Ex. No.: 1

CREATION OF BASE TABLE AND DML OPERATIONS

1.

```
CREATE TABLE MY_EMPLOYEE (
   ID NUMBER(4) NOT NULL,
   Last_name VARCHAR2(25),
   First_name VARCHAR2(25),
   Userid VARCHAR2(25),
   Salary NUMBER(9,2),
   CONSTRAINT pk_employee PRIMARY KEY (ID)
);
```

2.

```
INSERT INTO MY_EMPLOYEE (ID, Last_name, First_name, Userid, Salary)
VALUES (1, 'Patel', 'Ralph', 'rpatel', 895);
INSERT INTO MY_EMPLOYEE (ID, Last_name, First_name, Userid, Salary)
VALUES (2, 'Dancs', 'Betty', 'bdancs', 860);
```

3.

```
SELECT * FROM MY_EMPLOYEE;
```

4.

```
INSERT INTO MY_EMPLOYEE (ID, Last_name, First_name, Userid, Salary)
VALUES (3, 'Biri', 'Ben', NULL, 1100);
INSERT INTO MY_EMPLOYEE (ID, Last_name, First_name, Userid, Salary)
VALUES (4, 'Newman', 'Chad', NULL, 750);

UPDATE MY_EMPLOYEE
SET Userid = LOWER(CONCAT(SUBSTR(First_name, 1, 1), SUBSTR(Last_name, 1, 7)))
WHERE ID = 3 OR ID = 4;
```

5.

```
DELETE FROM MY_EMPLOYEE
WHERE First_name = 'Betty' AND Last_name = 'Dancs';
```

6.

```
UPDATE MY_EMPLOYEE
SET Last_name = NULL, First_name = NULL, Userid = NULL, Salary = NULL
WHERE ID = 4;
```

7.

```
COMMIT;
```

8.

```
UPDATE MY_EMPLOYEE
SET Last_name = 'Drexler'
WHERE ID = 3;
```

9.

```
UPDATE MY_EMPLOYEE
SET Salary = 1000
WHERE Salary < 900;
```

Ex. No.: 2

DATA MANIPULATIONS

A.

Initial:

```
CREATE TABLE EMPLOYEES (
   Employee_id NUMBER(6) NOT NULL,
   First_Name VARCHAR2(20),
   Last_Name VARCHAR2(25) NOT NULL,
   Email VARCHAR2(25) NOT NULL,
   Phone_Number VARCHAR2(20),
   Hire_date DATE NOT NULL,
   Job_id VARCHAR2(10) NOT NULL,
   Salary NUMBER(8,2),
   Commission_pct NUMBER(2,2),
   Manager_id NUMBER(6),
   Department_id NUMBER(4),
   CONSTRAINT pk_employee_id PRIMARY KEY (Employee_id)
);
```

```
INSERT INTO EMPLOYEES
VALUES (101, 'John', 'Doe', 'jdoe@example.com', '1234567890', TO_DATE('2022-06-15', 'YYYY-MM-DD'), 'IT_PROG', 5000, NULL, 100, 60);
```

```
INSERT INTO EMPLOYEES
VALUES (102, 'Jane', 'Austin', 'jaustin@example.com', '0987654321', TO_DATE('2022-08-20', 'YYYY-MM-DD'), 'HR_MAN', 4800, NULL, 101, 70);
```

```
INSERT INTO EMPLOYEES
VALUES (103, 'Mark', 'Smith', 'msmith@example.com', '1230984567', TO_DATE('2023-01-10', 'YYYY-MM-DD'), 'SA_REP', 4600, 0.10, 100, 80);
```

```
INSERT INTO EMPLOYEES
```

```
VALUES (104, 'Chad', 'Newman', 'cnewman@example.com', '7896541230',
TO_DATE('2021-11-03', 'YYYY-MM-DD'), 'FI_MGR', 6000, NULL, 102, 60);


INSERT INTO EMPLOYEES

VALUES (105, 'Betty', 'Austin', 'baustin@example.com', '9874563210', TO_DATE('2020-
12-25', 'YYYY-MM-DD'), 'HR_CLERK', 3900, NULL, 101, 70);
```

1.

```
SELECT Employee_id, First_Name, Last_Name, Salary

FROM EMPLOYEES;
```

2.

```
SELECT Employee_id, First_Name, Last_Name

FROM EMPLOYEES

WHERE Manager_id = 100;
```

3.

```
SELECT First_Name, Last_Name

FROM EMPLOYEES

WHERE Salary >= 4800;
```

4.

```
SELECT First_Name, Last_Name

FROM EMPLOYEES

WHERE Last_Name = 'AUSTIN';
```

5.

```
SELECT First_Name, Last_Name

FROM EMPLOYEES

WHERE Department_id IN (60, 70, 80);
```

6.

```
SELECT DISTINCT Manager_id

FROM EMPLOYEES;
```

B.

Initial:

```
CREATE TABLE EMP (
   EmpNo NUMBER(6),
   EmpName VARCHAR2(25),
   Job VARCHAR2(20),
   Basic NUMBER(8,2),
   DA NUMBER(8,2),
   HRA NUMBER(8,2),
   PF NUMBER(8,2),
   GrossPay NUMBER(8,2),
   NetPay NUMBER(8,2),
   Department_id NUMBER(4)
);
```

1.

```
INSERT INTO EMP (EmpNo, EmpName, Job, Basic, Department_id)
VALUES (1, 'John Doe', 'Manager', 5000, 60);
INSERT INTO EMP (EmpNo, EmpName, Job, Basic, Department_id)
VALUES (2, 'Jane Austin', 'Clerk', 4000, 70);
INSERT INTO EMP (EmpNo, EmpName, Job, Basic, Department_id)
VALUES (3, 'Mark Smith', 'Sales', 3500, 80);
INSERT INTO EMP (EmpNo, EmpName, Job, Basic, Department_id)
VALUES (4, 'Chad Newman', 'Manager', 6000, 60);
INSERT INTO EMP (EmpNo, EmpName, Job, Basic, Department_id)
VALUES (5, 'Betty Austin', 'HR', 3900, 70);

UPDATE EMP
SET
   DA = 0.30 * Basic,
   HRA = 0.40 * Basic,
   PF = 0.12 * Basic;
```

```
UPDATE EMP
SET
   GrossPay = Basic + DA + HRA;

UPDATE EMP
SET
   NetPay = GrossPay - PF;
```

2.

```
SELECT *
FROM EMP e
WHERE Basic = (
   SELECT MIN(Basic)
   FROM EMP
   WHERE Department_id = e.Department_id
);
```

3.

```
SELECT EmpName, NetPay
FROM EMP
WHERE NetPay < 7500;
```

C.

1.

```
CREATE TABLE DEPT (
   ID NUMBER(7),
   NAME VARCHAR2(25),
   CONSTRAINT pk_dept PRIMARY KEY (ID)
);
```

2.

```
CREATE TABLE EMP (
  ID NUMBER(7),
  LAST_NAME VARCHAR2(25),
  FIRST_NAME VARCHAR2(25),
  DEPT_ID NUMBER(7),
  CONSTRAINT pk_emp PRIMARY KEY (ID)
);
```

3.

```
ALTER TABLE EMP
MODIFY LAST_NAME VARCHAR2(50);
```

4.

```
CREATE TABLE EMPLOYEES2 AS
SELECT Employee_id AS Id, First_Name, Last_Name, Salary, Department_id AS Dept_id
FROM EMPLOYEES;
```

5.

```
DROP TABLE EMP;
```

6.

```
ALTER TABLE EMPLOYEES2
RENAME TO EMP;
```

7.

```
COMMENT ON TABLE DEPT IS 'Department Table';
COMMENT ON TABLE EMP IS 'Employees Table';
DESC DEPT;
DESC EMP;
```

8.

```
ALTER TABLE EMP
DROP COLUMN First_Name;
DESC EMP;
```

Ex. No.: 3

WRITING BASIC SQL SELECT STATEMENTS

Initial:

```
CREATE TABLE departments (
   dept_id NUMBER(4) PRIMARY KEY,
   dept_name VARCHAR2(30),
   manager_id NUMBER(6),
   location_id NUMBER(4)
);

INSERT INTO departments (dept_id, dept_name, manager_id, location_id)
VALUES (10, 'HR', 101, 1001);
INSERT INTO departments (dept_id, dept_name, manager_id, location_id)
VALUES (20, 'Sales', 102, 1002);
INSERT INTO departments (dept_id, dept_name, manager_id, location_id)
VALUES (30, 'IT', 103, 1003);

CREATE TABLE EMPLOYEES (
   Employee_id NUMBER(6) NOT NULL,
   First_Name VARCHAR2(20),
   Last_Name VARCHAR2(25) NOT NULL,
   Email VARCHAR2(25) NOT NULL,
   Phone_Number VARCHAR2(20),
   Hire_date DATE NOT NULL,
   Job_id VARCHAR2(10) NOT NULL,
   Salary NUMBER(8,2),
   Commission_pct NUMBER(2,2),
   Manager_id NUMBER(6),
   Department_id NUMBER(4),
   CONSTRAINT pk_employee_id PRIMARY KEY (Employee_id)
);
```

```
INSERT INTO EMPLOYEES
VALUES (101, 'John', 'Doe', 'jdoe@example.com', '1234567890', TO_DATE('2022-06-15', 'YYYY-MM-DD'), 'IT_PROG', 5000, NULL, 100, 60);

INSERT INTO EMPLOYEES
VALUES (102, 'Jane', 'Austin', 'jaustin@example.com', '0987654321', TO_DATE('2022-08-20', 'YYYY-MM-DD'), 'HR_MAN', 4800, NULL, 101, 70);

INSERT INTO EMPLOYEES
VALUES (103, 'Mark', 'Smith', 'msmith@example.com', '1230984567', TO_DATE('2023-01-10', 'YYYY-MM-DD'), 'SA_REP', 4600, 0.10, 100, 80);

INSERT INTO EMPLOYEES
VALUES (104, 'Chad', 'Newman', 'cnewman@example.com', '7896541230', TO_DATE('2021-11-03', 'YYYY-MM-DD'), 'FI_MGR', 6000, NULL, 102, 60);

INSERT INTO EMPLOYEES
VALUES (105, 'Betty', 'Austin', 'baustin@example.com', '9874563210', TO_DATE('2020-12-25', 'YYYY-MM-DD'), 'HR_CLERK', 3900, NULL, 101, 70);
```

1.

```
SELECT Employee_id, Last_Name, Salary * 12 AS "ANNUAL SALARY"
FROM EMPLOYEES;
```

2.

```
DESC departments;
SELECT * FROM departments;
```

3.

```
SELECT employee_id, last_name, job_id, hire_date
FROM employees;
```

4.

```
SELECT employee_id, last_name, job_id, hire_date AS "STARTDATE"
FROM employees;
```

5.

```
SELECT DISTINCT job_id
FROM employees;
```

6.

```
SELECT last_name || ', ' || job_id AS "EMPLOYEE and TITLE"
FROM employees;
```

7.

```
SELECT employee_id || ', ' || first_name || ', ' || last_name || ', ' || email || ', ' ||
phone_number || ', ' || hire_date || ', ' || job_id || ', ' || salary || ', ' || commission_pct || ', ' ||
manager_id || ', ' || department_id AS "THE_OUTPUT"
FROM employees;
```

Ex. No.: 4

WORKING WITH CONSTRAINTS

Initial:

```
CREATE TABLE departments (
   dept_id NUMBER(4),
   dept_name VARCHAR2(30),
   manager_id NUMBER(6),
   location_id NUMBER(4)
);

INSERT INTO departments (dept_id, dept_name, manager_id, location_id)
VALUES (10, 'HR', 101, 1001);
INSERT INTO departments (dept_id, dept_name, manager_id, location_id)
VALUES (20, 'Sales', 102, 1002);
INSERT INTO departments (dept_id, dept_name, manager_id, location_id)
VALUES (30, 'IT', 103, 1003);

CREATE TABLE EMP (
   Employee_id NUMBER(6) NOT NULL,
   First_Name VARCHAR2(20),
   Last_Name VARCHAR2(25) NOT NULL,
   Email VARCHAR2(25) NOT NULL,
   Phone_Number VARCHAR2(20),
   Hire_date DATE NOT NULL,
   Job_id VARCHAR2(10) NOT NULL,
   Salary NUMBER(8,2),
   Commission_pct NUMBER(2,2),
   Manager_id NUMBER(6),
   Department_id NUMBER(4)
);

INSERT INTO EMP
```

```
VALUES (101, 'John', 'Doe', 'jdoe@example.com', '1234567890', TO_DATE('2022-06-15',
'YYYY-MM-DD'), 'IT_PROG', 5000, NULL, 100, 60);


INSERT INTO EMP

VALUES (102, 'Jane', 'Austin', 'jaustin@example.com', '0987654321', TO_DATE('2022-
08-20', 'YYYY-MM-DD'), 'HR_MAN', 4800, NULL, 101, 70);


INSERT INTO EMP

VALUES (103, 'Mark', 'Smith', 'msmith@example.com', '1230984567', TO_DATE('2023-
01-10', 'YYYY-MM-DD'), 'SA_REP', 4600, 0.10, 100, 80);


INSERT INTO EMP

VALUES (104, 'Chad', 'Newman', 'cnewman@example.com', '7896541230',
TO_DATE('2021-11-03', 'YYYY-MM-DD'), 'FI_MGR', 6000, NULL, 102, 60);


INSERT INTO EMP

VALUES (105, 'Betty', 'Austin', 'baustin@example.com', '9874563210', TO_DATE('2020-
12-25', 'YYYY-MM-DD'), 'HR_CLERK', 3900, NULL, 101, 70);
```

1.

```
ALTER TABLE EMP

ADD CONSTRAINT my_emp_id_pk PRIMARY KEY (Employee_id);
```

2.

```
ALTER TABLE DEPARTMENTS

ADD CONSTRAINT my_dept_id_pk PRIMARY KEY (dept_id);
```

3.

```
ALTER TABLE EMP

ADD DEPT_ID NUMBER(4);


ALTER TABLE EMP

ADD CONSTRAINT my_emp_dept_id_fk FOREIGN KEY (DEPT_ID)

REFERENCES DEPARTMENTS(dept_id);
```

4.

```
ALTER TABLE EMP
ADD COMMISSION NUMBER(2,2);

ALTER TABLE EMP
ADD CONSTRAINT chk_commission_gt_zero CHECK (COMMISSION > 0);
```

Ex. No.: 5

CREATING VIEWS

Initial:

```
CREATE TABLE JOB_GRADE (
   Grade_level VARCHAR2(2),
   Lowest_sal NUMBER,
   Highest_sal NUMBER
);

INSERT INTO JOB_GRADE (Grade_level, Lowest_sal, Highest_sal)
VALUES ('A', 3000, 4999);
INSERT INTO JOB_GRADE (Grade_level, Lowest_sal, Highest_sal)
VALUES ('B', 5000, 6999);
INSERT INTO JOB_GRADE (Grade_level, Lowest_sal, Highest_sal)
VALUES ('C', 7000, 9999);

CREATE TABLE DEPARTMENTS (
   dept_id NUMBER(4) PRIMARY KEY,
   dept_name VARCHAR2(30),
   manager_id NUMBER(6),
   location_id NUMBER(4)
);

INSERT INTO DEPARTMENTS (dept_id, dept_name, manager_id, location_id)
VALUES (80, 'HR', 101, 1001);
INSERT INTO DEPARTMENTS (dept_id, dept_name, manager_id, location_id)
VALUES (20, 'Sales', 102, 1002);
INSERT INTO DEPARTMENTS (dept_id, dept_name, manager_id, location_id)
VALUES (30, 'IT', 103, 1003);
INSERT INTO DEPARTMENTS (dept_id, dept_name, manager_id, location_id)
VALUES (50, 'Support', 104, 1004);
```

```
CREATE TABLE EMPLOYEES (
   Employee_id NUMBER(6) NOT NULL,
   First_Name VARCHAR2(20),
   Last_Name VARCHAR2(25) NOT NULL,
   Email VARCHAR2(25) NOT NULL,
   Phone_Number VARCHAR2(20),
   Hire_date DATE NOT NULL,
   Job_id VARCHAR2(10) NOT NULL,
   Salary NUMBER(8,2),
   Commission NUMBER(2,2),
   Manager_id NUMBER(6),
   Dept_ID NUMBER(4),
   CONSTRAINT pk_employee_id PRIMARY KEY (Employee_id),
   CONSTRAINT fk_department FOREIGN KEY (Dept_ID) REFERENCES
DEPARTMENTS(dept_id)
);


INSERT INTO EMPLOYEES (Employee_id, First_Name, Last_Name, Email,
Phone_Number, Hire_date, Job_id, Salary, Commission, Manager_id, Dept_ID)
VALUES (101, 'John', 'Doe', 'jdoe@example.com', '1234567890',
TO_DATE('2022-06-15', 'YYYY-MM-DD'), 'IT_PROG', 5000, 0.05, 100, 80);


INSERT INTO EMPLOYEES (Employee_id, First_Name, Last_Name, Email,
Phone_Number, Hire_date, Job_id, Salary, Commission, Manager_id, Dept_ID)
VALUES (102, 'Jane', 'Austin', 'jaustin@example.com', '0987654321',
TO_DATE('2022-08-20', 'YYYY-MM-DD'), 'HR_MAN', 4800, NULL, 101, 50);


INSERT INTO EMPLOYEES (Employee_id, First_Name, Last_Name, Email,
Phone_Number, Hire_date, Job_id, Salary, Commission, Manager_id, Dept_ID)
VALUES (103, 'Mark', 'Smith', 'msmith@example.com', '1230984567',
TO_DATE('2023-01-10', 'YYYY-MM-DD'), 'SA_REP', 4600, 0.10, 100, 30);


INSERT INTO EMPLOYEES (Employee_id, First_Name, Last_Name, Email,
Phone_Number, Hire_date, Job_id, Salary, Commission, Manager_id, Dept_ID)
VALUES (104, 'Chad', 'Matos', 'cnewman@example.com', '7896541230',
TO_DATE('2021-11-03', 'YYYY-MM-DD'), 'FI_MGR', 6000, NULL, 102, 50);
```

```
INSERT INTO EMPLOYEES (Employee_id, First_Name, Last_Name, Email,
Phone_Number, Hire_date, Job_id, Salary, Commission, Manager_id, Dept_ID)

VALUES (105, 'Betty', 'Austin', 'baustin@example.com', '9874563210',
TO_DATE('2020-12-25', 'YYYY-MM-DD'), 'HR_CLERK', 3900, NULL, 101, 20);
```

1.

```
CREATE VIEW EMPLOYEE_VU AS

SELECT Employee_id,

    First_Name || ' ' || Last_Name AS EMPLOYEE,

    Dept_ID

FROM EMPLOYEES;
```

2.

```
SELECT * FROM EMPLOYEE_VU;
```

3.

```
SELECT VIEW_NAME, TEXT

FROM USER_VIEWS

WHERE VIEW_NAME = 'EMPLOYEE_VU';
```

4.

```
SELECT EMPLOYEE, Dept_ID

FROM EMPLOYEE_VU;
```

5.

```
CREATE VIEW DEPT50 AS

SELECT Employee_id AS EMPNO,

    Last_Name AS EMPLOYEE,

    Dept_ID AS DEPTNO

FROM EMPLOYEES

WHERE Dept_ID = 50;
```

6.

```
DESC DEPT50;

SELECT * FROM DEPT50;
```

7.

```
UPDATE EMPLOYEES
SET Dept_ID = 80
WHERE Last_Name = 'Matos';
```

8.

```
CREATE VIEW SALARY_VU AS
SELECT E.Last_Name AS Employee,
    D.dept_name AS Department,
    E.Salary AS Salary,
    J.Grade_level AS Grade
FROM EMPLOYEES E
JOIN DEPARTMENTS D ON E.Dept_ID = D.dept_id
JOIN JOB_GRADE J ON E.Salary BETWEEN J.Lowest_sal AND J.Highest_sal;
```

Ex. No.: 6

RESTRICTING AND SORTING DATA

Initial:

```
CREATE TABLE EMPLOYEES (
   Employee_id NUMBER(6) NOT NULL,
   Last_Name VARCHAR2(25) NOT NULL,
   First_Name VARCHAR2(20),
   Email VARCHAR2(25) NOT NULL,
   Phone_Number VARCHAR2(20),
   Hire_date DATE NOT NULL,
   Job_id VARCHAR2(10) NOT NULL,
   Salary NUMBER(8,2),
   Commission_pct NUMBER(2,2),
   Manager_id NUMBER(6),
   Department_id NUMBER(4),
   CONSTRAINT pk_employee_id PRIMARY KEY (Employee_id)
);
```

```
INSERT INTO EMPLOYEES
VALUES (176, 'Smith', 'John', 'jsmith@example.com', '555-1234', TO_DATE('1994-07-15', 'YYYY-MM-DD'), 'SA_REP', 13000, 0.10, NULL, 30);
```

```
INSERT INTO EMPLOYEES
VALUES (177, 'Doe', 'Jane', 'jdoe@example.com', '555-5678', TO_DATE('1998-03-25', 'YYYY-MM-DD'), 'IT_PROG', 11000, NULL, 176, 20);
```

```
INSERT INTO EMPLOYEES
VALUES (178, 'Johnson', 'Emily', 'ejohnson@example.com', '555-8765', TO_DATE('1995-11-30', 'YYYY-MM-DD'), 'ST_CLERK', 2500, NULL, 176, 50);
```

```
INSERT INTO EMPLOYEES
VALUES (179, 'Miller', 'Tom', 'tmiller@example.com', '555-4321', TO_DATE('1996-09-10', 'YYYY-MM-DD'), 'SA_REP', 8000, 0.15, 176, 20);
```

```
INSERT INTO EMPLOYEES
VALUES (180, 'Matos', 'Daniel', 'dmatos@example.com', '555-7890', TO_DATE('1994-05-23', 'YYYY-MM-DD'), 'HR_CLERK', 3000, NULL, NULL, 50);

INSERT INTO EMPLOYEES
VALUES (196, 'Sharukesh', 'John', 'jsharuk@example.com', '555-1274', TO_DATE('1999-07-15', 'YYYY-MM-DD'), 'SA_REP', 16000, 0.10, NULL, 60);
```

1.

```
SELECT Last_Name, Salary
FROM EMPLOYEES
WHERE Salary > 12000;
```

2.

```
SELECT Last_Name, Department_id
FROM EMPLOYEES
WHERE Employee_id = 176;
```

3.

```
SELECT Last_Name, Salary
FROM EMPLOYEES
WHERE Salary NOT BETWEEN 5000 AND 12000;
```

4.

```
SELECT Last_Name, Job_id, Hire_date
FROM EMPLOYEES
WHERE Hire_date BETWEEN TO_DATE('1998-02-20', 'YYYY-MM-DD') AND TO_DATE('1998-05-01', 'YYYY-MM-DD')
ORDER BY Hire_date;
```

5.

```
SELECT Last_Name, Department_id
FROM EMPLOYEES
WHERE Department_id IN (20, 50)
ORDER BY Last_Name;
```

6.

```
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;
```

7.

```
SELECT Last_Name, Hire_date
FROM EMPLOYEES
WHERE TO_CHAR(Hire_date, 'YYYY') = '1994';
```

8.

```
SELECT Last_Name, Job_id
FROM EMPLOYEES
WHERE Manager_id IS NULL;
```

9.

```
SELECT Last_Name, Salary, Commission_pct
FROM EMPLOYEES
WHERE Commission_pct IS NOT NULL
ORDER BY Salary DESC, Commission_pct DESC;
```

10.

```
SELECT Last_Name
FROM EMPLOYEES
WHERE Last_Name LIKE '__a%';
```

11.

```
SELECT Last_Name
FROM EMPLOYEES
WHERE Last_Name LIKE '%a%' AND Last_Name LIKE '%e%';
```

12.

```
SELECT Last_Name, Job_id, Salary
FROM EMPLOYEES
WHERE Job_id IN ('SA_REP', 'ST_CLERK')
AND Salary NOT IN (2500, 3500, 7000);
```

Ex. No.: 7

USING SET OPERATORS

Initial:

```
CREATE TABLE EMPLOYEES (
   employee_id NUMBER PRIMARY KEY,
   last_name VARCHAR2(50),
   job_id VARCHAR2(10),
   department_id NUMBER,
   hire_date DATE
);
CREATE TABLE DEPARTMENTS (
   department_id NUMBER PRIMARY KEY,
   department_name VARCHAR2(50),
   country_id VARCHAR2(10)
);

CREATE TABLE JOB_HISTORY (
   employee_id NUMBER,
   job_id VARCHAR2(10) PRIMARY KEY,
   hire_date DATE
);

CREATE TABLE COUNTRIES (
   country_id VARCHAR2(10) PRIMARY KEY,
   country_name VARCHAR2(50)
);

INSERT INTO EMPLOYEES VALUES
(101, 'Smith', 'ST_CLERK', 10, TO_DATE('2015-06-01', 'YYYY-MM-DD'));
INSERT INTO EMPLOYEES VALUES
(102, 'Johnson', 'SA_MAN', 50, TO_DATE('2018-03-12', 'YYYY-MM-DD'));
```

```
INSERT INTO EMPLOYEES VALUES
(103, 'Williams', 'ST_CLERK', 20, TO_DATE('2019-07-14', 'YYYY-MM-DD'));
INSERT INTO EMPLOYEES VALUES
(104, 'Brown', 'IT_PROG', 30, TO_DATE('2017-11-25', 'YYYY-MM-DD'));
INSERT INTO EMPLOYEES VALUES
(105, 'Jones', 'HR_REP', 40, TO_DATE('2020-01-03', 'YYYY-MM-DD'));
INSERT INTO EMPLOYEES VALUES
(106, 'Garcia', 'ST_CLERK', 50, TO_DATE('2015-04-19', 'YYYY-MM-DD'));
INSERT INTO EMPLOYEES VALUES
(107, 'Davis', 'IT_PROG', 20, TO_DATE('2019-01-01', 'YYYY-MM-DD'));
INSERT INTO EMPLOYEES VALUES
(108, 'Taylor', 'SA_MAN', 10, TO_DATE('2021-09-12', 'YYYY-MM-DD'));
INSERT INTO EMPLOYEES VALUES
(109, 'Clark', 'IT_PROG', 30, TO_DATE('2018-08-01', 'YYYY-MM-DD'));

INSERT INTO DEPARTMENTS
VALUES (10, 'Administration', 'US');
INSERT INTO DEPARTMENTS
VALUES (20, 'Marketing', 'US');
INSERT INTO DEPARTMENTS
VALUES (30, 'IT', 'UK');
INSERT INTO DEPARTMENTS
VALUES (40, 'HR', 'FR');
INSERT INTO DEPARTMENTS
VALUES (50, 'Sales', 'DE');
INSERT INTO DEPARTMENTS
VALUES (60, 'Finance', 'IN');

INSERT INTO JOB_HISTORY
VALUES (101, 'ST_CLERK', TO_DATE('2015-06-01', 'YYYY-MM-DD'));
INSERT INTO JOB_HISTORY
VALUES (102, 'SA_MAN', TO_DATE('2018-03-12', 'YYYY-MM-DD'));
```

```
INSERT INTO JOB_HISTORY
VALUES (107, 'IT_PROG',TO_DATE('2019-01-01', 'YYYY-MM-DD'));

INSERT INTO COUNTRIES
VALUES ('US', 'United States');
INSERT INTO COUNTRIES
VALUES ('UK', 'United Kingdom');
INSERT INTO COUNTRIES
VALUES ('FR', 'France');
INSERT INTO COUNTRIES
VALUES ('DE', 'Germany');
INSERT INTO COUNTRIES
VALUES ('IN', 'India');
INSERT INTO COUNTRIES
VALUES ('JP', 'Japan');
```

1.

```
SELECT department_id
FROM DEPARTMENTS
MINUS
SELECT department_id
FROM EMPLOYEES
WHERE job_id = 'ST_CLERK';
```

2.

```
SELECT country_id, country_name
FROM COUNTRIES
WHERE country_id IN (
   SELECT country_id FROM COUNTRIES
   MINUS
   SELECT DISTINCT country_id FROM DEPARTMENTS
   WHERE department_name='HR'
);
```

3.

```
SELECT job_id, department_id
FROM EMPLOYEES
WHERE department_id = 10
UNION ALL
SELECT job_id, department_id
FROM EMPLOYEES
WHERE department_id = 50
UNION ALL
SELECT job_id, department_id
FROM EMPLOYEES
WHERE department_id = 20;
```

4.

```
SELECT employee_id, job_id, hire_date
FROM EMPLOYEES
INTERSECT
SELECT employee_id, job_id, hire_date
FROM JOB_HISTORY
ORDER BY hire_date ASC;
```

5.

```
SELECT last_name, department_id, NULL AS department_name
FROM EMPLOYEES
UNION
SELECT NULL AS last_name, department_id, department_name
FROM DEPARTMENTS;
```

Ex. No.: 8

WORKING WITH MULTIPLE TABLES

Initial:

```
CREATE TABLE EMPLOYEES (
   EMPLOYEE_ID NUMBER(6) PRIMARY KEY,
   FIRST_NAME VARCHAR2(20),
   LAST_NAME VARCHAR2(25) NOT NULL,
   EMAIL VARCHAR2(50) UNIQUE NOT NULL,
   PHONE_NUMBER VARCHAR2(20),
   HIRE_DATE DATE NOT NULL,
   JOB_ID VARCHAR2(10) NOT NULL,
   SALARY NUMBER(8,2),
   COMMISSION_PCT NUMBER(2,2),
   MANAGER_ID NUMBER(6),
   DEPARTMENT_ID NUMBER(4)
);

CREATE TABLE DEPARTMENTS (
   DEPARTMENT_ID NUMBER(4) PRIMARY KEY,
   DEPARTMENT_NAME VARCHAR2(30) NOT NULL,
   MANAGER_ID NUMBER(6),
   LOCATION_ID NUMBER(4)
);

CREATE TABLE JOBS (
   JOB_ID VARCHAR2(10) PRIMARY KEY,
   JOB_TITLE VARCHAR2(35) NOT NULL,
   MIN_SALARY NUMBER(8,2),
   MAX_SALARY NUMBER(8,2)
);

CREATE TABLE LOCATIONS (
```

```
   LOCATION_ID NUMBER(4) PRIMARY KEY,
   STREET_ADDRESS VARCHAR2(40),
   POSTAL_CODE VARCHAR2(12),
   CITY VARCHAR2(30) NOT NULL,
   COUNTRY VARCHAR2(25),
   COUNTRY_CODE VARCHAR2(20)
);

CREATE TABLE JOB_GRADES (
   GRADE_LEVEL CHAR(1) PRIMARY KEY,
   LOW_SALARY NUMBER(8,2),
   HIGH_SALARY NUMBER(8,2)
);

INSERT INTO LOCATIONS VALUES
(1000, '123 Main St', '560001', 'Toronto', 'Ontario', 'CA');
INSERT INTO LOCATIONS VALUES
(1001, '456 Park Ave', '110020', 'New York', 'New York', 'US');
INSERT INTO LOCATIONS VALUES
(1002, '789 King Rd', '700008', 'London', 'England', 'UK');
INSERT INTO LOCATIONS VALUES
(1003, '696 VOC Rd', '600098', 'Chennai', 'India', 'IND');

INSERT INTO DEPARTMENTS VALUES
(10, 'Administration', NULL, 1001);
INSERT INTO DEPARTMENTS VALUES
(20, 'Marketing', 101, 1002);
INSERT INTO DEPARTMENTS VALUES
(30, 'IT', 102, 1001);
INSERT INTO DEPARTMENTS VALUES
(40, 'HR', 103, 1000);
INSERT INTO DEPARTMENTS VALUES
(50, 'Sales', 104, 1000);
```

```
INSERT INTO DEPARTMENTS VALUES
(80, 'Finance', 105, 1003);

INSERT INTO JOBS VALUES
('AD_PRES', 'President', 20000, 40000);
INSERT INTO JOBS VALUES
('MK_MAN', 'Marketing Manager', 10000, 20000);
INSERT INTO JOBS VALUES
('IT_PROG', 'Programmer', 5000, 15000);
INSERT INTO JOBS VALUES
('HR_REP', 'HR Representative', 6000, 12000);
INSERT INTO JOBS VALUES
('FI_MGR', 'Finance Manager', 12000, 25000);
INSERT INTO JOBS VALUES
('SA_REP', 'Sales Representative', 5000, 10000);

INSERT INTO JOB_GRADES VALUES
('A', 5000, 7000);
INSERT INTO JOB_GRADES VALUES
('B', 7001, 12000);
INSERT INTO JOB_GRADES VALUES
('C', 12001, 15000);
INSERT INTO JOB_GRADES VALUES
('D', 15001, 20000);
INSERT INTO JOB_GRADES VALUES
('E', 20001, 40000);

INSERT INTO EMPLOYEES VALUES
(101, 'John', 'King', 'JKing@example.com', '1234567890', TO_DATE('2010-01-01', 'YYYY-MM-DD'), 'AD_PRES', 30000, NULL, NULL, 10);
INSERT INTO EMPLOYEES VALUES
(102, 'Sara', 'Davies', 'SDavies@example.com', '2234567890', TO_DATE('2013-05-10', 'YYYY-MM-DD'), 'MK_MAN', 15000, NULL, 101, 20);
```

```
INSERT INTO EMPLOYEES VALUES

(103, 'Mike', 'Smith', 'MSmith@example.com', '3234567890', TO_DATE('2012-03-15',
'YYYY-MM-DD'), 'IT_PROG', 9000, NULL, 102, 80);

INSERT INTO EMPLOYEES VALUES

(104, 'Anna', 'Brown', 'ABrown@example.com', '4234567890', TO_DATE('2013-09-20',
'YYYY-MM-DD'), 'HR_REP', 7000, 0.10, 102, 40);

INSERT INTO EMPLOYEES VALUES

(105, 'James', 'Wilson', 'JWilson@example.com', '5234567890', TO_DATE('2014-07-23',
'YYYY-MM-DD'), 'FI_MGR', 18000, NULL, 101, 80);

INSERT INTO EMPLOYEES VALUES

(106, 'Sophia', 'Johnson', 'SJohnson@example.com', '6234567890', TO_DATE('2015-11-
05', 'YYYY-MM-DD'), 'SA_REP', 8000, 0.15, 103, 50);

INSERT INTO EMPLOYEES VALUES

(107, 'Emily', 'Taylor', 'ETaylor@example.com', '7234567890', TO_DATE('2016-04-18',
'YYYY-MM-DD'), 'SA_REP', 8500, 0.12, 104, 50);
```

1.

```
SELECT e.LAST_NAME, e.DEPARTMENT_ID, d.DEPARTMENT_NAME

FROM EMPLOYEES e

JOIN DEPARTMENTS d ON e.DEPARTMENT_ID = d.DEPARTMENT_ID;
```

2.

```
SELECT DISTINCT e.JOB_ID, d.LOCATION_ID, l.COUNTRY

FROM EMPLOYEES e

JOIN DEPARTMENTS d ON e.DEPARTMENT_ID = d.DEPARTMENT_ID

JOIN LOCATIONS l ON d.LOCATION_ID=l.LOCATION_ID

WHERE e.DEPARTMENT_ID = 80;
```

3.

```
SELECT e.LAST_NAME, d.DEPARTMENT_NAME, d.LOCATION_ID, l.CITY

FROM EMPLOYEES e

JOIN DEPARTMENTS d ON e.DEPARTMENT_ID = d.DEPARTMENT_ID

JOIN LOCATIONS l ON d.LOCATION_ID = l.LOCATION_ID

WHERE e.COMMISSION_PCT IS NOT NULL;
```

4.

```
SELECT e.LAST_NAME, d.DEPARTMENT_NAME
FROM EMPLOYEES e
JOIN DEPARTMENTS d ON e.DEPARTMENT_ID = d.DEPARTMENT_ID
WHERE LOWER(e.LAST_NAME) LIKE '%a%';
```

5.

```
SELECT e.LAST_NAME, e.JOB_ID, e.DEPARTMENT_ID, d.DEPARTMENT_NAME
FROM EMPLOYEES e
JOIN DEPARTMENTS d ON e.DEPARTMENT_ID = d.DEPARTMENT_ID
JOIN LOCATIONS l ON d.LOCATION_ID = l.LOCATION_ID
WHERE l.CITY = 'Toronto';
```

6.

```
SELECT e.LAST_NAME AS "Employee", e.EMPLOYEE_ID AS "Emp#",
    m.LAST_NAME AS "Manager", m.EMPLOYEE_ID AS "Mgr#"
FROM EMPLOYEES e
JOIN EMPLOYEES m ON e.MANAGER_ID = m.EMPLOYEE_ID;
```

7.

```
SELECT e.LAST_NAME AS "Employee", e.EMPLOYEE_ID AS "Emp#",
    m.LAST_NAME AS "Manager", m.EMPLOYEE_ID AS "Mgr#"
FROM EMPLOYEES e
LEFT JOIN EMPLOYEES m ON e.MANAGER_ID = m.EMPLOYEE_ID
ORDER BY e.EMPLOYEE_ID;
```

8.

```
SELECT e1.LAST_NAME AS "Employee", e1.DEPARTMENT_ID, e2.LAST_NAME AS "Co-
Workers"
FROM EMPLOYEES e1
JOIN EMPLOYEES e2 ON e1.DEPARTMENT_ID = e2.DEPARTMENT_ID
WHERE e1.EMPLOYEE_ID = 106 AND e1.EMPLOYEE_ID <> e2.EMPLOYEE_ID;
```

9.

```
DESCRIBE JOB_GRADES;

SELECT e.LAST_NAME, e.JOB_ID, d.DEPARTMENT_NAME, e.SALARY, jg.GRADE_LEVEL
FROM EMPLOYEES e
JOIN DEPARTMENTS d ON e.DEPARTMENT_ID = d.DEPARTMENT_ID
JOIN JOB_GRADES jg ON e.SALARY BETWEEN jg.LOW_SALARY AND jg.HIGH_SALARY;
```

10.

```
SELECT e.LAST_NAME AS "Employee", e.HIRE_DATE AS "Hire Date"
FROM EMPLOYEES e
JOIN EMPLOYEES r ON r.LAST_NAME = 'Davies'
WHERE e.HIRE_DATE > r.HIRE_DATE;
```

11.

```
SELECT e.LAST_NAME AS "Employee", e.HIRE_DATE AS "Emp Hired",
    m.LAST_NAME AS "Manager", m.HIRE_DATE AS "Mgr Hired"
FROM EMPLOYEES e
JOIN EMPLOYEES m ON e.MANAGER_ID = m.EMPLOYEE_ID
WHERE e.HIRE_DATE < m.HIRE_DATE AND e.EMPLOYEE_ID <> m.EMPLOYEE_ID;
```

Ex. No.: 9

SUB QUERIES

Initial:

```
CREATE TABLE departments (
   department_id NUMBER PRIMARY KEY,
   department_name VARCHAR2(100),
   location_id NUMBER
);

CREATE TABLE employees (
   employee_id NUMBER PRIMARY KEY,
   last_name VARCHAR2(100),
   first_name VARCHAR2(100),
   hire_date DATE,
   salary NUMBER(10, 2),
   department_id NUMBER,
   job_id VARCHAR2(10),
   manager_id NUMBER,
   FOREIGN KEY (department_id) REFERENCES departments(department_id)
);

INSERT INTO departments VALUES (10, 'Executive', 1700);
INSERT INTO departments VALUES (20, 'HR', 1800);
INSERT INTO departments VALUES (30, 'IT', 1700);
INSERT INTO departments VALUES (40, 'Finance', 1600);

INSERT INTO employees
VALUES (1, 'King', 'John', TO_DATE('2000-01-01', 'YYYY-MM-DD'), 10000, 10, 'CEO',
NULL);
INSERT INTO employees
VALUES (2, 'Zlotkey', 'Jane', TO_DATE('2001-02-15', 'YYYY-MM-DD'), 8000, 10, 'VP', 1);
```

```
INSERT INTO employees
VALUES (3, 'Smith', 'Anna', TO_DATE('2005-03-10', 'YYYY-MM-DD'), 8500, 10,
'Manager', 1);
INSERT INTO employees
VALUES (4, 'Green', 'Tom', TO_DATE('2010-05-20', 'YYYY-MM-DD'), 4500, 20, 'HR Rep',
2);
INSERT INTO employees
VALUES (5, 'Brown', 'Lily', TO_DATE('2011-06-22', 'YYYY-MM-DD'), 4200, 20, 'HR Rep',
2);
INSERT INTO employees
VALUES (6, 'Turner', 'Michael', TO_DATE('2012-07-13', 'YYYY-MM-DD'), 5000, 30,
'Developer', 3);
INSERT INTO employees
VALUES (7, 'Miller', 'Sandra', TO_DATE('2014-08-25', 'YYYY-MM-DD'), 5500, 30,
'Developer', 3);
INSERT INTO employees
VALUES (8, 'Jones', 'Peter', TO_DATE('2018-09-15', 'YYYY-MM-DD'), 6000, 40,
'Accountant', 1);
INSERT INTO employees
VALUES (9, 'Austin', 'James', TO_DATE('2014-06-13', 'YYYY-MM-DD'), 7500, 30,
'Developer', 1);
```

1.

```
SELECT last_name, hire_date
FROM employees
WHERE department_id = (
   SELECT department_id FROM employees
   WHERE last_name = 'Zlotkey'
)
AND last_name != 'Zlotkey';
```

2.

```
SELECT employee_id, last_name, salary
FROM employees
WHERE salary > (
   SELECT AVG(salary) FROM employees
)
ORDER BY salary;
```

3.

```
SELECT employee_id, last_name
FROM employees
WHERE department_id IN (
   SELECT department_id FROM employees
   WHERE last_name LIKE '%u%'
);
```

4.

```
SELECT last_name, department_id, job_id
FROM employees
WHERE department_id IN (
   SELECT department_id FROM departments
   WHERE location_id=1700
);
```

5.

```
SELECT last_name, salary
FROM employees e
WHERE EXISTS(
   SELECT last_name FROM employees m
   WHERE e.manager_id = m.employee_id
   AND m.last_name='King'
);
```

6.

```
SELECT department_id, last_name, job_id
FROM employees
WHERE department_id = (
   SELECT department_id
   FROM departments
   WHERE department_name = 'Executive'
);
```

7.

```
SELECT e.employee_id, e.last_name, e.salary
FROM employees e
WHERE e.salary > (SELECT AVG(salary) FROM employees)
AND EXISTS (
   SELECT *
   FROM employees e2
   WHERE e.department_id = e2.department_id
   AND e2.last_name LIKE '%u%'
);
```

Ex. No.: 10

AGGREGATING DATA USING GROUP FUNCTIONS

Initial:

```
CREATE TABLE departments (
   department_id NUMBER PRIMARY KEY,
   department_name VARCHAR2(100),
   location_id NUMBER
);

CREATE TABLE employees (
   employee_id NUMBER PRIMARY KEY,
   last_name VARCHAR2(100),
   first_name VARCHAR2(100),
   hire_date DATE,
   salary NUMBER(10, 2),
   department_id NUMBER,
   job_id VARCHAR2(10),
   manager_id NUMBER,
   FOREIGN KEY (department_id) REFERENCES departments(department_id)
);

INSERT INTO departments VALUES (10, 'Executive', 1700);
INSERT INTO departments VALUES (20, 'HR', 1800);
INSERT INTO departments VALUES (30, 'IT', 1700);
INSERT INTO departments VALUES (40, 'Finance', 1600);

INSERT INTO employees
VALUES (1, 'King', 'John', TO_DATE('1998-01-01', 'YYYY-MM-DD'), 10000, 10, 'CEO',
NULL);
INSERT INTO employees
VALUES (2, 'Zlotkey', 'Jane', TO_DATE('1995-02-15', 'YYYY-MM-DD'), 8000, 10, 'VP', 1);
```

```
INSERT INTO employees

VALUES (3, 'Smith', 'Anna', TO_DATE('1996-03-10', 'YYYY-MM-DD'), 8500, 10,
'Manager', 1);

INSERT INTO employees

VALUES (4, 'Green', 'Tom', TO_DATE('1998-05-20', 'YYYY-MM-DD'), 7500, 20, 'HR Rep',
2);

INSERT INTO employees

VALUES (5, 'Brown', 'Lily', TO_DATE('1997-06-22', 'YYYY-MM-DD'), 7200, 20, 'HR Rep',
2);

INSERT INTO employees

VALUES (6, 'Turner', 'Michael', TO_DATE('1995-07-13', 'YYYY-MM-DD'), 5000, 30,
'Developer', 3);

INSERT INTO employees

VALUES (7, 'Miller', 'Sandra', TO_DATE('1992-08-25', 'YYYY-MM-DD'), 5500, 30,
'Developer', 3);

INSERT INTO employees

VALUES (8, 'Jones', 'Peter', TO_DATE('1997-09-15', 'YYYY-MM-DD'), 6500, 40,
'Accountant', 1);

INSERT INTO employees

VALUES (9, 'Austin', 'James', TO_DATE('1996-06-13', 'YYYY-MM-DD'), 7500, 30,
'Developer', 1);
```

1. TRUE
2. FALSE
3. TRUE

4.

```
SELECT

   ROUND(MAX(salary)) AS Maximum,

   ROUND(MIN(salary)) AS Minimum,

   ROUND(SUM(salary)) AS Sum,

   ROUND(AVG(salary)) AS Average

FROM employees;
```

5.

```
SELECT
   job_id,
   ROUND(MIN(salary)) AS Minimum,
   ROUND(MAX(salary)) AS Maximum,
   ROUND(SUM(salary)) AS Sum,
   ROUND(AVG(salary)) AS Average
FROM employees
GROUP BY job_id;
```

6.

```
SELECT
   job_id,
   COUNT(*) AS Number_of_People
FROM employees
WHERE job_id = 'Developer'
GROUP BY job_id;
```

7.

```
SELECT
   COUNT(DISTINCT manager_id) AS Number_of_Managers
FROM employees
WHERE manager_id IS NOT NULL;
```

8.

```
SELECT
   ROUND(MAX(salary) - MIN(salary)) AS DIFFERENCE
FROM employees;
```

9.

```
SELECT
   manager_id,
   MIN(salary) AS Lowest_Salary
FROM employees
WHERE manager_id IS NOT NULL
GROUP BY manager_id
HAVING MIN(salary) > 6000
ORDER BY Lowest_Salary DESC;
```

10.

```
SELECT
   COUNT(*) AS Total_Employees,
   SUM(CASE WHEN EXTRACT(YEAR FROM hire_date) = 1995 THEN 1 ELSE 0 END) AS Employees_1995,
   SUM(CASE WHEN EXTRACT(YEAR FROM hire_date) = 1996 THEN 1 ELSE 0 END) AS Employees_1996,
   SUM(CASE WHEN EXTRACT(YEAR FROM hire_date) = 1997 THEN 1 ELSE 0 END) AS Employees_1997,
   SUM(CASE WHEN EXTRACT(YEAR FROM hire_date) = 1998 THEN 1 ELSE 0 END) AS Employees_1998
FROM employees;
```

11.

```
SELECT
   job_id,
   department_id,
   SUM(salary) AS Total_Salary,
   AVG(salary) AS Average_Salary
FROM employees
WHERE department_id IN (20, 50, 80, 90)
GROUP BY job_id, department_id
ORDER BY department_id, job_id;
```

12.

```
SELECT
   d.department_name AS "Name-Location",
   d.location_id AS Location,
   COUNT(e.employee_id) AS "Number of People",
   ROUND(AVG(e.salary), 2) AS Salary
FROM departments d
LEFT JOIN employees e ON d.department_id = e.department_id
GROUP BY d.department_name, d.location_id;
```