Introduction to Oracle and SQL

Learning Objective

After completing this lab the student should be able to:

- What is Schemas?
- Understand and familiar with default schemas provided by oracle 11g.
- Understand of Sql statements.
- Apply DML statements in default schemas.
- Apply queries in schema.

Tools and Technologies

- Oracle Database 11g Express Edition /Enterprise Edition.

Oracle Credentials for Lab

Enter the Url in your browser **http:\\172.168.8.16:8080\apex**

Username **hr**

Password **hr**

Schemas

A schema is the set of metadata (data dictionary) used by the database, typically generated using DDL. A schema defines attributes of the database, such as tables, columns, and properties. A database schema is a description of the data in a database.

Most Oracle database installations traditionally come with a default schema called HR, Scott etc., after the installation process has set up the sample tables.

HR Schema

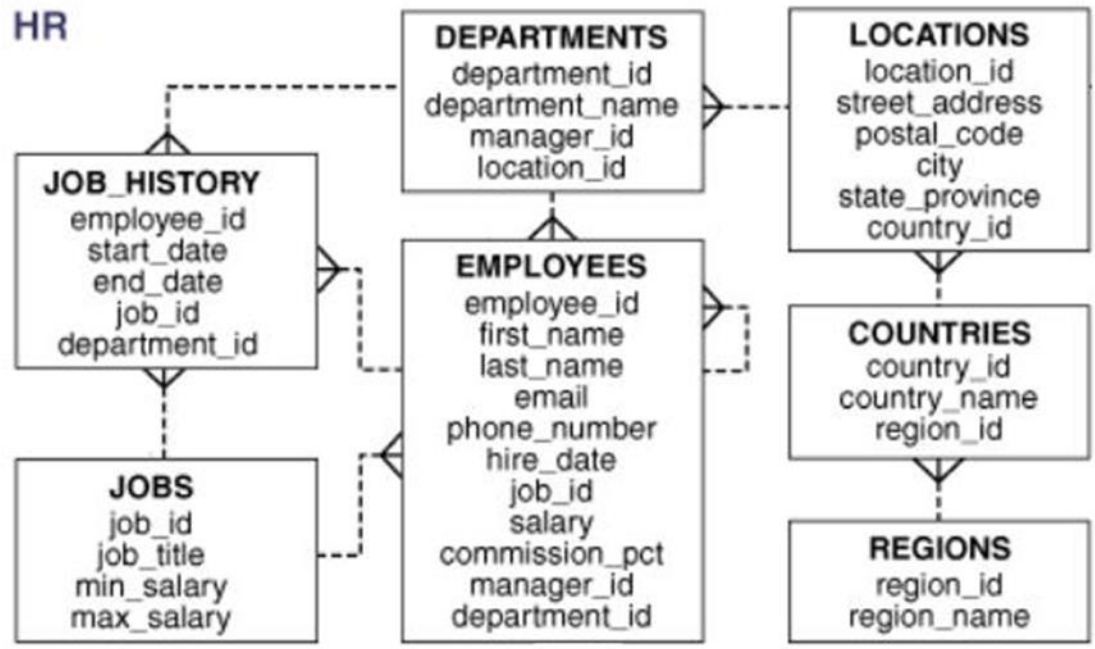
During the course/lab we would be using HR Schema. Its better to take an insight of HR Schema first. In the Human Resource (HR) records, each employee has an identification number, e-mail address, job identification code, salary, and manager. Some employees earn commissions in addition to their salary.

The company also tracks information about jobs within the organization. Each job has an identification code, job title, and a minimum and maximum salary range for the job.

Some employees have been with the company for a long time and have held different positions within the company. When an employee resigns, the duration the employee was working, the job identification number, and the department are recorded.

The sample company is regionally diverse, so it tracks the locations of its warehouses and departments. Each employee is assigned to a department, and each department is identified either by a unique department number or a short name. Each department is associated with one location, and each location has a full address that includes the street name, postal code, city, state or province, and the country code.

In places where the departments and warehouses are located, the company records details such as the country name, currency symbol, currency name, and the region where the country is located geographically.



HR Table Descriptions

Table **COUNTRIES**

Name	Null?	Type
COUNTRY_ID	NOT NULL	CHAR(2)
COUNTRY_NAME		VARCHAR2(40)
REGION_ID		NUMBER

Table **DEPARTMENTS**

Name	Null?	Type
DEPARTMENT_ID	NOT NULL	NUMBER(4)
DEPARTMENT_NAME	NOT NULL	VARCHAR2(30)
MANAGER_ID		NUMBER(6)
LOCATION_ID		NUMBER(4)

Table **EMPLOYEES**

Name	Null?	Type
EMPLOYEE_ID	NOT NULL	NUMBER(6)
FIRST_NAME		VARCHAR2(20)
LAST_NAME	NOT NULL	VARCHAR2(25)
EMAIL	NOT NULL	VARCHAR2(25)

```
 PHONE NUMBER                                          VARCHAR2(20)
 HIRE DATE                                             NOT NULL DATE
 JOB_ID                                                NOT NULL
VARCHAR2(10)
 SALARY                                                NUMBER(8,2)
 COMMISSION PCT                                        NUMBER(2,2)
 MANAGER_ID                                            NUMBER(6)
 DEPARTMENT_ID                                         NUMBER(4)
```

Table JOBS

```
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------
 JOB ID                                    NOT NULL VARCHAR2(10)
 JOB_TITLE                                 NOT NULL VARCHAR2(35)
 MIN SALARY                                         NUMBER(6)
 MAX SALARY                                         NUMBER(6)
```

Table JOB_HISTORY

```
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------
 EMPLOYEE ID                               NOT NULL NUMBER(6)
 START_DATE                                NOT NULL DATE
 END_DATE                                  NOT NULL DATE
 JOB_ID                                    NOT NULL VARCHAR2(10)
 DEPARTMENT_ID                                      NUMBER(4)
```

Table LOCATIONS

```
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------
 LOCATION_ID                               NOT NULL NUMBER(4)
 STREET_ADDRESS                                     VARCHAR2(40)
 POSTAL_CODE                                        VARCHAR2(12)
 CITY                                      NOT NULL VARCHAR2(30)
 STATE_PROVINCE                                     VARCHAR2(25)
 COUNTRY_ID                                         CHAR(2)
```

Table REGIONS

```
 Name                                      Null?    Type
 ----------------------------------------- -------- ---------------
 REGION_ID                                 NOT NULL NUMBER
 REGION_NAME                                        VARCHAR2(25)
```

Write SQL statements are not case sensitive.

- SQL statements can be on one or more lines.
- Keywords cannot be abbreviated or split across lines.
- Clauses are usually placed on separate lines.
- Tabs and indents are used to enhance readability Basic SQL Statements.

Executing SQL Statements

- Place a semicolon (;) at the end of the last clause.
- Place a slash on the last line in the buffer.
- Place a slash at the SQL prompt.

Tables/Views with in a schema

To view all tables and views with in a schema.

SELECT * FROM tab

Selecting all Columns

You can display all columns of data in a table by following the SELECT keyword with an asterisk (*).

SELECT * FROM employees;
Or
SELECT * FROM
departments;

Selecting specific Columns

You can use the SELECT statement to display specific columns of the table by specifying the column names, separated by commas.

e.g

SELECT department_id, department_name
FROM departments;

Arithmetic expressions

- You may need to modify the way in which data is displayed, perform calculation, or look at what-if scenarios. This is possible using arithmetic expressions. An arithmetic expression may contain column names, constant numeric values, and the arithmetic operators.
- List of arithmetic operators available in SQL are + Add, - Subtract, * Multiply, / Divide
- You can use arithmetic operators in any clause of a SQL statement except the FROM clause.
- If an arithmetic expression contains more than one operator then multiplication and division are evaluated first.
- If operators within an expression are of same priority, then evaluation is done from left to right.
- You can use parentheses to force the expression within parentheses to be evaluated first.

Example

SELECT Employee_ID, First_Name, Salary, 12*Salary+100 from employees;
will give different result from

SELECT **Employee_ID, First_Name, Salary, 12*(Salary+100) from employees;**

Null value

If a row lacks the data value for a particular column, that value is said to be null, or to contain null. A null value is a value that is unavailable, unassigned. unknown, or inapplicable. A null value is not the same as zero or a space. Zero is a number and space is a character.

If any column value is an arithmetic expression is null, the result is null. For e.g, if you attempt to perform division with zero, you get an error. However if you divide a number by null, the result is a null or unknown.

Column alias

Specify the alias after the column in the SELECT list using space as a separator. By default alias heading appear in uppercase. If the alias contains spaces, special character (such as # or $), or is case sensitive, enclose the alias in double quotation marks (“ “).

Example

SELECT first_name AS Name from employees;
SELECT first_name “Name”, salary*12 “Annual Salary” from employees;

Eliminating duplicate rows

To eliminate duplicate rows in the result, include the DISTINCT keyword in the SELECT clause immediately after the SELECT keyword.
Example

Display the all unique department number from employees table
SELECT DISTINCT department_id from employees;

Displaying table structure

In SQL* Plus you can display the structure of a table using the DESCRIBE command.

DESCRIBE employees;

Limiting rows selected

You can restrict the rows returned from the query by using the **WHERE clause**.A WHERE clause contains a condition that must be met and it directly follows the FORM clause.

The WHERE clause can compare values in columns, literal values, arithmetic expressions or functions. The WHERE clause consists of three elements: Column name, Comparison operator, Column name, constant or list of values

Display the first name, job title, department number for those employees whose job tile is 'AD_PRES'

Example

```
SELECT first_name, job_id, department_id
FROM employees
WHERE job_id='AD_PRES';
```

Character strings and dates in the WHERE clause must be enclosed in single quotation marks (' ') Number constants however should not. All character searches are case sensitive.
The default date display is DD-MON-YY.

Comparison operators

Comparison operators are used in conditions that compare one expression to another.

The operators are

- = Equal to
- >Greater than
- >= Greater than or equal to
- < Less than
- <= Less than or equal to
- < > Not equal to

They are used in the WHERE clause in following format.

Syntax

WHERE expr operator value

Write a query to display the first name, salary for those employees whose salary is less than 10000.

Example

```
SELECT first_name, salary from employees where salary<=10000;
```

Other comparison operators

- BETWEEN …AND…. Between two values (inclusive)
- IN (list) Match any of a list of values
- LIKE Match a character pattern
- IS NULL Is a null value

You can display rows based on a range of values using the BETWEEN operator. The range that you specify contains a lower range and an upper range.
Example

```
SELECT first_name, salary from
employees
where salary between 1000 and
1500;
```

To test for values in a specified list use the IN.

Example

Create a report to display the employee number, first name, salary and manager for the employees with the manager number in 100,102 and 103.

```
SELECT employee_id,first_name, salary,manager_id from
employees where manager_id in (100,102,103);
```

You can select rows that match a character pattern by using the LIKE operator. The character pattern-matching operation is referred to as wild card search. Two symbols can be used to construct the search string.

- % Represents any sequence of zero or more character.
- Represents any single character.

Example

SELECT first_name from employees where first_name like 'S%';
SELECT first_name from employees where first_name like '_A%';

Null operator

The IS NULL operator tests for values that are null. A null value means the value is unavailable, unassigned, unknown or inapplicable. Therefore you cannot test with (=) because a null value cannot be equal or unequal to any value.

Example

SELECT first_name,manager_id from employees where manager_id is null;

Lab Exercise

Q1 You are required to read the lab manual and implement all the queries mentioned in the manual. (5 marks)

Q2 Display all records whose first name contains ‘a’; (2 marks)

Q3 Write a query to display employee number, salary and manager number of those employees Whose salary range 2000 to 8000 (3 marks)

Q4 Show all employee record whose salary in less than 5000. (2 marks)

Q5 Display job number, employee id and salary of those employee whose salary is 2000, 5000 and 8000 (3 marks).

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