor. The database query itself might have its own time complexity depending on the database engine and table size, but in the context of this algorithm, it's considered part of the loop's processing.

QUERY:

```
DECLARE
v_employee_id employees.employee_id%TYPE;
v_first_name employees.last_name%TYPE;
v_end_date job_history.end_date%TYPE;
 CURSOR c_employees IS
  SELECT e.employee_id, e.first_name, jh.end_date
  FROM employees e
  JOIN job_history jh ON e.employee_id = jh.employee_id;
BEGIN
 OPEN c_employees;
 FETCH c_employees INTO v_employee_id, v_first_name, v_end_date;
 WHILE c_employees%FOUND LOOP
  DBMS_OUTPUT.PUT_LINE('Employee ID: ' || v_employee_id);
  DBMS_OUTPUT.PUT_LINE('Employee Name: ' || v_first_name);
  DBMS_OUTPUT.PUT_LINE('End Date: ' || v_end_date);
  DBMS_OUTPUT.PUT_LINE('----------------------');
  FETCH c_employees INTO v_employee_id, v_first_name, v_end_date;
 END LOOP;
```

```
  CLOSE c_employees;
END;
```

OUTPUT:

RESULT:

The program is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

PROCEDURES AND FUNCTIONS

EX_NO: 17 **DATE:8.5.24**

1.)Factorial of a number using a function.

PROCEDURE

Here's the algorithm for the provided PL/SQL code that calculates the factorial of a user-provided number:

1. Variable Declaration:

- Declare two numeric variables:
  - `fac`: This variable is initialized to 1 (type: `NUMBER`). It will be used to accumulate the factorial product.
  - `n`: This variable will store the user-provided number for which the factorial needs to be calculated (type: `NUMBER`). Its value is taken as input using the positional parameter `:1`.

2. Factorial Calculation Loop:

- Use a `WHILE` loop to iterate as long as `n` is greater than 0:
  - Inside the loop:
    - Multiply the current value of `fac` by `n` and store the result back in `fac`. This accumulates the product for the factorial.
    - Decrement `n` by 1 to move towards the base case (0).

3. Displaying the Result:

- After the loop exits (when `n` becomes 0), use `DBMS_OUTPUT.PUT_LINE` to print the final value of `fac`, which represents the factorial of the user-provided number.

4. Termination:

- The `BEGIN` and `END` keywords mark the beginning and end of the code block, respectively.

Time Complexity:

This algorithm has a time complexity of O(n), where n is the user-provided number. The `WHILE` loop iterates n times, performing a constant-time multiplication and decrement operation within each iteration. The exact number of iterations depends on the user's input.

QUERY:

```
DECLARE
   fac NUMBER := 1;
   n NUMBER := :1;
BEGIN
   WHILE n > 0 LOOP
      fac := n * fac;
      n := n - 1;
   END LOOP;
   DBMS_OUTPUT.PUT_LINE(fac);
END;
```

OUTPUT:

RESULT:

The program is executed successfully.

2.) Write a PL/SQL program using Procedures IN,INOUT,OUT parameters to retrieve the corresponding book information in the library.

PROCEDURE

Here's the algorithm for the provided PL/SQL code snippet that demonstrates calling a procedure to retrieve book information:

1. Procedure `get_book_info`:

- **Parameters:**
  - Define four parameters:
    - `p_book_id (IN NUMBER)`: Input parameter for the book ID.
    - `p_title (IN OUT VARCHAR2)`: IN/OUT parameter for book title (can be pre-populated and potentially modified).
    - `p_author (OUT VARCHAR2)`: OUT parameter for author name.
    - `p_year_published (OUT NUMBER)`: OUT parameter for year published.
- **Logic:**
  - Execute a `SELECT` statement:
    - Retrieve book information (title, author, year_published) from the `books` table based on the provided `p_book_id`.
  - Assign retrieved values to OUT parameters:
    - Set `p_title`, `p_author`, and `p_year_published` to the corresponding values from the database query.
  - **Optional Modification (p_title):**
    - Append the string " - Retrieved" to the `p_title` value to indicate successful retrieval.
- **Exception Handling:**
  - Catch the `NO_DATA_FOUND` exception:
    - If no matching book is found, set all OUT parameters (`p_title`, `p_author`, and `p_year_published`) to `NULL`.

2. Main Program Block:

- Declare variables:
  - `v_book_id (NUMBER)`: Stores the book ID to be queried (e.g., 1).
  - `v_title (VARCHAR2(100))`: Variable to hold the book title (initially set to "Initial Title").
  - `v_author (VARCHAR2(100))`: Variable to hold the author name.
  - `v_year_published (NUMBER)`: Variable to hold the year published.
- **Optional Initialization:**
  - Assign an initial value (e.g., "Initial Title") to `v_title`.
- **Calling the Procedure:**
  - Call the `get_book_info` procedure, passing the following arguments:
    - `p_book_id => v_book_id`: Pass the book ID for retrieval.
    - `p_title => v_title`: Pass the initial title value (potentially modified by the procedure).
    - `p_author => v_author`: Pass the author name variable (to be populated by the procedure).
    - `p_year_published => v_year_published`: Pass the year published variable (to be populated by the procedure).
- **Displaying Results:**
  - Use `DBMS_OUTPUT.PUT_LINE` statements to print the retrieved information:
    - Title (using `v_title`)
    - Author (using `v_author`)
    - Year Published (using `v_year_published`)

Overall Flow:

1. The main program defines variables and optionally initializes the title.
2. It calls the `get_book_info` procedure, passing the book ID and variables to hold the retrieved information.
3. The procedure retrieves book data based on the ID and populates the passed variables with the results (or `NULL` if no data is found).

4. The main program displays the retrieved title, author, and year published using the populated variables.

QUERY:

```
CREATE OR REPLACE PROCEDURE get_book_info (
   p_book_id IN NUMBER,
   p_title IN OUT VARCHAR2,
   p_author OUT VARCHAR2,
   p_year_published OUT NUMBER
)
AS
BEGIN
   SELECT title, author, year_published INTO p_title, p_author, p_year_published
   FROM books
   WHERE book_id = p_book_id;

   p_title := p_title || ' - Retrieved';
EXCEPTION
   WHEN NO_DATA_FOUND THEN
      p_title := NULL;
      p_author := NULL;
      p_year_published := NULL;
END;



DECLARE
   v_book_id NUMBER := 1;
   v_title VARCHAR2(100);
   v_author VARCHAR2(100);
   v_year_published NUMBER;
BEGIN
   v_title := 'Initial Title';

   get_book_info(p_book_id => v_book_id, p_title => v_title, p_author => v_author,
p_year_published => v_year_published);

   DBMS_OUTPUT.PUT_LINE('Title: ' || v_title);
```

```
    DBMS_OUTPUT.PUT_LINE('Author: ' || v_author);
    DBMS_OUTPUT.PUT_LINE('Year Published: ' || v_year_published);
END;
```

OUTPUT:

RESULT:

The program is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

TRIGGER

EX_NO: 18 **DATE:8.5.24**

1.)Write a code in PL/SQL to develop a trigger that enforces referential integrity by preventing the deletion of a parent record if child records exist

PROCEDURE

Here's the algorithm for the provided PL/SQL trigger `prevent_parent_deletion`:

1. Trigger Firing:

- The trigger fires before each DELETE operation on a row in the `parent_table`.

2. Checking for Child Records:

- The trigger declares a custom exception (`child_exists`) to signal the presence of child records.
- It then retrieves the `parent_id` of the row being deleted from the `parent_table` using the pseudo-record variable `:OLD`.
- A `SELECT` statement is executed to count the number of child records in the `child_table` that have a `parent_id` matching the one being deleted.

3. Preventing Deletion (if Applicable):

- An `IF` statement checks if the retrieved child record count (`v_child_count`) is greater than 0.
    - If `v_child_count` is greater than 0 (meaning child records exist), the `child_exists` exception is raised.

4. Exception Handling:

- An `EXCEPTION` block is defined to catch the `child_exists` exception raised within the trigger logic.

- Inside the exception block, another exception (`RAISE_APPLICATION_ERROR`) is raised with a user-defined error code (`-20001`) and an informative message indicating that the deletion is blocked due to existing child records.

5. Interaction with Main Program:

- The trigger itself doesn't directly interact with the main program that initiated the DELETE operation.
- When the `child_exists` exception is raised within the trigger, the database transaction attempting to delete the parent record fails due to the unhandled exception.
- The user or application that initiated the DELETE will likely receive an error message associated with the raised exception code (`-20001`) and its message (referential integrity constraint violation or similar).

Overall Logic:

The trigger acts as an enforcement mechanism to prevent data inconsistencies. It ensures that parent records cannot be deleted from the `parent_table` if there are child records referencing them in the `child_table`. The raised exception with a user-friendly message provides feedback to the user about the reason for the failed deletion.

QUERY:

```
CREATE OR REPLACE TRIGGER prevent_parent_deletion
BEFORE DELETE ON parent_table
FOR EACH ROW
DECLARE
  child_exists EXCEPTION;
  PRAGMA EXCEPTION_INIT(child_exists, -20001);
  v_child_count NUMBER;
BEGIN
```

```
    SELECT COUNT(*) INTO v_child_count FROM child_table WHERE parent_id = :OLD.parent_id;
    IF v_child_count > 0 THEN
        RAISE child_exists;
    END IF;
EXCEPTION
    WHEN child_exists THEN
        RAISE_APPLICATION_ERROR(-20001, 'Cannot delete parent record while child records exist.');
END;
```

OUTPUT:

RESULT:

The trigger is executed successfully.

2.) Write a code in PL/SQL to create a trigger that checks for duplicate values in a specific column and raises an exception if found

PROCEDURE

Here's the algorithm for the provided PL/SQL trigger `check_duplicates`:

1. Trigger Firing:

- The trigger fires before each INSERT or UPDATE operation on a row in the `unique_values_table`.

2. Checking for Duplicate Values:

- The trigger declares a custom exception (`duplicate_found`) to signal the presence of a duplicate value in the `unique_col`.
- It retrieves the `unique_col` value from the new row being inserted/updated using the pseudo-record variable `:NEW.unique_col`.
- A `SELECT` statement is executed to count the number of existing rows in the `unique_values_table` that have:
    - A `unique_col` value matching the new row's `unique_col` value.
    - An `id` value different from the new row's `id` (achieved using `id != :NEW.id`). This ensures the current row itself isn't counted as a duplicate.

3. Preventing Insert/Update (if Duplicate Found):

- An `IF` statement checks if the retrieved duplicate count (`v_count`) is greater than 0.
    - If `v_count` is greater than 0 (meaning a duplicate value exists), the `duplicate_found` exception is raised.

4. Exception Handling:

- An `EXCEPTION` block is defined to catch the `duplicate_found` exception raised within the trigger logic.
- Inside the exception block, another exception (`RAISE_APPLICATION_ERROR`) is raised with a user-defined error code (`-20002`) and an informative message indicating that the insert/update is blocked due to a duplicate value in the `unique_col`.

5. Interaction with Main Program:

- The trigger itself doesn't directly interact with the main program that initiated the INSERT or UPDATE operation.
- When the `duplicate_found` exception is raised within the trigger, the database transaction attempting to insert/update the row fails due to the unhandled exception.

- The user or application that initiated the INSERT or UPDATE will likely receive an error message associated with the raised exception code (`-20002`) and its message (referring to a duplicate value violation).

Overall Logic:

The trigger enforces a constraint on the `unique_values_table` to maintain data integrity. It prevents insert or update operations that would introduce duplicate values in the `unique_col`, excluding the row being modified itself (assuming a unique identifier column `id` exists). The raised exception with a user-friendly message provides feedback about the reason for the failed insert/update attempt.

QUERY:

```
CREATE OR REPLACE TRIGGER check_duplicates
BEFORE INSERT OR UPDATE ON unique_values_table
FOR EACH ROW
DECLARE
   duplicate_found EXCEPTION;
   PRAGMA EXCEPTION_INIT(duplicate_found, -20002);
   v_count NUMBER;
BEGIN
   SELECT COUNT(*) INTO v_count FROM unique_values_table
   WHERE unique_col = :NEW.unique_col AND id != :NEW.id;
   IF v_count > 0 THEN
      RAISE duplicate_found;
   END IF;
EXCEPTION
   WHEN duplicate_found THEN
      RAISE_APPLICATION_ERROR(-20002, 'Duplicate value found in unique_col.');
END;
```

OUTPUT:

RESULT:

The trigger is executed successfully..

3.) Write a code in PL/SQL to create a trigger that restricts the insertion of new rows if the total of a column's values exceeds a certain threshold

PROCEDURE

Here's the algorithm for the provided PL/SQL trigger `check_threshold`:

1. Trigger Firing:

- The trigger fires before each INSERT or UPDATE operation on a row in the `threshold_table`.

2. Threshold Checking:

- The trigger declares a custom exception (`threshold_exceeded`) to signal exceeding the defined threshold.
- It defines a variable (`v_threshold`) to hold the threshold value (modifiable based on your needs).

3. Calculating Potential Sum (Before Insert/Update):

- A `SELECT` statement retrieves the current sum of the `value_col` from all existing rows in the `threshold_table`.
- The value being inserted/updated (`NEW.value_col`) is then added to the retrieved sum, storing the result in `v_sum`. This simulates the potential impact on the total sum after the operation.

4. Preventing Insert/Update (if Threshold Exceeded):

- An `IF` statement checks if the calculated `v_sum` (including the new/updated value) is greater than the `v_threshold`.
    - If true, the `threshold_exceeded` exception is raised.

5. Exception Handling:

- An `EXCEPTION` block is defined to catch the `threshold_exceeded` exception raised within the trigger logic.
- Inside the exception block, another exception (`RAISE_APPLICATION_ERROR`) is raised with a user-defined error code (`-20003`) and an informative message indicating that the insert/update is blocked because it would cause the sum to exceed the threshold.

6. Interaction with Main Program:

- The trigger itself doesn't directly interact with the main program that initiated the INSERT or UPDATE operation.
- When the `threshold_exceeded` exception is raised within the trigger, the database transaction attempting to insert/update the row fails due to the unhandled exception.
- The user or application that initiated the INSERT or UPDATE will likely receive an error message associated with the raised exception code (`-20003`) and its message (referring to exceeding the threshold for `value_col`).

Overall Logic:

The trigger enforces a business rule on the `threshold_table`. It prevents insert or update operations that would cause the sum of the `value_col` to exceed the predefined threshold. The raised exception with a user-friendly message provides feedback about the reason for the failed insert/update attempt.

QUERY:

```
CREATE OR REPLACE TRIGGER check_threshold
BEFORE INSERT OR UPDATE ON threshold_table
FOR EACH ROW
DECLARE
   threshold_exceeded EXCEPTION;
   PRAGMA EXCEPTION_INIT(threshold_exceeded, -20003);
   v_sum NUMBER;
   v_threshold NUMBER := 10000; -- Set your threshold here
BEGIN
   SELECT SUM(value_col) INTO v_sum FROM threshold_table;
   v_sum := v_sum + :NEW.value_col;
   IF v_sum > v_threshold THEN
      RAISE threshold_exceeded;
   END IF;
EXCEPTION
   WHEN threshold_exceeded THEN
      RAISE_APPLICATION_ERROR(-20003, 'Threshold exceeded for value_col.');
END;
```

OUTPUT:

RESULT:

The trigger is executed successfully.

4.) Write a code in PL/SQL to design a trigger that captures changes made to specific columns and logs them in an audit table.

PROCEDURE

Here's the algorithm for the provided PL/SQL trigger `log_changes`:

1. Trigger Firing:
    - The trigger fires after each update operation on a row in the `main_table`.
2. Data Retrieval:
    - The trigger doesn't explicitly retrieve data from the `main_table` beyond the values available through pseudo-record variables.
3. Audit Trail Entry Creation:
    - The trigger defines how a new row will be inserted into the `audit_table`.
4. Populating Audit Table Columns:
    - `audit_id`:
        - The trigger likely retrieves the next value from a sequence named `audit_seq` (assuming it exists) to generate a unique identifier for the audit record.
    - `changed_id`:
        - This is set to the `id` of the updated row in the `main_table`, obtained using the pseudo-record variable `:OLD.id`.
    - `old_col1`, `new_col1`:
        - These capture the old and new values of the `col1` column from the updated row, accessed using `:OLD.col1` and `:NEW.col1` respectively.
    - `old_col2`, `new_col2`:
        - Similar to `col1`, these capture old and new values of the `col2` column using `:OLD.col2` and `:NEW.col2`.

- `change_time`:
  - This is set to the current system timestamp using `SYSTIMESTAMP` to record the exact time of the update.

5. Inserting Audit Entry:
   - An `INSERT` statement is executed to insert the constructed new row containing the audit information into the `audit_table`.
6. Trigger Completion:
   - After the `INSERT` statement is executed, the trigger logic completes without any additional actions.

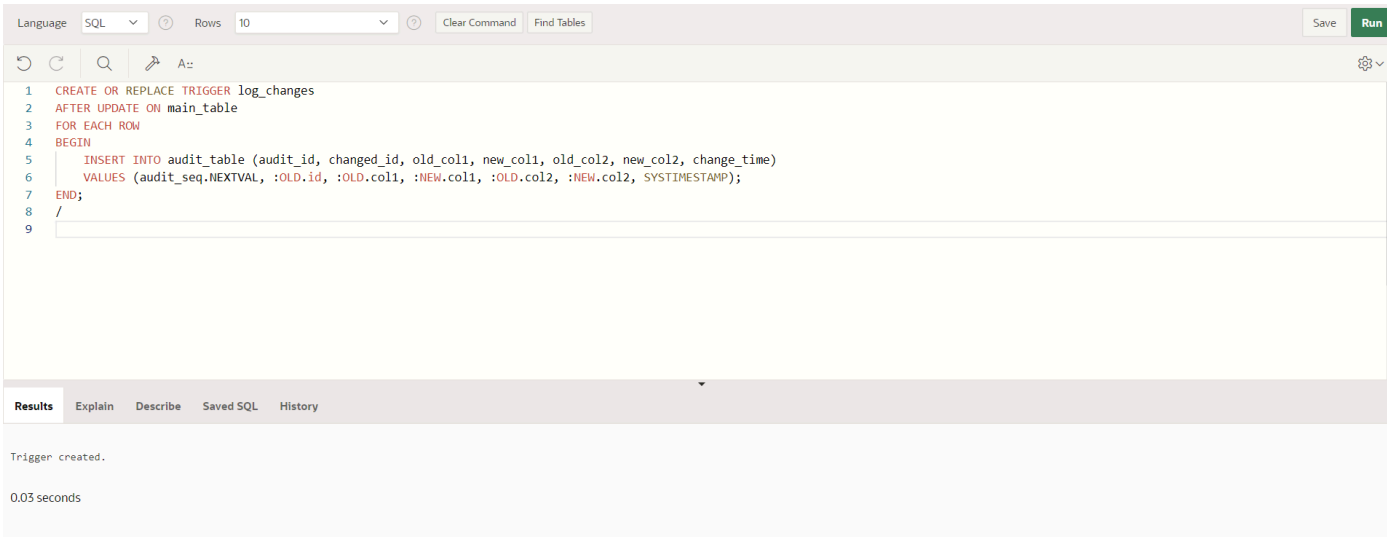
Overall Logic:

The trigger intercepts update operations on the `main_table` and leverages pseudo-record variables (`:OLD` and `:NEW`) to access the original and updated values of specific columns (`col1` and `col2`). It then constructs a new row containing this information along with a unique identifier (`audit_id`) and the current timestamp (`change_time`) to be inserted into the `audit_table`. This effectively creates an audit trail for tracking data modifications in the `main_table`.

QUERY:

```
CREATE OR REPLACE TRIGGER log_changes
AFTER UPDATE ON main_table
FOR EACH ROW
BEGIN
   INSERT INTO audit_table (audit_id, changed_id, old_col1, new_col1, old_col2, new_col2, change_time)
   VALUES (audit_seq.NEXTVAL, :OLD.id, :OLD.col1, :NEW.col1, :OLD.col2, :NEW.col2, SYSTIMESTAMP);
END;
```

OUTPUT:



RESULT:

The trigger is executed successfully.

5.) Write a code in PL/SQL to implement a trigger that records user activity (inserts, updates, deletes) in an audit log for a given set of tables.

PROCEDURE

Here's the algorithm for the provided PL/SQL trigger `log_user_activity`:

1. Trigger Firing:
    - The trigger fires after each insert, update, or delete operation on a row in the `activity_table`.
2. Action Identification:
    - The trigger uses an `IF` statement block to determine the type of operation that occurred based on built-in PL/SQL variables:
        - `INSERTING`: True after an insert operation.
        - `UPDATING`: True after an update operation.
        - `DELETING`: True after a delete operation.
3. Log Entry Creation (Conditional):

- Within each `IF` block (depending on the operation type), an `INSERT` statement is used to create a new row in the `user_activity_log` table.
    - `log_id`: Likely retrieved using `activity_log_seq.NEXTVAL` (assuming it's a sequence for generating unique identifiers).
    - `action`: Set to 'INSERT', 'UPDATE', or 'DELETE' based on the operation type.
    - `table_name`: Set to a constant value 'activity_table' (assuming the trigger is specific to this table).
    - `record_id`:
        - For inserts and updates, this is set to the `id` of the new/updated row using `:NEW.id`.
        - For deletes, it's set to the `id` of the deleted row using `:OLD.id` (accessed from the pseudo-record variable).
    - `change_time`: Set to the current system timestamp using `SYSTIMESTAMP` to record the time of the operation.

4. Trigger Completion:
    - After the conditional `INSERT` statement (based on the operation type), the trigger logic completes without any further actions.

Overall Logic:

The trigger acts as an auditing mechanism to capture user activity related to the `activity_table`. It leverages built-in PL/SQL variables to identify the operation type and access relevant data (record ID) based on insert, update, or delete. The trigger then constructs and inserts a corresponding log entry into the `user_activity_log` table, providing a detailed record of user interactions with the `activity_table`.

QUERY:

CREATE OR REPLACE TRIGGER log_user_activity

```
AFTER INSERT OR UPDATE OR DELETE ON activity_table
FOR EACH ROW
BEGIN
   IF INSERTING THEN
      INSERT INTO user_activity_log (log_id, action, table_name, record_id, change_time)
      VALUES (activity_log_seq.NEXTVAL, 'INSERT', 'activity_table', :NEW.id, SYSTIMESTAMP);
   ELSIF UPDATING THEN
      INSERT INTO user_activity_log (log_id, action, table_name, record_id, change_time)
      VALUES (activity_log_seq.NEXTVAL, 'UPDATE', 'activity_table', :NEW.id, SYSTIMESTAMP);
   ELSIF DELETING THEN
      INSERT INTO user_activity_log (log_id, action, table_name, record_id, change_time)
      VALUES (activity_log_seq.NEXTVAL, 'DELETE', 'activity_table', :OLD.id, SYSTIMESTAMP);
   END IF;
END;
```

OUTPUT:

RESULT:

The trigger is executed successfully.

6.) Write a code in PL/SQL to implement a trigger that automatically calculates and updates a running total column for a table whenever new rows are inserted

PROCEDURE

Here's the algorithm for the provided PL/SQL trigger `update_running_total`:

1. Trigger Firing:
    - The trigger fires before each insert operation on a row in the `running_total_table`.
2. Variable Initialization:
    - A numeric variable `v_total` is declared to store the calculated running total.
3. Retrieving Existing Total (if any):
    - A `SELECT` statement is executed to query the existing total from the `running_total_table`.
    - The `NVL(SUM(amount), 0)` expression calculates the sum of the `amount` column in all existing rows. The `NVL` function ensures `v_total` is set to 0 if the sum is null (no existing records).
4. Calculating Updated Total:
    - The trigger retrieves the `amount` value from the new row being inserted (presumably using a column named `amount`).
    - It calculates the updated running total by adding the new row's `amount` to the `v_total` which holds the existing total (or 0 if no previous records).
5. Updating New Row (if applicable):
    - The trigger modifies the `:NEW.running_total` pseudo-record variable. This variable represents the values being inserted in the new row.
    - It assigns the calculated updated running total (from step 4) to the `:NEW.running_total` pseudo-record, effectively updating the `running_total` value for the new row before insertion.
6. Trigger Completion:
    - After updating the new row's `running_total` (if applicable), the trigger logic completes without any further actions.

Overall Logic:

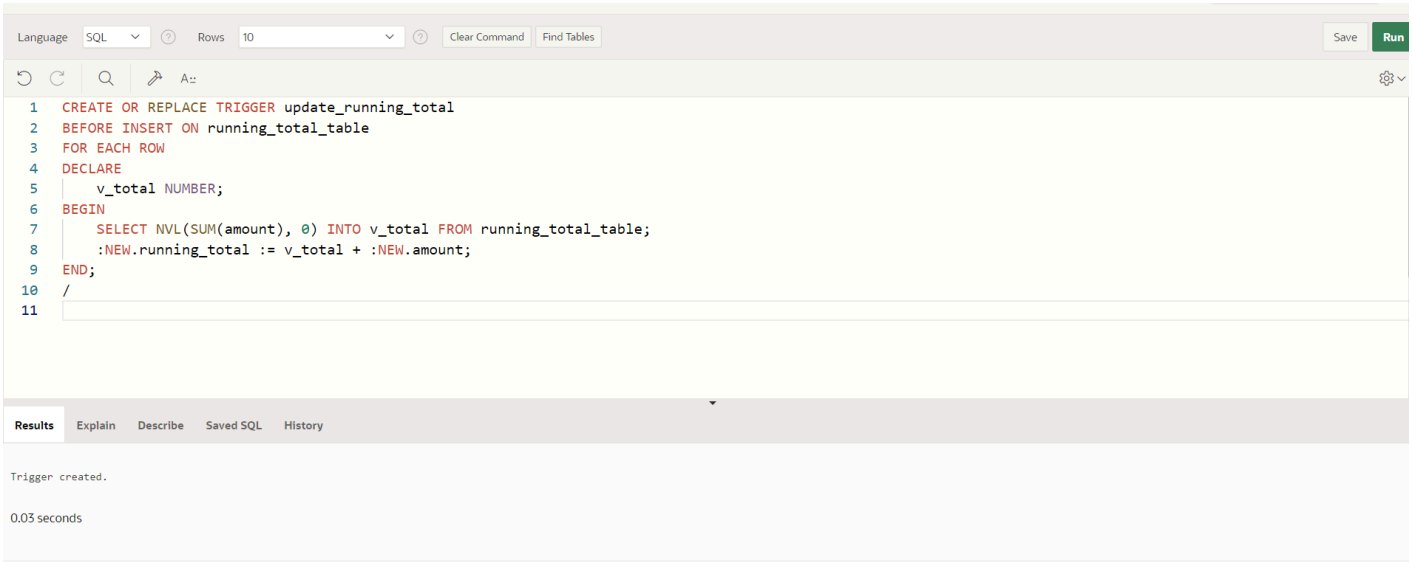
The trigger intercepts insert operations on the `running_total_table` and calculates an updated running total by considering the `amount` value from the new row being inserted and the potentially existing total from the table. It then updates the `running_total` value in the new row itself (assuming

the table structure doesn't already have a `running_total` column) before the insertion occurs. This ensures the `running_total_table` always reflects the cumulative total amount.

QUERY:

```
CREATE OR REPLACE TRIGGER update_running_total
BEFORE INSERT ON running_total_table
FOR EACH ROW
DECLARE
   v_total NUMBER;
BEGIN
   SELECT NVL(SUM(amount), 0) INTO v_total FROM running_total_table;
   :NEW.running_total := v_total + :NEW.amount;
END;
```

OUTPUT:



RESULT:

The trigger is executed successfully.

7.) Write a code in PL/SQL to create a trigger that validates the availability of items before allowing an order to be placed, considering stock levels and pending orders

PROCEDURE

Here's the algorithm for the provided PL/SQL trigger `validate_order`:

1. Trigger Firing:
    - The trigger fires before each insert operation on a row in the `orders` table (representing a new order).
2. Variable Declaration:
    - A variable `v_stock` is declared to hold the retrieved stock quantity for the ordered item.
    - A custom exception `insufficient_stock` is declared to signal insufficient stock for the order.
3. Exception Initialization:
    - The `PRAGMA EXCEPTION_INIT` statement associates the `insufficient_stock` exception with a specific error code (`-20004`).
4. Checking Stock Availability:
    - A `SELECT` statement queries the stock quantity for the item being ordered. It retrieves the `stock_quantity` from the `items` table where the `item_id` in the new order row (`NEW.item_id`) matches the item's ID in the `items` table.
    - The retrieved stock quantity is stored in the `v_stock` variable.
5. Order Quantity Validation:
    - An `IF` statement checks if the available stock (`v_stock`) is less than the quantity ordered (`NEW.order_quantity`).
        - If true (insufficient stock):
            - The `insufficient_stock` exception is raised, causing the trigger to move to the exception handling block.
6. Updating Stock Level (if sufficient):
    - This step assumes the `IF` statement condition (insufficient stock) wasn't met, implying sufficient stock is available.
    - An `UPDATE` statement is executed to decrease the stock quantity in the `items` table.

        - The `stock_quantity` is reduced by the `NEW.order_quantity` (ordered amount) for the item identified by `NEW.item_id`.
7. Exception Handling:
    - The `EXCEPTION` block defines how to handle the `insufficient_stock` exception that might be raised within the trigger logic (step 5).
    - When the `insufficient_stock` exception is raised:
        - Another exception (`RAISE_APPLICATION_ERROR`) is raised with a user-defined error code (`-20004`) and an informative message explaining the insufficient stock issue. This prevents order insertion and provides feedback to the user.
8. Trigger Completion:
    - If no exceptions are raised (sufficient stock and successful update), the trigger logic completes without any further actions.

Overall Logic:

The trigger enforces a business rule by ensuring sufficient stock exists for an order before creating a new order record. It checks stock availability, updates the stock level if sufficient, and raises an exception with a user-friendly message if there's insufficient stock. This helps maintain data integrity and prevents processing orders that would exceed available inventory.

QUERY:

```
CREATE OR REPLACE TRIGGER validate_order
BEFORE INSERT ON orders
FOR EACH ROW
DECLARE
  v_stock NUMBER;
  insufficient_stock EXCEPTION;
  PRAGMA EXCEPTION_INIT(insufficient_stock, -20004);
BEGIN
  SELECT stock_quantity INTO v_stock FROM items WHERE item_id = :NEW.item_id;
  IF v_stock < :NEW.order_quantity THEN
```

```
        RAISE insufficient_stock;
    END IF;
    UPDATE items SET stock_quantity = stock_quantity - :NEW.order_quantity WHERE item_id =
:NEW.item_id;
EXCEPTION
    WHEN insufficient_stock THEN
        RAISE_APPLICATION_ERROR(-20004, 'Insufficient stock for the item.');
END;
```

OUTPUT:

RESULT:

The trigger is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

MONGODB

EX_NO: 19 **DATE:22.5.24**

1.) Write a MongoDB query to find the restaurant Id, name, borough and cuisine for those restaurants which prepared dishes except 'American' and 'Chinese' or the restaurant's name begins with letter 'Wil'.

QUERY:

db.restaurants.find({ $or: [{ name: /^Wil/ }, { cuisine: { $nin: ['American', 'Chinese'] } }] , { restaurant_id: 1, name: 1, borough: 1, cuisine: 1 });

OUTPUT:

```
user> db.restaurants.find({$and:[{ $or: [{cuisine: { $nin: ["American", "Chinese"] }}, {name: /^Wil/}]}]}, {restaurant_irestaurant_id: 1, name: 1, borough:
1, cuisine: 1})
[
  {
    _id: ObjectId('6652df15df1cfc37b3cdcdf6'),
    borough: 'Bronx',
    cuisine: 'Bakery',
    name: 'Morris Park Bake Shop',
    restaurant_id: '30075445'
  }
]
user>
```

RESULT:

The query is executed successfully.

2.)

```
mongosh mongodb://127.0.0.

user> db.restaurants.find({ "grades": { $elemMatch: { "grade": "A", "score": 11, "date": ISODate("2014-08-11T00:00:00Z") } } }, { restaurant_id: 1, name: 1, grades: 1 })
[
  {
    _id: ObjectId('6652e2d7df1cfc37b3cdcdfa'),
    grades: [
      {
        date: ISODate('2014-08-11T00:00:00.000Z'),
        grade: 'A',
        score: 11
      },
      {
        date: ISODate('2013-09-11T00:00:00.000Z'),
        grade: 'B',
        score: 14
      }
    ],
    name: 'Example Chinese Restaurant',
    restaurant_id: '50012345'
  },
  {
    _id: ObjectId('6652e2d7df1cfc37b3cdcdfb'),
    grades: [
      {
        date: ISODate('2014-08-11T00:00:00.000Z'),
        grade: 'A',
        score: 11
      },
      {
        date: ISODate('2014-07-10T00:00:00.000Z'),
        grade: 'B',
        score: 12
      }
    ],
    name: 'Sample Italian Bistro',
    restaurant_id: '50012346'
  },
  {
    _id: ObjectId('6652e2d7df1cfc37b3cdcdfc'),
    grades: [
      {
        date: ISODate('2014-08-11T00:00:00.000Z'),
        grade: 'A',
        score: 11
      },
      {
        date: ISODate('2014-06-15T00:00:00.000Z'),
        grade: 'A',
        score: 8
      }
```

QUERY:

db.restaurants.find({ grades: { $elemMatch: { grade: "A",score: 11, date: ISODate("2014-08-11T00:00:00Z")} }},{ restaurant_id: 1,name: 1,grades: 1 });

OUTPUT:

RESULT:

The query is executed successfully.

3.) Write a MongoDB query to find the restaurant Id, name and grades for those restaurants where the 2nd element of grades array contains a grade of "A" and score 9 on an ISODate "2014-08-11T00:00:00Z".

QUERY:

db.restaurants.find({"grades.1.grade": "A", "grades.1.score": 9, "grades.1.date": ISODate("2014-08-1T00:00:00Z") },{ restaurant_id: 1, name: 1, grades: 1 });

OUTPUT:

RESULT:

The query is executed successfully.

4.) Write a MongoDB query to find the restaurant Id, name, address and geographical location for those restaurants where 2nd element of coord array contains a value which is more than 42 and upto 52

QUERY:

db.restaurants.find({$and : [{"address.coord.1": {$gt : 42}},{"address.coord.1": {$lte : 52}}]}, {_id:0, restaurant_id:1, name:1, address:1})

OUTPUT:

```
user> db.restaurants.find({$and : [{"address.coord.1": {$gt : 42}},{"address.coord.1": {$lte : 52}}]}, {_id:0, restaurant_id:1, name:1, address:1})
[
  {
    address: {
      building: '789',
      coord: [ -73.856077, 45.848447 ],
      street: 'Test Blvd',
      zipcode: '10036'
    },
    name: 'Test Mexican Grill',
    restaurant_id: '50012347'
  },
  {
    address: {
      building: '789',
      coord: [ -73.856077, 45.848447 ],
      street: 'Test Blvd',
      zipcode: '10036'
    },
    name: 'Test Mexican Grill',
    restaurant_id: '50012347'
  }
]
user>
```

RESULT:

The query is executed successfully.

5.) Write a MongoDB query to arrange the name of the restaurants in ascending order along with all the columns.

QUERY:

db.restaurants.find({}, { _id: 0 }).sort({ name: 1 });

OUTPUT:

```
user> db.restaurants.find({}, { _id: 0 }).sort({ name: 1 })
[
  {
    address: {
      building: '123',
      coord: [ -73.856077, 40.848447 ],
      street: 'Sample Ave',
      zipcode: '11225'
    },
    borough: 'Brooklyn',
    cuisine: 'Italian',
    grades: [
      {
        date: ISODate('2019-08-11T00:00:00.000Z'),
        grade: 'A',
        score: 11
      },
      {
        date: ISODate('2018-07-10T00:00:00.000Z'),
        grade: 'B',
        score: 12
      }
    ],
    name: 'A Sample Italian Bistro',
    restaurant_id: '50012349'
  },
  {
    address: {
      building: '400',
      coord: [ -73.984381, 40.759145 ],
      street: 'Broadway',
      zipcode: '10036'
    },
    borough: 'Manhattan',
    cuisine: 'Steakhouse',
    grades: [
      {
        date: ISODate('2014-03-03T00:00:00.000Z'),
        grade: 'A',
        score: 7
      },
      {
        date: ISODate('2013-09-11T00:00:00.000Z'),
        grade: 'A',
        score: 8
      }
    ],
    name: 'Broadway Steakhouse',
    restaurant_id: '40356442'
  },
  {
    address: {
      building: '101',
      coord: [ -73.927, 40.829 ],
      street: 'Demo Rd',
      zipcode: '10451'
```

RESULT:

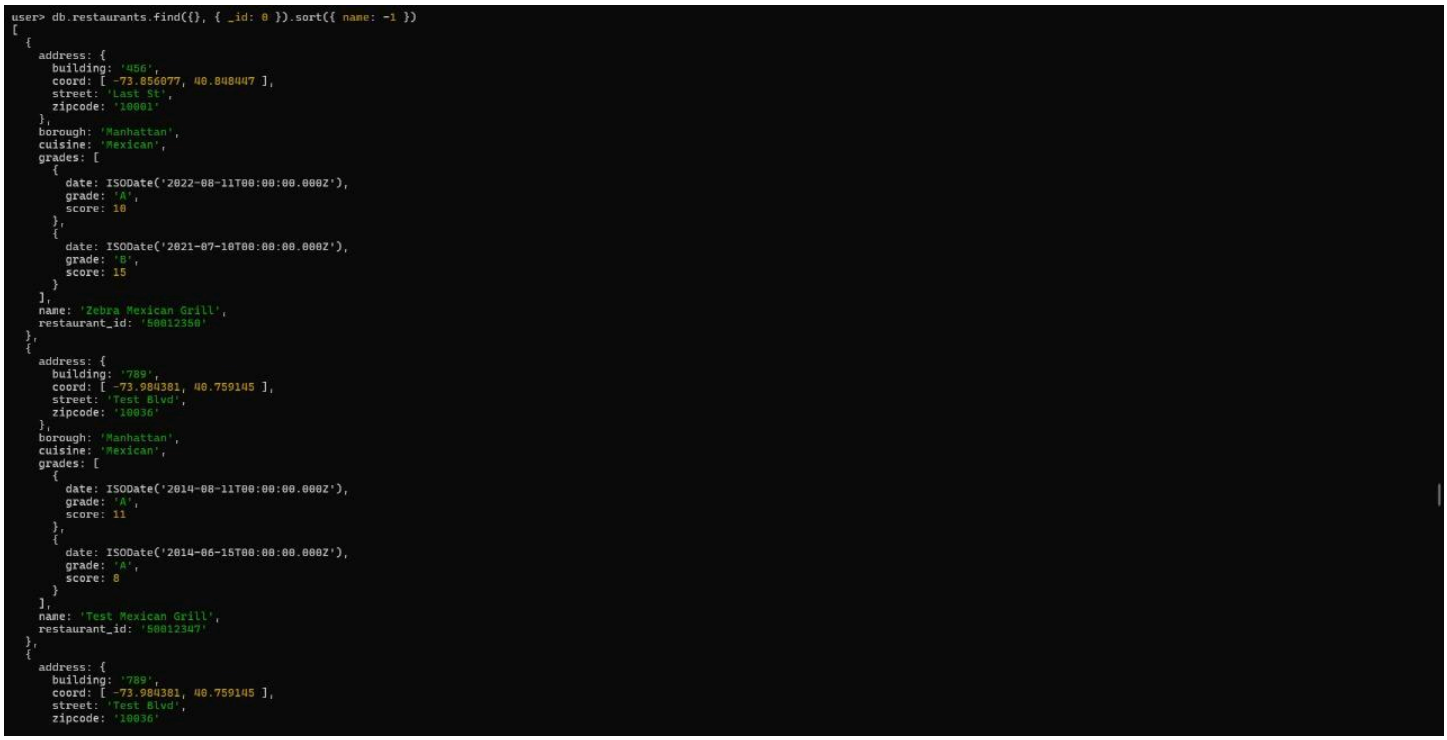
The query is executed successfully.

6.) Write a MongoDB query to arrange the name of the restaurants in descending order along with all the columns.

QUERY:

db.restaurants.find({}, { _id: 0 }).sort({ name: -1 })

OUTPUT:



RESULT:

The query is executed successfully.

7.) Write a MongoDB query to arrange the name of the cuisine in ascending order and for that same cuisine borough should be in descending order.

QUERY:

db.restaurants.find({}, { _id: 0 }).sort({ cuisine: 1, borough: -1 })

OUTPUT:

```
user> db.restaurants.find({}, { _id: 0 }).sort({ cuisine: 1, borough: -1 })
[
  {
    address: {
      building: '1007',
      coord: [ -73.856077, 40.848447 ],
      street: 'Morris Park Ave',
      zipcode: '10462'
    },
    borough: 'Bronx',
    cuisine: 'Bakery',
    grades: [
      {
        date: ISODate('2014-03-03T00:00:00.000Z'),
        grade: 'A',
        score: 2
      },
      {
        date: ISODate('2013-09-11T00:00:00.000Z'),
        grade: 'A',
        score: 6
      },
      {
        date: ISODate('2013-01-24T00:00:00.000Z'),
        grade: 'A',
        score: 10
      },
      {
        date: ISODate('2011-11-23T00:00:00.000Z'),
        grade: 'A',
        score: 9
      },
      {
        date: ISODate('2011-03-10T00:00:00.000Z'),
        grade: 'B',
        score: 14
      }
    ],
    name: 'Morris Park Bake Shop',
    restaurant_id: '30075445'
  },
  {
    address: {
      building: '101',
      coord: [ -73.927, 40.829 ],
      street: 'Demo Rd',
      zipcode: '10451'
    },
    borough: 'Bronx',
    cuisine: 'Bakery',
    grades: [
      {
        date: ISODate('2014-08-11T00:00:00.000Z'),
        grade: 'A',
        score: 11
      },
```

RESULT:

The query is executed successfully.

8.) Write a MongoDB query to know whether all the addresses contains the street or not.

QUERY:

db.restaurants.find({ "address.street": { $exists: true, $ne: "" } })

OUTPUT:

```
user> db.restaurants.find({ "address.street": { $exists: true, $ne: "" } })
[
  {
    _id: ObjectId('6652df15df1cfc37b3cdcdf6'),
    address: {
      building: '1007',
      coord: [ -73.856077, 40.848447 ],
      street: 'Morris Park Ave',
      zipcode: '10462'
    },
    borough: 'Bronx',
    cuisine: 'Bakery',
    grades: [
      {
        date: ISODate('2014-03-03T00:00:00.000Z'),
        grade: 'A',
        score: 2
      },
      {
        date: ISODate('2013-09-11T00:00:00.000Z'),
        grade: 'A',
        score: 6
      },
      {
        date: ISODate('2013-01-24T00:00:00.000Z'),
        grade: 'A',
        score: 10
      },
      {
        date: ISODate('2011-11-23T00:00:00.000Z'),
        grade: 'A',
        score: 9
      },
      {
        date: ISODate('2011-03-10T00:00:00.000Z'),
        grade: 'B',
        score: 14
      }
    ],
    name: 'Morris Park Bake Shop',
    restaurant_id: '30075445'
  },
  {
    _id: ObjectId('6652e1addf1cfc37b3cdcdf7'),
    address: {
      building: '200',
      coord: [ -73.961704, 40.662942 ],
      street: 'Flatbush Ave',
      zipcode: '11225'
    },
    borough: 'Brooklyn',
    cuisine: 'Pizza',
    grades: [
      {
        date: ISODate('2014-03-03T00:00:00.000Z'),
```

RESULT:

The query is executed successfully.

9.) Write a MongoDB query which will select all documents in the restaurants collection where the coord field value is Double.

QUERY:

db.restaurants.find({ "address.coord": { $elemMatch: { $type: "double" } } })

OUTPUT:

RESULT:

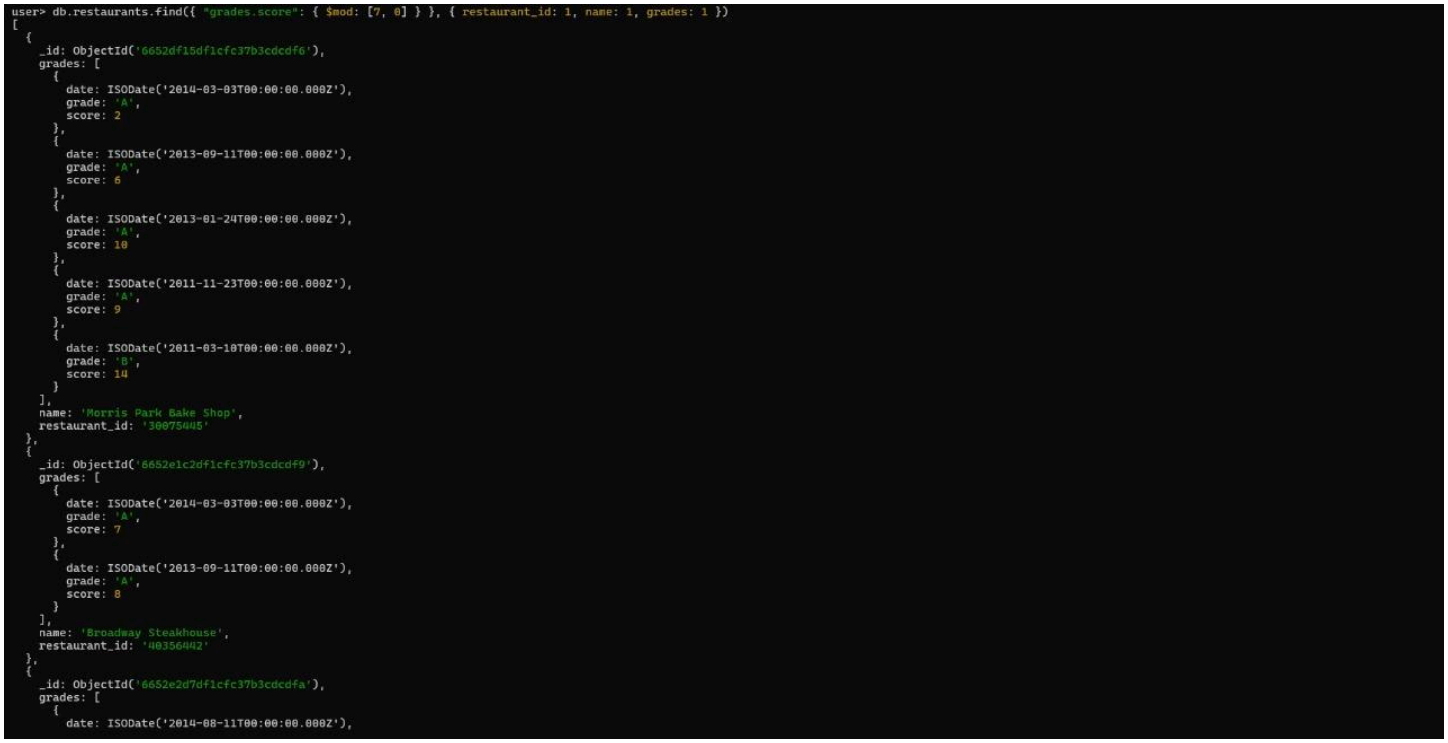
The query is executed successfully.

10. Write a MongoDB query which will select the restaurant Id, name and grades for those restaurants which returns 0 as a remainder after dividing the score by 7.

QUERY:

db.restaurants.find({ "grades.score": { $mod: [7, 0] } }, { restaurant_id: 1, name: 1, grades: 1 });

OUTPUT:



RESULT:

The query is executed successfully.

11. Write a MongoDB query to find the restaurant name, borough, longitude and attitude and cuisine for those restaurants which contains 'mon' as three letters somewhere in its name.

QUERY:

db.restaurants.find({ name: /mon/i }, { name: 1, borough: 1, "address.coord": 1, cuisine: 1 })

OUTPUT:

RESULT:

The query is executed successfully.

12. Write a MongoDB query to find the restaurant name, borough, longitude and latitude and cuisine for those restaurants which contain 'Mad' as the first three letters of its name.

QUERY:

db.restaurants.find({ name: /^Mad/i }, { name: 1, borough: 1, "address.coord": 1, cuisine: 1 })

OUTPUT:

RESULT:

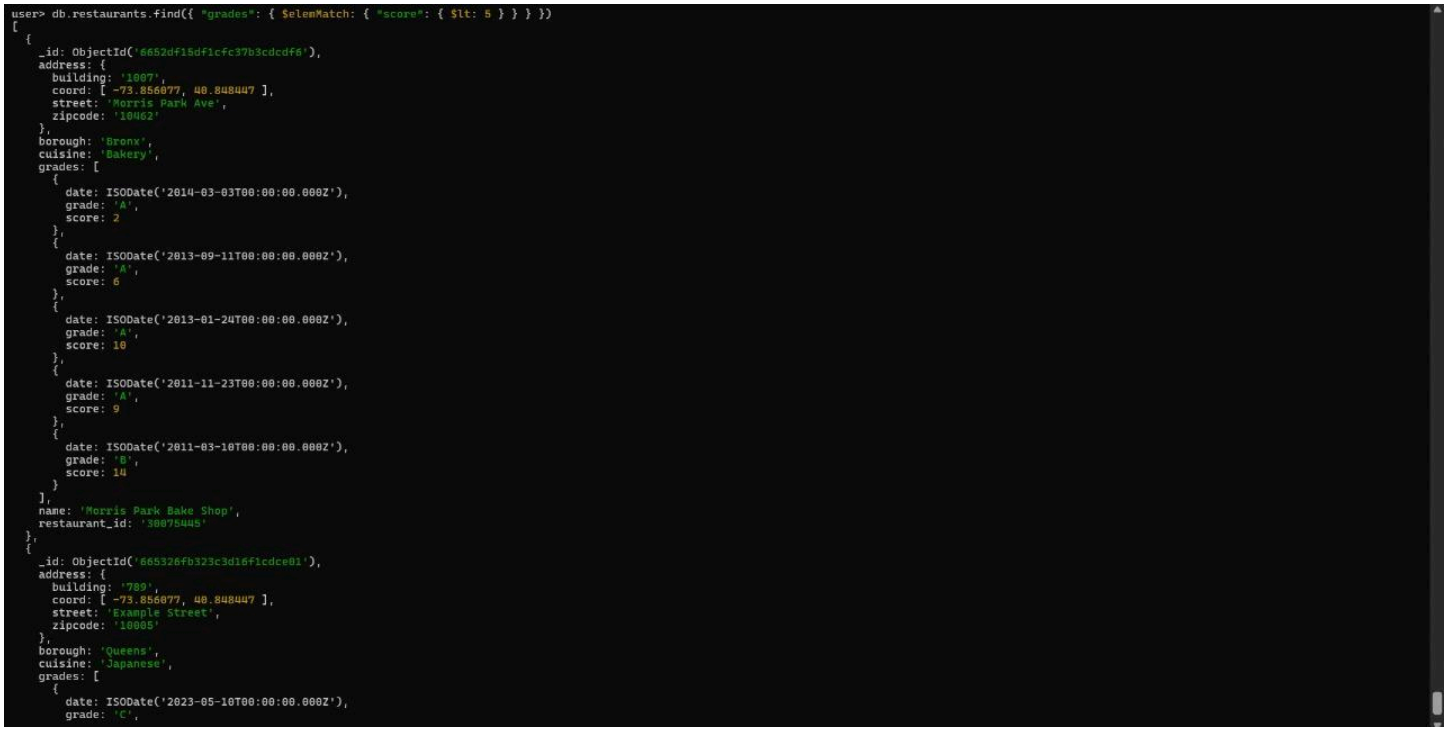
The query is executed successfully.

13. Write a MongoDB query to find the restaurants that have at least one grade with a score of less than 5.

QUERY:

db.restaurants.find({ "grades": { $elemMatch: { "score": { $lt: 5 } } } })

OUTPUT:



RESULT:

The query is executed successfully.

14. Write a MongoDB query to find the restaurants that have at least one grade with a score of less than 5 and that are located in the borough of Manhattan.

QUERY:

db.restaurants.find({ "grades": { $elemMatch: { "score": { $lt: 5 } } }, "borough": "Manhattan" })

OUTPUT:

RESULT:

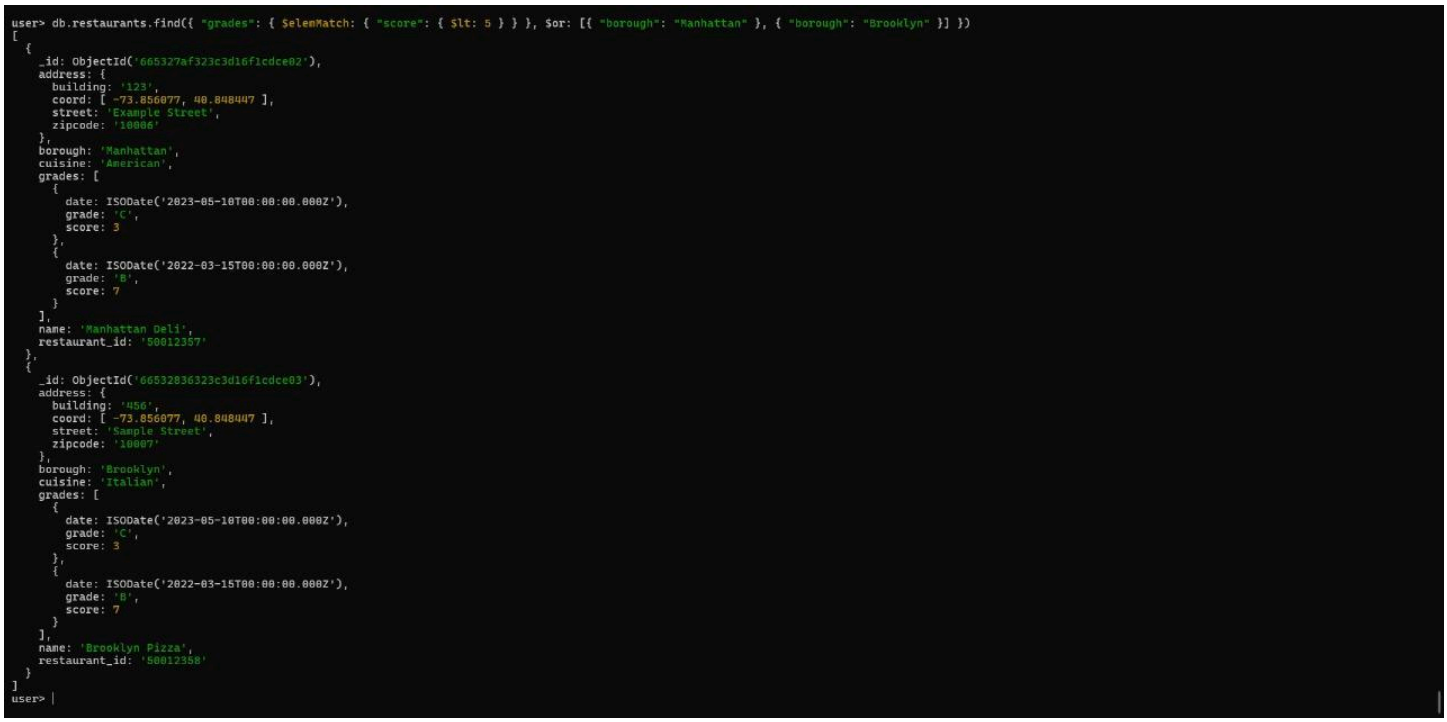
The query is executed successfully.

15.Write a MongoDB query to find the restaurants that have at least one grade with a score of less than 5 and that are located in the borough of Manhattan or Brooklyn.

QUERY:

db.restaurants.find({ "grades": { $elemMatch: { "score": { $lt: 5 } } }, $or: [{ "borough": "Manhattan" }, { "borough": "Brooklyn" }] })

OUTPUT:



RESULT:

The query is executed successfully.

16. Write a MongoDB query to find the restaurants that have at least one grade with a score of less than 5 and that are located in the borough of Manhattan or Brooklyn, and their cuisine is not American.

QUERY:

db.restaurants.find({ "grades": { $elemMatch: { "score": { $lt: 5 } } }, $or: [{ "borough": "Manhattan" }, { "borough": "Brooklyn" }], "cuisine": { $ne: "American" } })

OUTPUT:

RESULT:

The query is executed successfully.

17. Write a MongoDB query to find the restaurants that have at least one grade with a score of less than 5 and that are located in the borough of Manhattan or Brooklyn, and their cuisine is not American or Chinese.

QUERY:

db.restaurants.find({ "grades": { $elemMatch: { "score": { $lt: 5 } } }, $or: [{ "borough": "Manhattan" }, { "borough": "Brooklyn" }], "cuisine": { $nin: ["American", "Chinese"] } })

OUTPUT:

```
user> db.restaurants.find({ "grades": { $elemMatch: { "score": { $lt: 5 } } }, $or: [{ "borough": "Manhattan" }, { "borough": "Brooklyn" }], "cuisine": { $nin: ["American", "Chinese"] } })
[
  {
    _id: ObjectId('66532836323c3d16f1cdce03'),
    address: {
      building: '456',
      coord: [ -73.856077, 40.848447 ],
      street: 'Sample Street',
      zipcode: '10007'
    },
    borough: 'Brooklyn',
    cuisine: 'Italian',
    grades: [
      {
        date: ISODate('2023-05-10T00:00:00.000Z'),
        grade: 'C',
        score: 3
      },
      {
        date: ISODate('2022-03-15T00:00:00.000Z'),
        grade: 'B',
        score: 7
      }
    ],
    name: 'Brooklyn Pizza',
    restaurant_id: '50012358'
  },
  {
    _id: ObjectId('6653288f323c3d16f1cdce04'),
    address: {
      building: '789',
      coord: [ -73.856077, 40.848447 ],
      street: 'Sample Avenue',
      zipcode: '10008'
    },
    borough: 'Manhattan',
    cuisine: 'Italian',
    grades: [
      {
        date: ISODate('2023-05-10T00:00:00.000Z'),
        grade: 'C',
        score: 3
      },
      {
        date: ISODate('2022-03-15T00:00:00.000Z'),
        grade: 'B',
        score: 7
      }
    ],
    name: 'Manhattan Pasta',
    restaurant_id: '50012359'
  },
  {
    _id: ObjectId('66532948323c3d16f1cdce05'),
    address: {
```

RESULT:

The query is executed successfully.

18. Write a MongoDB query to find the restaurants that have a grade with a score of 2 and a grade with a score of 6.

QUERY:

db.restaurants.find({ $and: [{ "grades.grade": "A", "grades.score": 2 }, { "grades.grade": "A", "grades.score": 6 }] })

OUTPUT:

```
[
  {
    _id: ObjectId('664f3c798752f54dc3cdcdf7'),
    address: {
      building: '1007',
      coord: [ -73.856077, 40.848447 ],
      street: 'Morris Park Ave',
      zipcode: '10462'
    },
    borough: 'Bronx',
    cuisine: 'Bakery',
    grades: [
      {
        date: ISODate('2014-03-03T00:00:00.000Z'),
        grade: 'A',
        score: 2
      },
      {
        date: ISODate('2013-09-11T00:00:00.000Z'),
        grade: 'A',
        score: 6
      },
      {
        date: ISODate('2013-01-24T00:00:00.000Z'),
        grade: 'A',
        score: 10
      },
      {
        date: ISODate('2011-11-23T00:00:00.000Z'),
        grade: 'A',
        score: 9
      },
      {
        date: ISODate('2011-03-10T00:00:00.000Z'),
        grade: 'B',
        score: 14
      }
    ],
    name: 'Morris Park Bake Shop',
    restaurant_id: '30075445'
  }
]
```

RESULT:

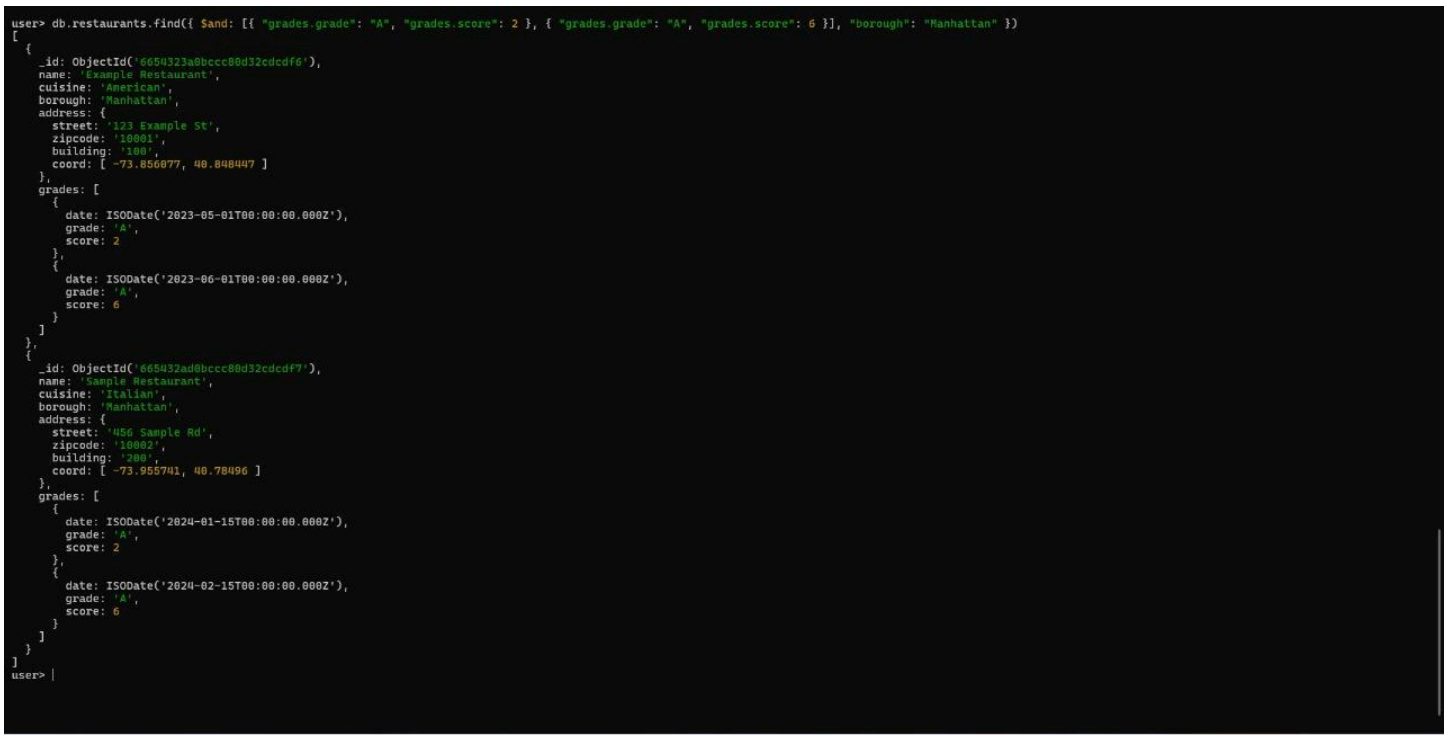
The query is executed successfully.

19. Write a MongoDB query to find the restaurants that have a grade with a score of 2 and a grade with a score of 6 and are located in the borough of Manhattan.

QUERY:

db.restaurants.find({ $and: [{ "grades.grade": "A", "grades.score": 2 }, { "grades.grade": "A", "grades.score": 6 }], "borough": "Manhattan" })

OUTPUT:



RESULT:

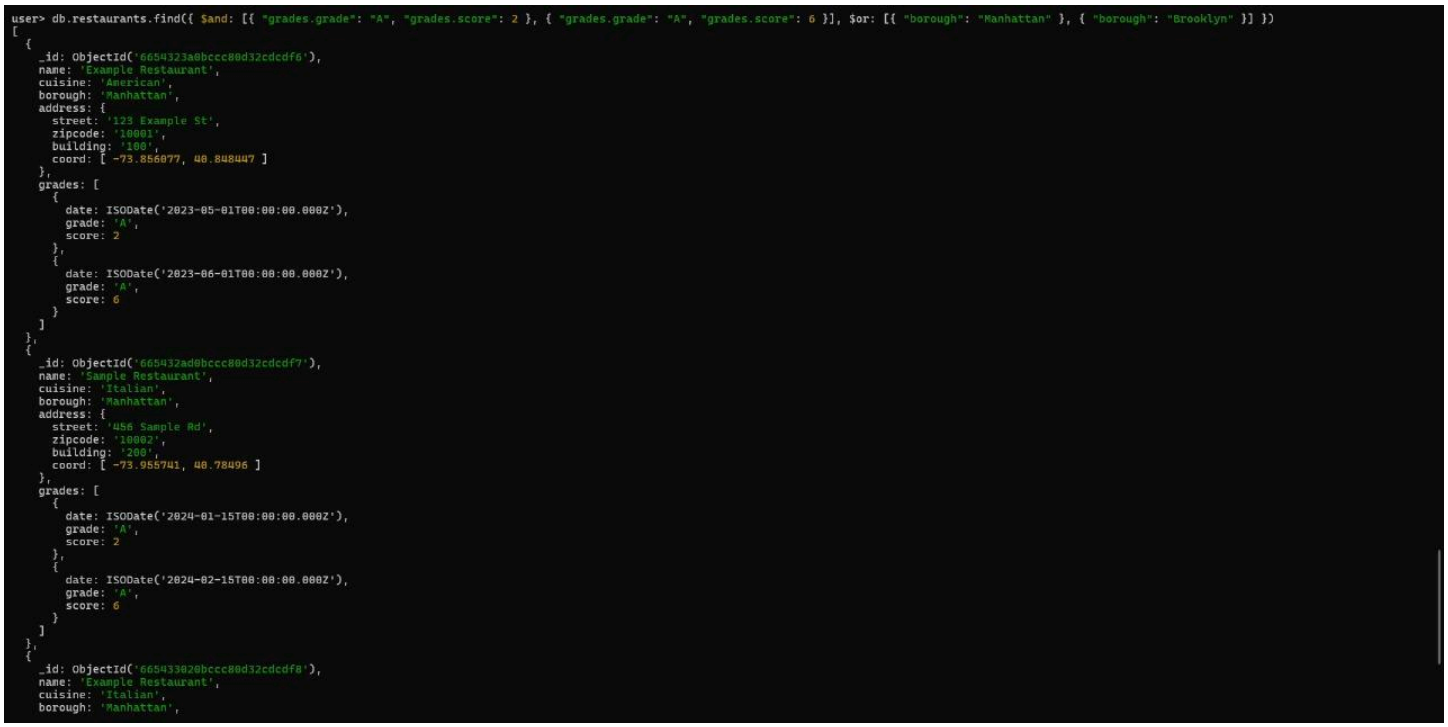
The query is executed successfully.

20. Write a MongoDB query to find the restaurants that have a grade with a score of 2 and a grade with a score of 6 and are located in the borough of Manhattan or Brooklyn.

QUERY:

db.restaurants.find({ $and: [{ "grades.grade": "A", "grades.score": 2 }, { "grades.grade": "A", "grades.score": 6 }], $or: [{ "borough": "Manhattan" }, { "borough": "Brooklyn" }] })

OUTPUT:



RESULT:

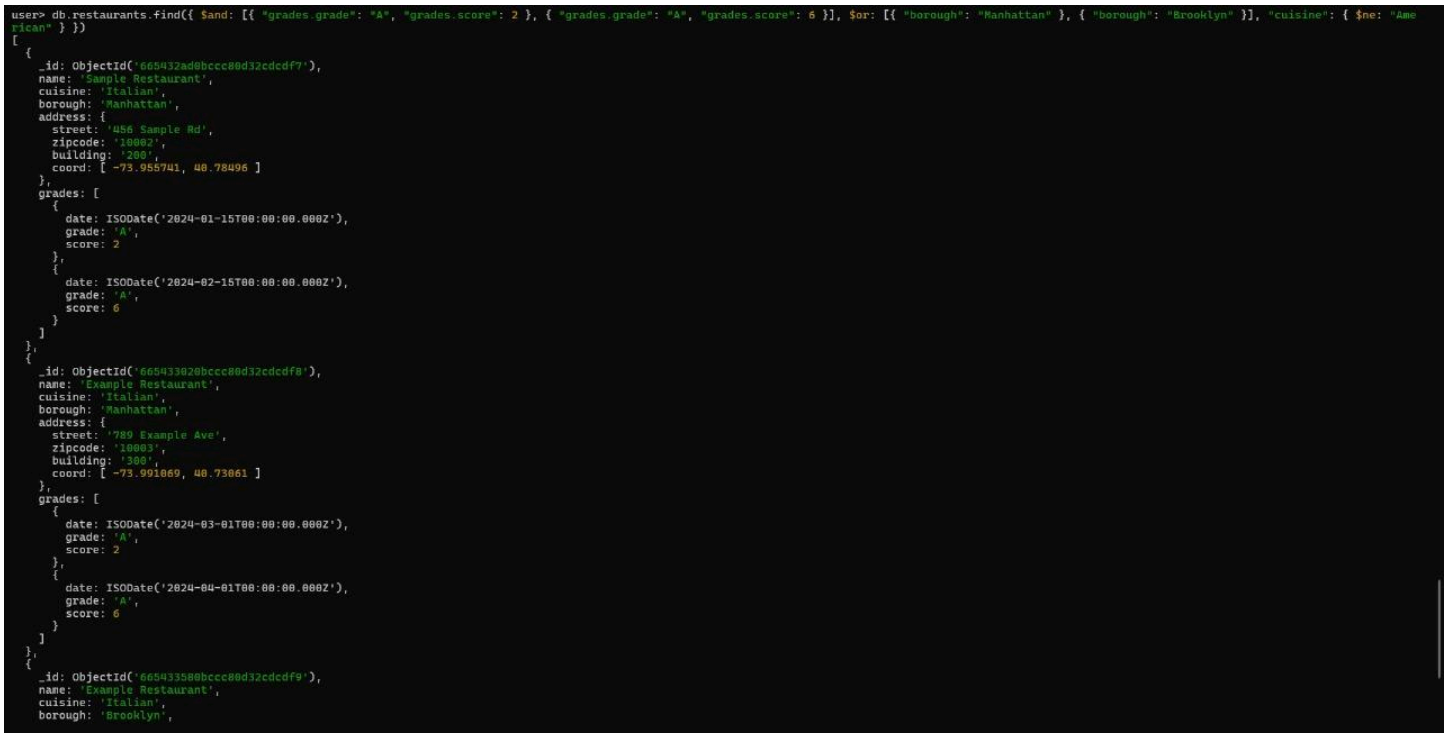
The query is executed successfully.

21. Write a MongoDB query to find the restaurants that have a grade with a score of 2 and a grade with a score of 6 and are located in the borough of Manhattan or Brooklyn, and their cuisine is not American.

QUERY:

db.restaurants.find({ $and: [{ "grades.grade": "A", "grades.score": 2 }, { "grades.grade": "A", "grades.score": 6 }], $or: [{ "borough": "Manhattan" }, { "borough": "Brooklyn" }], "cuisine": { $ne: "American" } })

OUTPUT:



RESULT:

The query is executed successfully.

22. Write a MongoDB query to find the restaurants that have a grade with a score of 2 and a grade with a score of 6 and are located in the borough of Manhattan or Brooklyn, and their cuisine is not American or Chinese.

QUERY:

db.restaurants.find({ $and: [{ "grades.grade": "A", "grades.score": 2 }, { "grades.grade": "A", "grades.score": 6 }], $or: [{ "borough": "Manhattan" }, { "borough": "Brooklyn" }], "cuisine": { $nin: ["American", "Chinese"] } })

OUTPUT:

RESULT:

The query is executed successfully.

23. Write a MongoDB query to find the restaurants that have a grade with a score of 2 or a grade with a score of 6.

QUERY:

db.restaurants.find({ $or: [{ "grades.score": 2 }, { "grades.score": 6 }] })

OUTPUT:

RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	

MONGODB

EX_NO: 20 **DATE:22.5.24**

1.) Find all movies with full information from the 'movies' collection that was released in the year 1893.

QUERY:

db.movies.find({ year: 1893 })

OUTPUT:

RESULT:

The query is executed successfully.

2.) Find all movies with full information from the 'movies' collection that have a runtime greater than 120 minutes.

QUERY:

db.movies.find({ runtime: { $gt: 120 } })

OUTPUT:

RESULT:

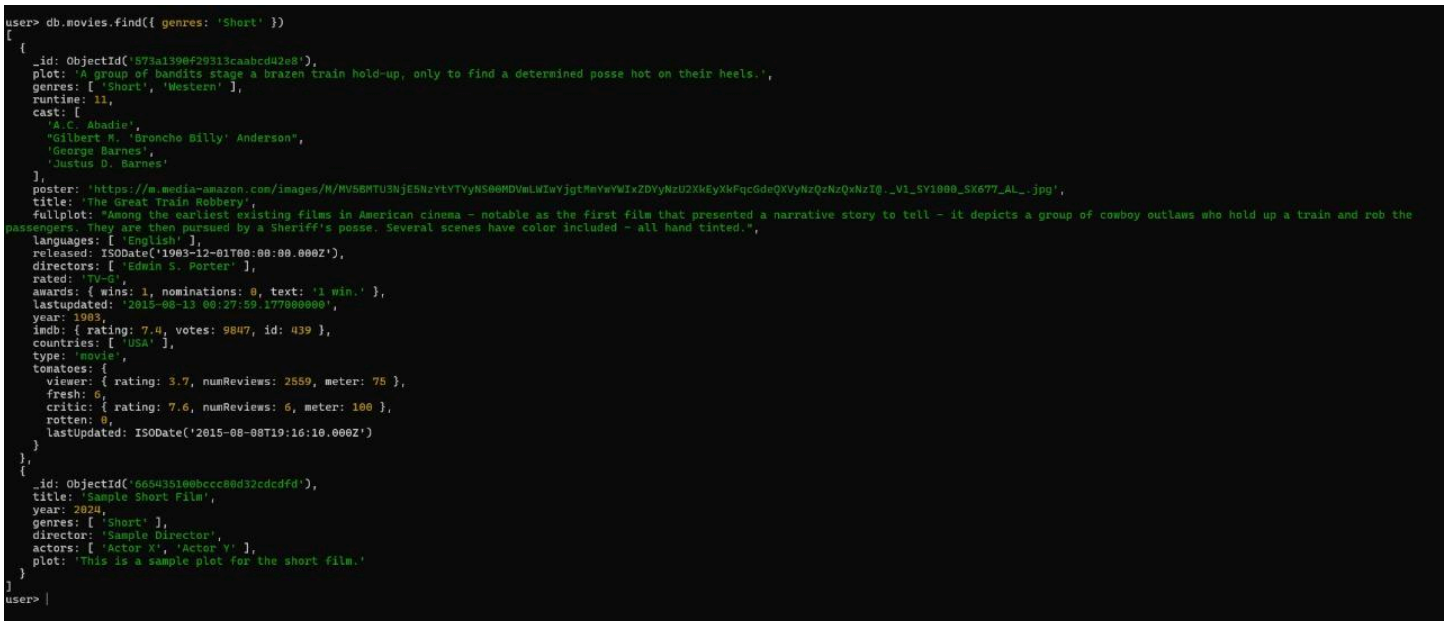
The query is executed successfully.

3.) Find all movies with full information from the 'movies' collection that have "Short" genre.

QUERY:

db.movies.find({ genres: 'Short' })

OUTPUT:



RESULT:

The query is executed successfully.

4.) Retrieve all movies from the 'movies' collection that were directed by William K.L. Dickson and include complete information for each movie.

QUERY:

db.movies.find({ directors: 'William K.L. Dickson' })

OUTPUT:

RESULT:

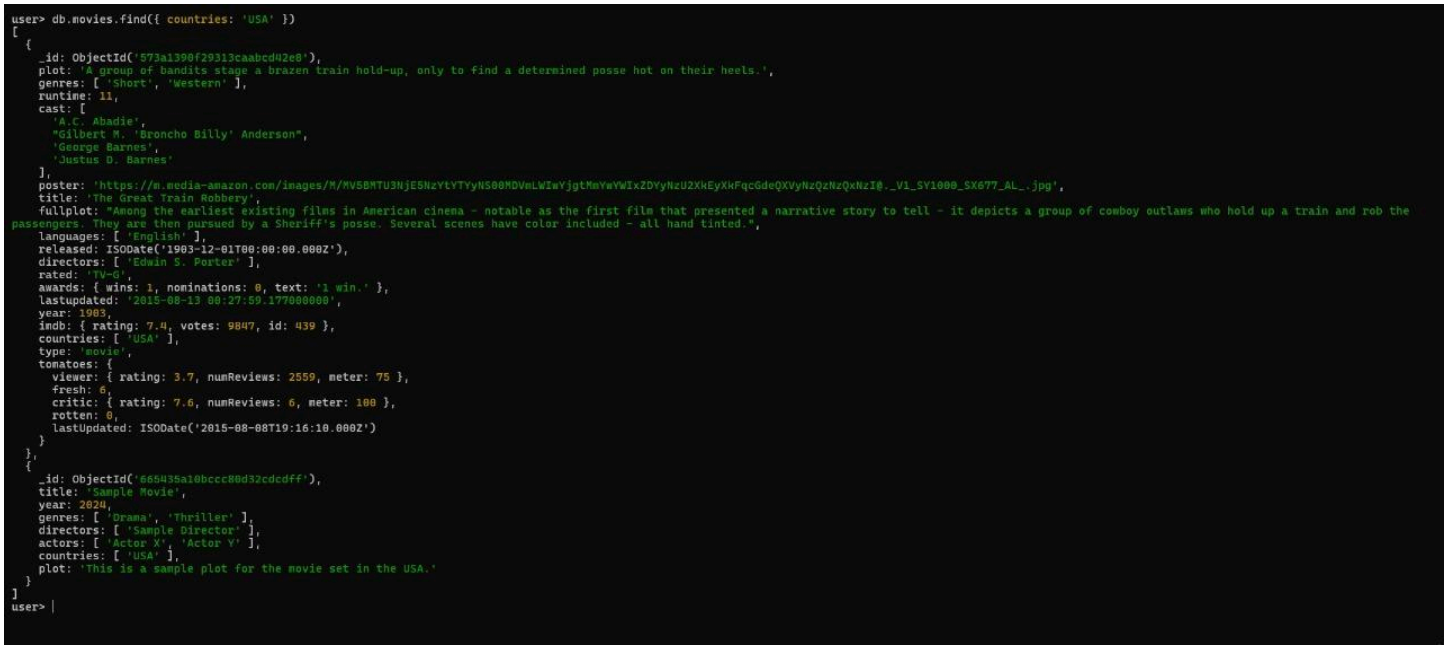
The query is executed successfully.

5.) Retrieve all movies from the 'movies' collection that were released in the USA and include complete information for each movie.

QUERY:

db.movies.find({ countries: 'USA' })

OUTPUT:



RESULT:

The query is executed successfully.

6.) Retrieve all movies from the 'movies' collection that have complete information and are rated as "UNRATED".

QUERY:

db.movies.find({ rated: 'UNRATED' })

OUTPUT:

RESULT:

The query is executed successfully.

7.) Retrieve all movies from the 'movies' collection that have complete information and have received more than 1000 votes on IMDb.

QUERY:

db.movies.find({ 'imdb.votes': { $gt: 1000 } })

OUTPUT:

```
user> db.movies.find({ 'imdb.votes': { $gt: 1000 } })
[
  {
    _id: ObjectId('573a1390f29313caabcd42e8'),
    plot: 'A group of bandits stage a brazen train hold-up, only to find a determined posse hot on their heels.',
    genres: [ 'Short', 'Western' ],
    runtime: 11,
    cast: [
      'A.C. Abadie',
      "Gilbert M. 'Broncho Billy' Anderson",
      'George Barnes',
      'Justus D. Barnes'
    ],
    poster: 'https://m.media-amazon.com/images/M/MV5BMTU3NjE5NzYtYTYyNS00MDVmLWIwYjgtMmYwYWIxZDYyNzU2XkEyXkFqcGdeQXVyNzQzNzQxNzI@._V1_SY1000_SX677_AL_.jpg',
    title: 'The Great Train Robbery',
    fullplot: "Among the earliest existing films in American cinema - notable as the first film that presented a narrative story to tell - it depicts a group of cowboy outlaws who hold up a train and rob the
passengers. They are then pursued by a Sheriff's posse. Several scenes have color included - all hand tinted.",
    languages: [ 'English' ],
    released: ISODate('1903-12-01T00:00:00.000Z'),
    directors: [ 'Edwin S. Porter' ],
    rated: 'TV-G',
    awards: { wins: 1, nominations: 0, text: '1 win.' },
    lastupdated: '2015-08-13 00:27:59.177000000',
    year: 1903,
    imdb: { rating: 7.4, votes: 9847, id: 439 },
    countries: [ 'USA' ],
    type: 'movie',
    tomatoes: {
      viewer: { rating: 3.7, numReviews: 2559, meter: 75 },
      fresh: 6,
      critic: { rating: 7.6, numReviews: 6, meter: 100 },
      rotten: 0,
      lastUpdated: ISODate('2015-08-08T19:16:10.000Z')
    }
  },
  {
    _id: ObjectId('665436090bccc80d32cdce01'),
    title: 'Sample Movie',
    year: 2026,
    genres: [ 'Action', 'Adventure' ],
    directors: [ 'Sample Director' ],
    actors: [ 'Actor X', 'Actor Y' ],
    imdb: { rating: 7.5, votes: 1200 },
    plot: 'This is a sample plot for the movie with more than 1000 IMDb votes.'
  }
]
user>
```

RESULT:

The query is executed successfully.

8.) Retrieve all movies from the 'movies' collection that have complete information and have an IMDb rating higher than 7.

QUERY:

db.movies.find({ 'imdb.rating': { $gt: 7 } })

OUTPUT:

```
user> db.movies.find({ 'imdb.rating': { $gt: 7 } })
[
  {
    _id: ObjectId('573a1390f29313caabcd42e8'),
    plot: 'A group of bandits stage a brazen train hold-up, only to find a determined posse hot on their heels.',
    genres: [ 'Short', 'Western' ],
    runtime: 11,
    cast: [
      'A.C. Abadie',
      "Gilbert M. 'Broncho Billy' Anderson",
      'George Barnes',
      'Justus D. Barnes'
    ],
    poster: 'https://m.media-amazon.com/images/M/MV5BMTU3NjE5NzYtYTYyNS00MDVmLWIwYjgtMmYwYWIxZDYyNzU2XkEyXkFqcGdeQXVyNzQzNzQxNzI@._V1_SY1000_SX677_AL_.jpg',
    title: 'The Great Train Robbery',
    fullplot: "Among the earliest existing films in American cinema - notable as the first film that presented a narrative story to tell - it depicts a group of cowboy outlaws who hold up a train and rob the
passengers. They are then pursued by a Sheriff's posse. Several scenes have color included - all hand tinted.",
    languages: [ 'English' ],
    released: ISODate('1903-12-01T00:00:00.000Z'),
    directors: [ 'Edwin S. Porter' ],
    rated: 'TV-G',
    awards: { wins: 1, nominations: 0, text: '1 win.' },
    lastupdated: '2015-08-13 00:27:59.177000000',
    year: 1903,
    imdb: { rating: 7.4, votes: 9847, id: 439 },
    countries: [ 'USA' ],
    type: 'movie',
    tomatoes: {
      viewer: { rating: 3.7, numReviews: 2559, meter: 75 },
      fresh: 6,
      critic: { rating: 7.6, numReviews: 6, meter: 100 },
      rotten: 0,
      lastUpdated: ISODate('2015-08-08T19:16:10.000Z')
    }
  },
  {
    _id: ObjectId('665436090bccc80d32cdce01'),
    title: 'Sample Movie',
    year: 2026,
    genres: [ 'Action', 'Adventure' ],
    directors: [ 'Sample Director' ],
    actors: [ 'Actor X', 'Actor Y' ],
    imdb: { rating: 7.5, votes: 1200 },
    plot: 'This is a sample plot for the movie with more than 1000 IMDb votes.'
  },
  {
    _id: ObjectId('6654363c0bccc80d32cdce02'),
    title: 'Sample High Rated Movie',
    year: 2027,
    genres: [ 'Drama', 'Romance' ],
    directors: [ 'Sample Director' ],
    actors: [ 'Actor A', 'Actor B' ],
    imdb: { rating: 7.5, votes: 1500 },
    plot: 'This is a sample plot for a highly rated movie with an IMDb rating greater than 7.'
  }
]
```

RESULT:

The query is executed successfully.

9.) Retrieve all movies from the 'movies' collection that have complete information and have a viewer rating higher than 4 on Tomatoes.

QUERY:

db.movies.find({ 'tomatoes.viewer.rating': { $gt: 4 } })

OUTPUT:

```
user> db.movies.find({ 'tomatoes.viewer.rating': { $gt: 4 } })
[
  {
    _id: ObjectId('665436950bccc80d32cdce03'),
    title: 'Sample Movie',
    year: 2028,
    genres: [ 'Comedy', 'Adventure' ],
    directors: [ 'Sample Director' ],
    actors: [ 'Actor X', 'Actor Y' ],
    tomatoes: { viewer: { rating: 4.5 } },
    plot: 'This is a sample plot for the movie with a Rotten Tomatoes viewer rating greater than 4.'
  }
]
user>
```

RESULT:

The query is executed successfully.

10.) Retrieve all movies from the 'movies' collection that have received an award.

QUERY:

db.movies.find({ 'awards.wins': { $gt: 0 } })

OUTPUT:

```
user> db.movies.find({ 'awards.wins': { $gt: 0 } })
[
  {
    _id: ObjectId('573a1390f29313caabcd42e8'),
    plot: 'A group of bandits stage a brazen train hold-up, only to find a determined posse hot on their heels.',
    genres: [ 'Short', 'Western' ],
    runtime: 11,
    cast: [
      'A.C. Abadie',
      "Gilbert M. 'Broncho Billy' Anderson",
      'George Barnes',
      'Justus D. Barnes'
    ],
    poster: 'https://m.media-amazon.com/images/M/MV5BMTU3NjE5NzYtYTYyNS00NDVmLWIwYjgtMmYwYWIxZDYyNzU2XkEyXkFqcGdeQXVyNzQzNzQxNzI@._V1_SY1000_SX677_AL_.jpg',
    title: 'The Great Train Robbery',
    fullplot: "Among the earliest existing films in American cinema - notable as the first film that presented a narrative story to tell - it depicts a group of cowboy outlaws who hold up a train and rob the
passengers. They are then pursued by a Sheriff's posse. Several scenes have color included - all hand tinted.",
    languages: [ 'English' ],
    released: ISODate('1903-12-01T00:00:00.000Z'),
    directors: [ 'Edwin S. Porter' ],
    rated: 'TV-G',
    awards: { wins: 1, nominations: 0, text: '1 win.' },
    lastupdated: '2015-08-13 00:27:59.177000000',
    year: 1903,
    imdb: { rating: 7.4, votes: 9847, id: 439 },
    countries: [ 'USA' ],
    type: 'movie',
    tomatoes: {
      viewer: { rating: 3.7, numReviews: 2559, meter: 75 },
      fresh: 6,
      critic: { rating: 7.6, numReviews: 6, meter: 100 },
      rotten: 0,
      lastUpdated: ISODate('2015-08-08T19:16:10.000Z')
    }
  },
  {
    _id: ObjectId('6654348400bccc80d32cdcdfb'),
    title: 'Sample Movie',
    year: 1893,
    genre: 'Drama',
    director: 'Sample Director',
    actors: [ 'Actor 1', 'Actor 2' ],
    plot: 'This is a sample plot for the movie.',
    awards: { wins: 5, nominations: 10 }
  },
  {
    _id: ObjectId('665436df0bccc80d32cdce04'),
    title: 'Sample Award-Winning Movie',
    year: 2029,
    genres: [ 'Drama', 'Biography' ],
    directors: [ 'Sample Director' ],
    actors: [ 'Actor A', 'Actor B' ],
    awards: { wins: 3, nominations: 5 },
    plot: 'This is a sample plot for the award-winning movie with wins greater than 0.'
  }
```

RESULT:

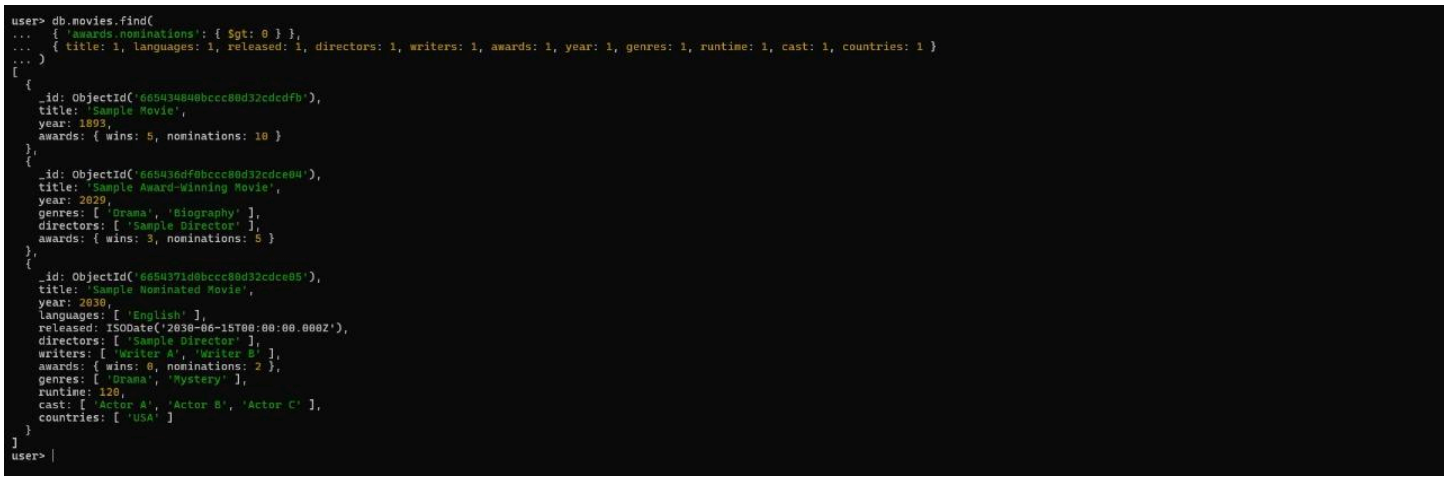
The query is executed successfully.

11.) Find all movies with title, languages, released, directors, writers, awards, year, genres, runtime, cast, countries from the 'movies' collection in MongoDB that have at least one nomination.

QUERY:

db.movies.find({ 'awards.nominations': { $gt: 0 } }, { title: 1, languages: 1, released: 1, directors: 1, writers: 1, awards: 1, year: 1, genres: 1, runtime: 1, cast: 1, countries: 1 })

OUTPUT:



RESULT:

The query is executed successfully.

12.) Find all movies with title, languages, released, directors, writers, awards, year, genres, runtime, cast, countries from the 'movies' collection in MongoDB with cast including "Charles Kayser".

QUERY:

db.movies.find({ cast: 'Charles Kayser' }, { title: 1, languages: 1, released: 1, directors: 1, writers: 1, awards: 1, year: 1, genres: 1, runtime: 1, cast: 1, countries: 1 })

OUTPUT:

RESULT:

The query is executed successfully.

13.) Retrieve all movies with title, languages, releases, directors, writers, countries from the 'movies' collection in MongoDB that was released on May 9, 1893.

QUERY:

db.movies.find({ released: ISODate("1893-05-09T00:00:00.000Z") }, { title: 1, languages: 1, released: 1, directors: 1, writers: 1, countries: 1 })

OUTPUT:

RESULT:

The query is executed successfully.

14.) Retrieve all movies with title, languages, released, directors, writers, countries from the 'movies' collection in MongoDB that have a word "scene" in the title.

QUERY:

db.movies.find({ title: /scene/i }, { title: 1, languages: 1, released: 1, directors: 1, writers: 1, countries: 1 })

OUTPUT:

RESULT:

The query is executed successfully.

Evaluation Procedure	Marks awarded
Query(5)	
Execution (5)	
Viva(5)	
Total (15)	
Faculty Signature	