# Autonomous University of Zacatecas

Academic Unit of Electrical Engineering

Software Engineering Academic Program

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# Practice Number: 07

# Practice Name: Data retrieval using the SQL SELECT statement

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# Data retrieval using the SQL SELECT statement

September 29th, 2022

## 1 Introduction

The DML (Data Modification Language) is one of the fundamental parts of the SQL language. It is formed by the instructions capable of modifying (add, change or delete) the data of the tables.

The set of DML statements that are executed consecutively is called a transaction. The interesting thing about transactions is that we can cancel them, since they form a logical unit of work that until they are accepted, their results will not be final.

In all DML statements, the only data returned by the system is the number of rows that have been modified by executing the statement.

The elements used to manipulate the data are the following:

**-SELECT**, this statement is used to query the data.
**-INSERT**, with this instruction we can insert the values in a database.
**-UPDATE**, used to modify the values of one or more records.
**-DELETE** is used to remove rows from a table.

**Data queries with SQL (DQL):**

DQL is short for SQL Data Query Language. The only command that belongs to this language is the versatile SELECT command. This command fundamentally allows:

**1-** Get data from certain columns of a table (projection).

**2-** Get records (rows) from a table according to certain criteria (selection).

**3-** Mix data from different tables (association, join).

**4-** Perform calculations on the data group data.

## 2 Practice objective

Use SQL SELECT statements for retrieving data from database by means of different contexts.

## 3 Developing

**Activity 1:** Read all the choices carefully because there might be more than one correct answer. Choose all the correct answers for each question.

**Explain the reason for your answer.**

**LIST THE CAPABILITIES OF SQL SELECT STATEMENTS.**

**1. Which query creates a projection of the DEPARTMENT_NAME and LOCATION_ID columns from the DEPARTMENTS table? (Choose the best answer.)**

**R** = D) SELECT DEPARTMENT_NAME, LOCATION_ID FROM DEPARTMENTS;

**Explanation:** This is because a projection is the ability to specify which columns are going to be shown in the header of our query.

**2. After describing the EMPLOYEES table, you discover that the SALARY column**

**has a data type of NUMBER(8,2). Which SALARY value(s) will not be permitted in this column?**

**R** = A) SALARY=12345678 and C) SALARY=12345.678.

**Explanation:** This is because the number must contain 6 whole digits and a maximum of two decimal digits example: 123456.90.
A is not allowed because it contains eight whole number digits, but the data type is constrained to store six whole number digits and two fractional digits. C is not allowed since it has three fractional digits and the data type allows a maximum of two fractional digits.

**3. Afnter describing the JOB_HISTORY table, you discover that the START_DATE and END_DATE columns have a data type of DATE. Consider the expression END_DATE-START_DATE. (Choose two correct statements.)**

**R** = E) A value of type NUMBER is returned.
D) The expression is invalid since arithmetic cannot be performed on columns with DATE data types.

**Explanation:** The result of arithmetic between two date values represents a certain number of days.

**4. The DEPARTMENTS table contains a DEPARTMENT_NAME column with data type VARCHAR2(30). (Choose two true statements about this column.)**

**R** = A) This column can store character data up to a maximum of 30 characters.
B) This column can store data in a column with data type VARCHAR2(50) provided that the contents are at most 30 characters long.

**Explanation:** The scale of the VARCHAR2 data type, specified in brackets, determines its maximum capacity for storing character data as mentioned by A. If a data value that is at most 30 characters long is stored in any data type, it can also be stored in this column as stated by D.

**EXECUTE A BASIC SELECT STATEMENT.**

**5. Which statement reports on unique JOB_ID values from the EMPLOYEES table? (Choose all that apply.)**

**R** = B) SELECT DISTINCT JOB_ID FROM EMPLOYEES;

**Explanation:** Unique JOB_ID values are projected from the EMPLOYEES table by applying the DISTINCT keyword to just the JOB_ID column.

**6. Choose the two illegal statements. The two correct statements produce identical results. The two illegal statements will cause an error to be raised:**

**R** = B and D.

**Explanation:** B and D represent the two illegal statements that will return syntax errors if they are executed. This is a tricky question because it asks for the illegal statements and not the legal statements. B is illegal because it is missing a single quote enclosing the character literal "represents the." D is illegal because it does not make use of single quotes to enclose its character literals.

**7. Which expressions do not return NULL values? (Choose all that apply.)**

**R** = B and D.

**Explanation:** B and D do not return null values since character expressions are not affected in the same way by null values as arithmetic expressions. B and D ignore the presence of null values in their expressions and return the remaining character literals.

**8. Choose the correct syntax to return all columns and rows of data from the EMPLOYEES table.**

**R** = A) select * from employees;

**Explanation:** An asterisk is the SQL operator that implies that all columns must be selected from a table.

**9. The following character literal expression is selected from the DUAL table: SELECT 'Coda''s favorite fetch toy is his orange ring' FROM DUAL; (Choose the result that is returned.)**

**R** = D) Coda's favorite fetch toy is his orange ring.

**Explanation:** The key to identifying the correct result lies in understanding the role of the single quotation marks. The entire literal is enclosed by a pair of quotes to avoid the generation of an error. The two adjacent quotes are necessary to delimit the single quote that appears in literal D.

**10. There are four rows of data in the REGIONS table. Consider the following SQL statement:**
***SELECT '6 * 6' "Area" FROM REGIONS;***
**How many rows of results are returned and what value is returned by the Area column? (Choose the best answer.**

**R** = A) 4 rows returned, Area column contains value 6 * 6 for all 4 rows.

**Explanation:** The literal expression '6 * 6' is selected once for each row of data in the REGIONS table.

**Activity 2:** Propose an answer to the following issues:

**a)** You want to construct and execute queries against tables stored in an Oracle database. Are you confined to using SQL Developer?

**R** = SQL Plus could not be used as the command line interface for the Oracle relational database. This allows you to interact with the database by using a text-based interface. SQL Plus is accessed through a DOS command window in the Windows operating system. The DOS command window is the Windows-based text interface. This interface offers the user the option of using DOS commands on modern Windows systems. Commands are typed on the computer keyboard.

**b)** To explore your database environment further, you would like a list of tables, owned by your current schema, available for you to query. How do you interrogate the database dictionary to provide this metadata?.

**R** = With the Oracle Database, you can perform a search query against the Oracle database using Oracle search expressions that support the LIKE operator. For example, adapter clients can use a search expression such as 'EMP%' to get tables from EMP. The adapter converts this to the following SQL query:

SELECT TABLE_NAME FROM ALL_TABLES WHERE TABLE_NAME LIKE 'EMP%' AND OWNER = 'SCOTT';

Where SCOTT is the schema with a collection of Oracle database artifacts.

**c)** When querying the JOBS table for every row containing just the JOB_ID and MAX_SALARY columns, is a projection, selection, or join being performed?

**R** = A selection is being made as a query is made for the tuples that satisfy a condition.

**d)** An alias provides a mechanism to rename a column or an expression. Under what conditions should you enclose an alias in double quotes?.

**1-** If the alias has more than on word.

**2-** If you want the alias to be case sensitive.

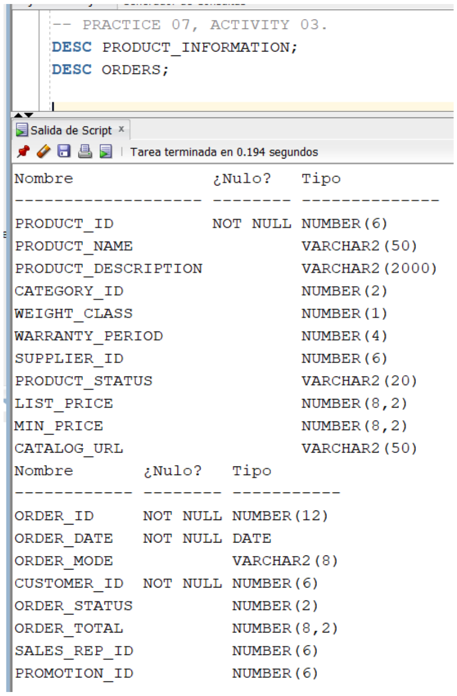
**3-** If the alias has special characters.

**e)** When working with character literal values that include single quotation marks, how should you specify these literals in the SELECT clause without raising an error?.

**R** = In this case the (q) operator should be used.

## Activity 3: Connect to the OE schema and complete the following tasks.

**1. Obtain structural information for the PRODUCT_INFORMATION and ORDERS tables, see figure 1.**



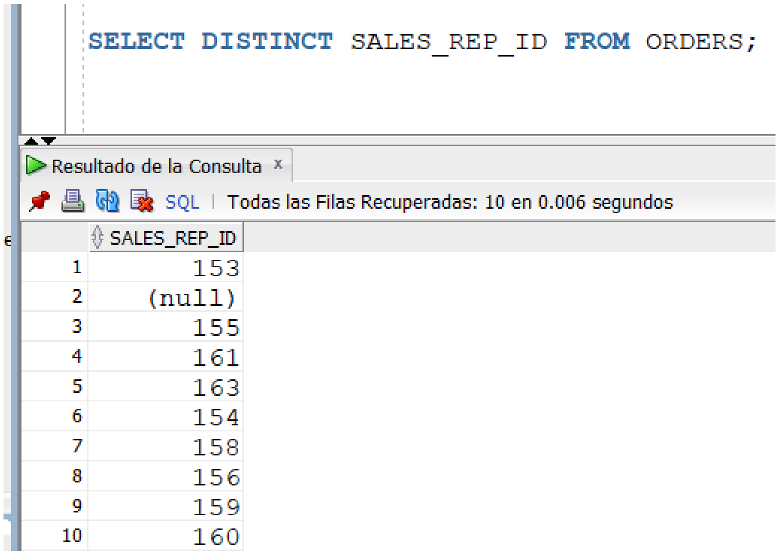
```
-- PRACTICE 07, ACTIVITY 03.
DESC PRODUCT_INFORMATION;
DESC ORDERS;
```

Tarea terminada en 0.194 segundos

```
Nombre                 ¿Nulo?   Tipo
-------------------- -------- --------------
PRODUCT_ID           NOT NULL NUMBER(6)
PRODUCT_NAME                  VARCHAR2(50)
PRODUCT_DESCRIPTION           VARCHAR2(2000)
CATEGORY_ID                   NUMBER(2)
WEIGHT_CLASS                  NUMBER(1)
WARRANTY_PERIOD               NUMBER(4)
SUPPLIER_ID                   NUMBER(6)
PRODUCT_STATUS                VARCHAR2(20)
LIST_PRICE                    NUMBER(8,2)
MIN_PRICE                     NUMBER(8,2)
CATALOG_URL                   VARCHAR2(50)
Nombre       ¿Nulo?   Tipo
------------ -------- -----------
ORDER_ID     NOT NULL NUMBER(12)
ORDER_DATE   NOT NULL DATE
ORDER_MODE            VARCHAR2(8)
CUSTOMER_ID  NOT NULL NUMBER(6)
ORDER_STATUS          NUMBER(2)
ORDER_TOTAL           NUMBER(8,2)
SALES_REP_ID          NUMBER(6)
PROMOTION_ID          NUMBER(6)
```

Figure 1: *Description of the structure of the PRODUCT_INFORMATION and ORDERS tables.*

**2. Select the unique SALES_REP_ID values from the ORDERS table. How many different sales representatives have been assigned to orders in the ORDERS table?, see figure 2.**



```
SELECT DISTINCT SALES_REP_ID FROM ORDERS;
```

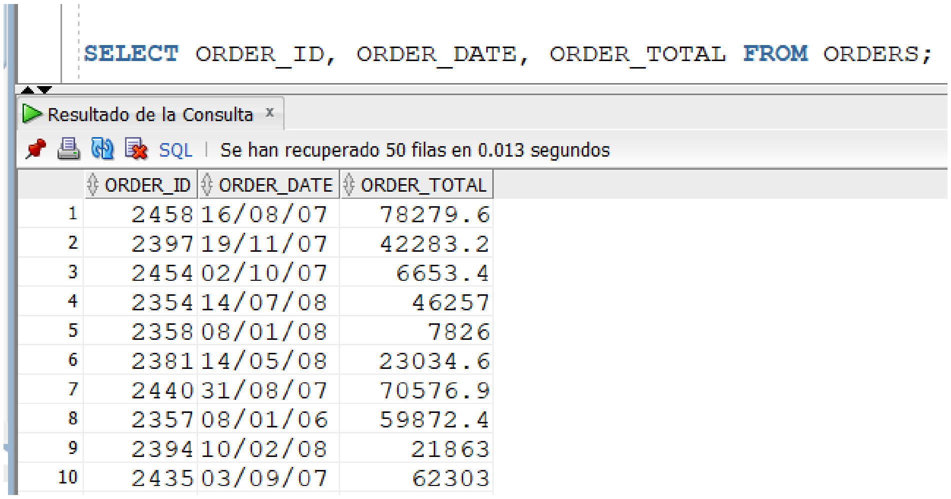
Resultado de la Consulta

SQL | Todas las Filas Recuperadas: 10 en 0.006 segundos

```
     SALES_REP_ID
 1            153
 2         (null)
 3            155
 4            161
 5            163
 6            154
 7            158
 8            156
 9            159
10            160
```

Figure 2: *unique values of SALES_REP_ID from the ORDERS table.*

**3. Create a results set based on the ORDERS table that includes the ORDER_ID, ORDER_DATE, and ORDER_TOTAL columns. Notice how the ORDER_DATE output is formatted differently from the START_DATE and END_DATE columns in the HR.JOB_ID table, see figure 3 and 4.**

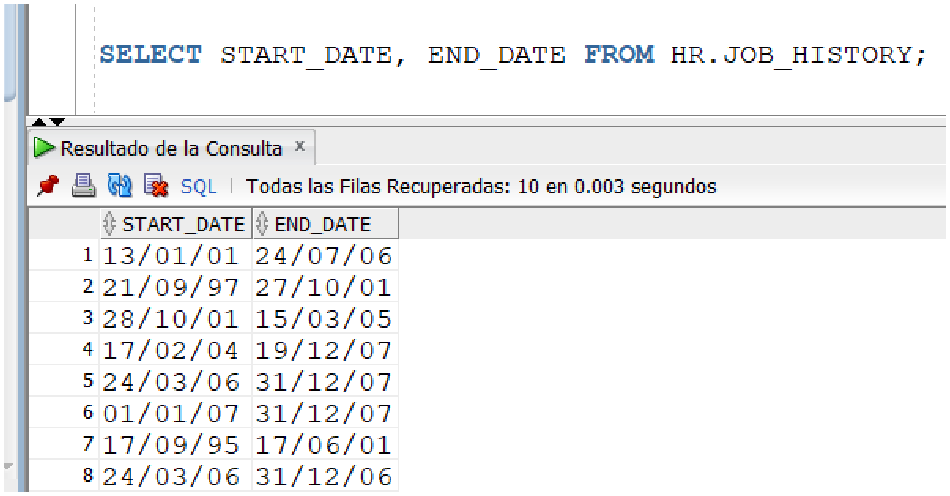


```sql
SELECT ORDER_ID, ORDER_DATE, ORDER_TOTAL FROM ORDERS;
```

Se han recuperado 50 filas en 0.013 segundos

| | ORDER_ID | ORDER_DATE | ORDER_TOTAL |
|---|---|---|---|
| 1 | 2458 | 16/08/07 | 78279.6 |
| 2 | 2397 | 19/11/07 | 42283.2 |
| 3 | 2454 | 02/10/07 | 6653.4 |
| 4 | 2354 | 14/07/08 | 46257 |
| 5 | 2358 | 08/01/08 | 7826 |
| 6 | 2381 | 14/05/08 | 23034.6 |
| 7 | 2440 | 31/08/07 | 70576.9 |
| 8 | 2357 | 08/01/06 | 59872.4 |
| 9 | 2394 | 10/02/08 | 21863 |
| 10 | 2435 | 03/09/07 | 62303 |

Figure 3: *Data query.*



```sql
SELECT START_DATE, END_DATE FROM HR.JOB_HISTORY;
```

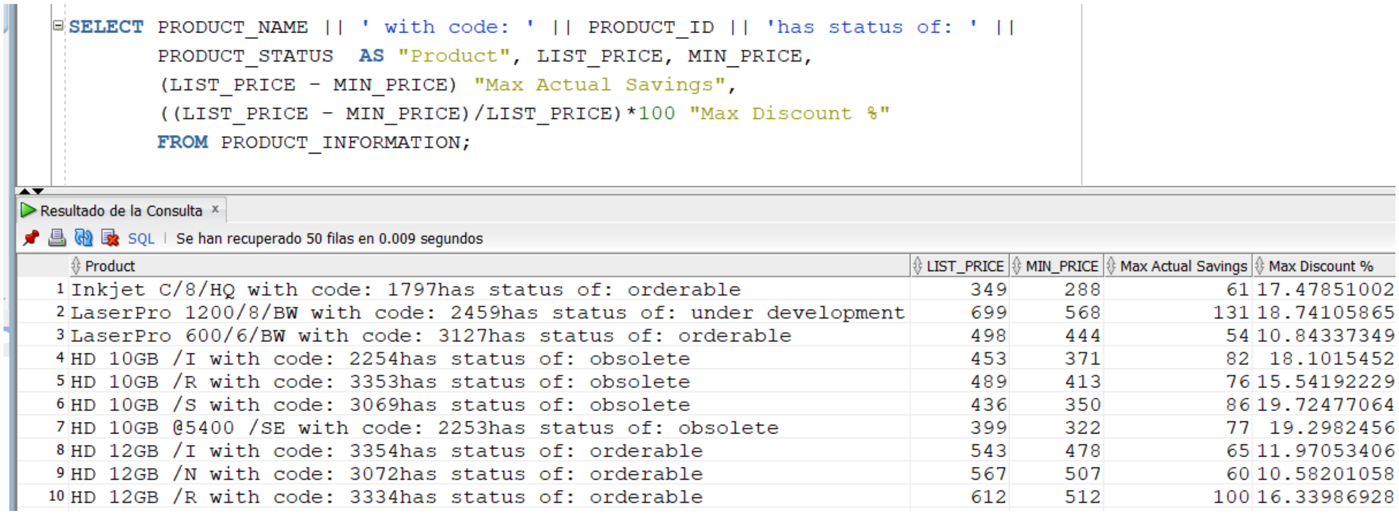
Todas las Filas Recuperadas: 10 en 0.003 segundos

| | START_DATE | END_DATE |
|---|---|---|
| 1 | 13/01/01 | 24/07/06 |
| 2 | 21/09/97 | 27/10/01 |
| 3 | 28/10/01 | 15/03/05 |
| 4 | 17/02/04 | 19/12/07 |
| 5 | 24/03/06 | 31/12/07 |
| 6 | 01/01/07 | 31/12/07 |
| 7 | 17/09/95 | 17/06/01 |
| 8 | 24/03/06 | 31/12/06 |

Figure 4: *Data query.*

**4. The PRODUCT_INFORMATION table stores data regarding the products available for sale in a fictitious IT hardware store. Produce a set of results that will be useful for a sales person. Extract product information in the format PRODUCT_NAME with code: PRODUCT_ID has status of: PRODUCT_STATUS. Alias the expression as "Product." The results should provide the LIST_PRICE, the MIN_PRICE, the difference between LIST_PRICE, and MIN_PRICE aliased as "Max Actual Savings," along with an addi-**

**tional expression that takes the difference between LIST_PRICE and MIN_PRICE and divides it by the LIST_PRICE and then multiplies the total by 100. This last expression should be aliased as "Max Discount %", see figure 5.**



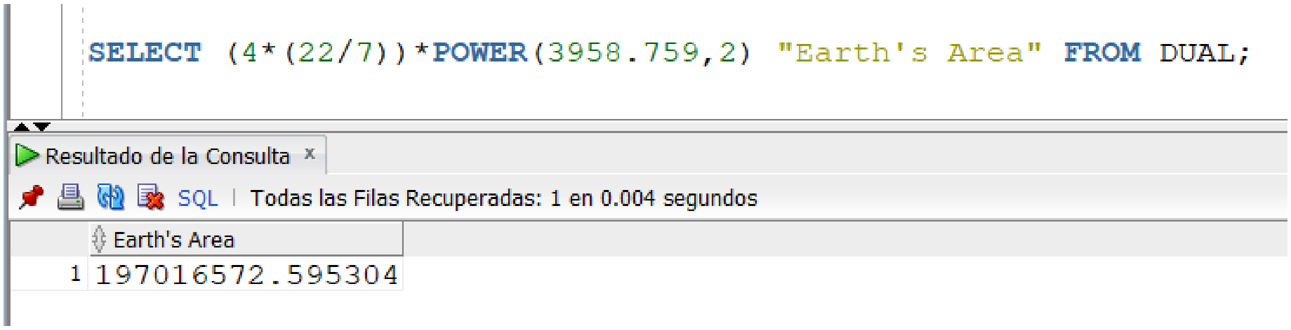
```sql
SELECT PRODUCT_NAME || ' with code: ' || PRODUCT_ID || 'has status of: ' ||
       PRODUCT_STATUS  AS "Product", LIST_PRICE, MIN_PRICE,
       (LIST_PRICE - MIN_PRICE) "Max Actual Savings",
       ((LIST_PRICE - MIN_PRICE)/LIST_PRICE)*100 "Max Discount %"
       FROM PRODUCT_INFORMATION;
```

Se han recuperado 50 filas en 0.009 segundos

| | Product | LIST_PRICE | MIN_PRICE | Max Actual Savings | Max Discount % |
|---|---|---|---|---|---|
| 1 | Inkjet C/8/HQ with code: 1797has status of: orderable | 349 | 288 | 61 | 17.47851002 |
| 2 | LaserPro 1200/8/BW with code: 2459has status of: under development | 699 | 568 | 131 | 18.74105865 |
| 3 | LaserPro 600/6/BW with code: 3127has status of: orderable | 498 | 444 | 54 | 10.84337349 |
| 4 | HD 10GB /I with code: 2254has status of: obsolete | 453 | 371 | 82 | 18.1015452 |
| 5 | HD 10GB /R with code: 3353has status of: obsolete | 489 | 413 | 76 | 15.54192229 |
| 6 | HD 10GB /S with code: 3069has status of: obsolete | 436 | 350 | 86 | 19.72477064 |
| 7 | HD 10GB @5400 /SE with code: 2253has status of: obsolete | 399 | 322 | 77 | 19.2982456 |
| 8 | HD 12GB /I with code: 3354has status of: orderable | 543 | 478 | 65 | 11.97053406 |
| 9 | HD 12GB /N with code: 3072has status of: orderable | 567 | 507 | 60 | 10.58201058 |
| 10 | HD 12GB /R with code: 3334has status of: orderable | 612 | 512 | 100 | 16.33986928 |

Figure 5: *Data query with literal values.*

**5. Calculate the surface area of the Earth using the DUAL table. Alias this expression as "Earth's Area." The formula for calculating the area of a sphere is: 4*PI*r2. Assume, for this example, that the earth is a simple sphere with a radius of 3,958.759 miles and that PI is 22/7. This calculation approximates that planet Earth's surface area is 197016572.595304 square miles, see figure 6.**



```
SELECT (4*(22/7))*POWER(3958.759,2) "Earth's Area" FROM DUAL;
```

```
  Earth's Area
1 197016572.595304
```

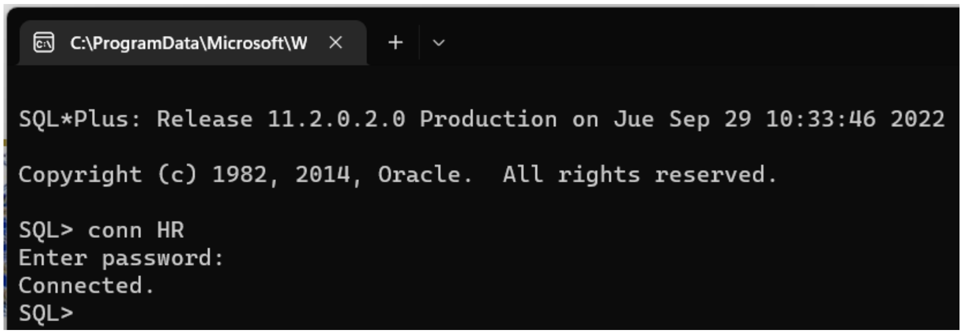
Figure 6: *Calculating the area of the earth, arithmetic expressions.*

**Activity 4:** In this step-by-step activity a connection is made using SQL Developer as the HR user. Use expressions and operators to answer three questions related to the SELECT statement:

**Using Select Statement.**

**Question 1:** How many unique departments have employees currently working in them?.

**1.** Start SQL*Plus and connect to the HR schema, see **figure 7**.



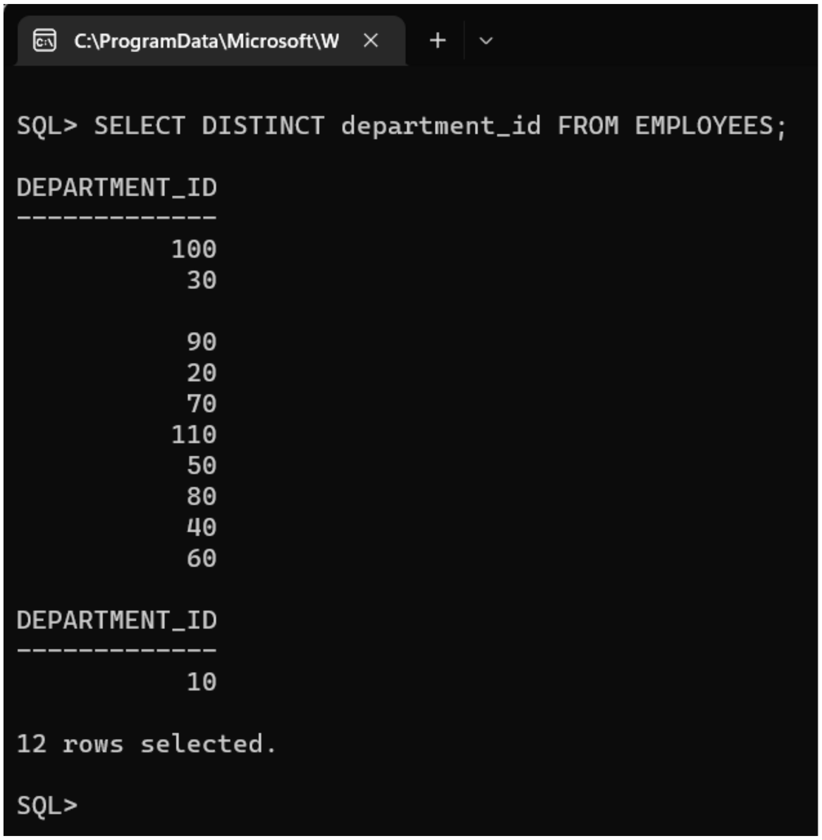
```
SQL*Plus: Release 11.2.0.2.0 Production on Jue Sep 29 10:33:46 2022

Copyright (c) 1982, 2014, Oracle.  All rights reserved.

SQL> conn HR
Enter password:
Connected.
SQL>
```

Figure 7: *Connection to HR schema from SQL*Plus.*

**2.** You may initially be tempted to find the answer in the DEPARTMENTS table. A careful examination reveals that the question asks for information about employees. This information is contained in the EMPLOYEES table.

**3.** The word "unique" should guide you to use the DISTINCT keyword.

**4.** Combining steps 2 and 3, you can construct the following SQL statement: see **figure 8**.



```
SQL> SELECT DISTINCT department_id FROM EMPLOYEES;

DEPARTMENT_ID
-------------
          100
           30

           90
           20
           70
          110
           50
           80
           40
           60

DEPARTMENT_ID
-------------
           10

12 rows selected.

SQL>
```

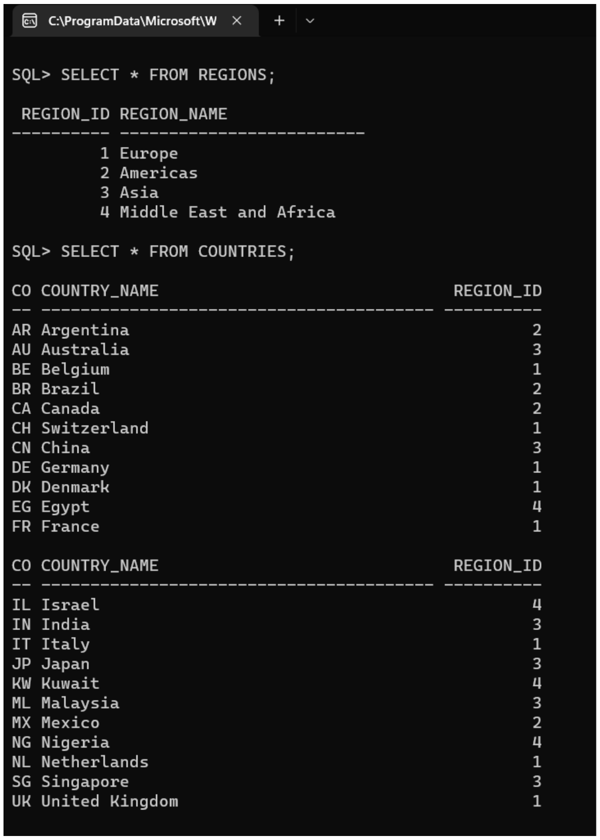
Figure 8: *Data query, EMPLOYEES table.*

**5.** As shown in **Figure 8**, the query returns 12 rows. Note that the third the row is empty. This is a null value in the DEPARTMENT_ID column.

**6.** The answer to the first question is therefore: Eleven unique departments have employees working in them, but at least one employee has not been assigned to a department.

**Question 2:** : How many countries are there in the Europe region?

**1.** This question comprises two parts. Consider the REGIONS table, which contains four regions each uniquely identified by a REGION_ID value, and the COUNTRIES table, which has a REGION_ID column indicating which region a country belongs to, see **figure 9**.



```
SQL> SELECT * FROM REGIONS;

 REGION_ID REGION_NAME
---------- -------------------------
         1 Europe
         2 Americas
         3 Asia
         4 Middle East and Africa

SQL> SELECT * FROM COUNTRIES;

CO COUNTRY_NAME                              REGION_ID
-- ---------------------------------------- ----------
AR Argentina                                         2
AU Australia                                         3
BE Belgium                                           1
BR Brazil                                            2
CA Canada                                            2
CH Switzerland                                       1
CN China                                             3
DE Germany                                           1
DK Denmark                                           1
EG Egypt                                             4
FR France                                            1

CO COUNTRY_NAME                              REGION_ID
-- ---------------------------------------- ----------
IL Israel                                            4
IN India                                             3
IT Italy                                             1
JP Japan                                             3
KW Kuwait                                            4
ML Malaysia                                          3
MX Mexico                                            2
NG Nigeria                                           4
NL Netherlands                                       1
SG Singapore                                         3
UK United Kingdom                                    1
```

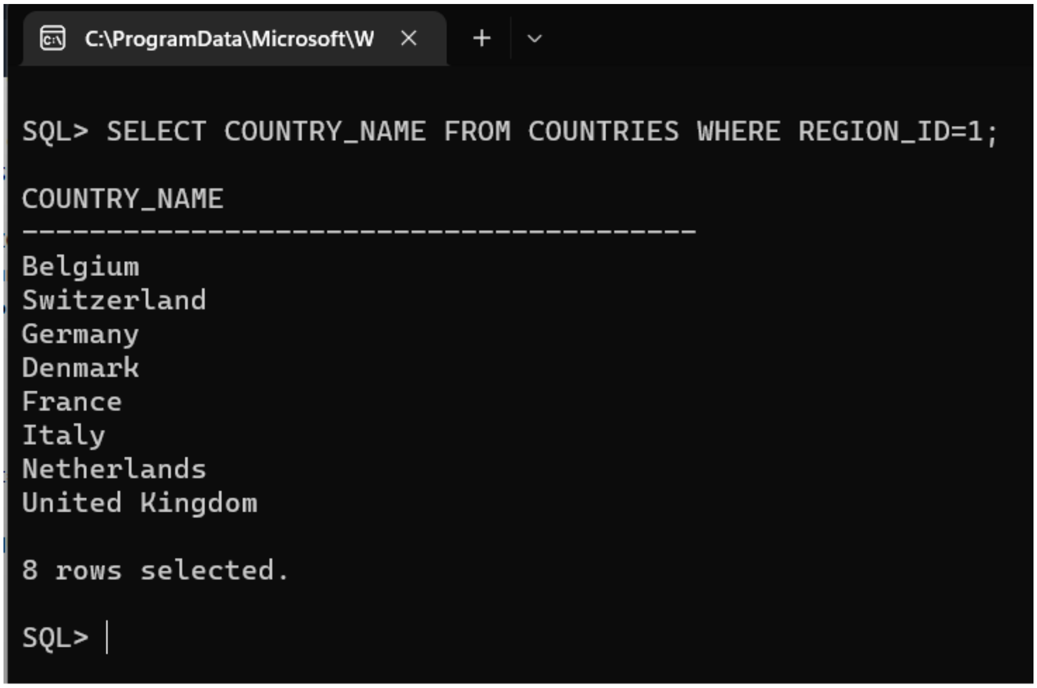
Figure 9: *Data query table REGIONS and COUNTRIES.*

**2.** The first query needs to identify the REGION_ID of the Europe region. This is accomplished by the SQL statement:

***SELECT COUNTRY_NAME FROM COUNTRIES WHERE REGION_ID=1;***

**3.** The following illustration shows that the Europe region has a REGION_ID value of 1, see **figure 10**.

**4.** To identify which countries have 1 as their REGION_ID, you need to execute the following SQL query, see **figure 10**.



```
SQL> SELECT COUNTRY_NAME FROM COUNTRIES WHERE REGION_ID=1;

COUNTRY_NAME
----------------------------------------
Belgium
Switzerland
Germany
Denmark
France
Italy
Netherlands
United Kingdom

8 rows selected.

SQL>
```

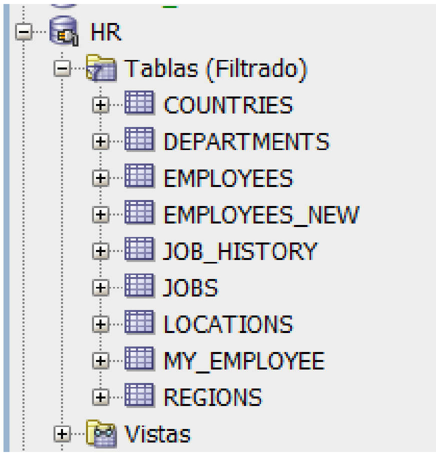
Figure 10: *Data query table COUNTRIES.*

**5.** Manually counting the country rows with a REGION_ID of 1 in the following illustration helps answer the second question.

**6.** The answer to the second question is therefore: There are eight countries in the Europe region as far as the HR data model is concerned.

**Question3:** The HR schema contains seven tables representing a data model of a fictitious Human Resources department. The EMPLOYEES table, which stores details of the staff, and the DEPARTMENTS table, which contains the details of the departments in the organization, have been described. In this step-by-step exercise, a connection is made using SQL Developer as the HR user and the remaining five sample tables are described. They are the JOBS table, which keeps track of the different job types available in the organization, and the JOB_HISTORY table, which keeps track of the job details of employees who changed jobs but remained in the organization. To understand the data model further, the LOCATIONS, COUNTRIES, and REGIONS tables, which keep track of the geographical information pertaining to departments in the organization, will be described.

**1.** Launch SQL Developer and choose New from the File menu. Choose Database Connection. If this is the first time you are connecting to the database from SQL Developer, you are required to create a connection. Provide a descriptive connection name and input HR as the username. The remaining connection details should be obtained from your database administrator. Once the connection is saved, choose the Connect button.



HR
Tablas (Filtrado)
COUNTRIES
DEPARTMENTS
EMPLOYEES
EMPLOYEES_NEW
JOB_HISTORY
JOBS
LOCATIONS
MY_EMPLOYEE
REGIONS
Vistas

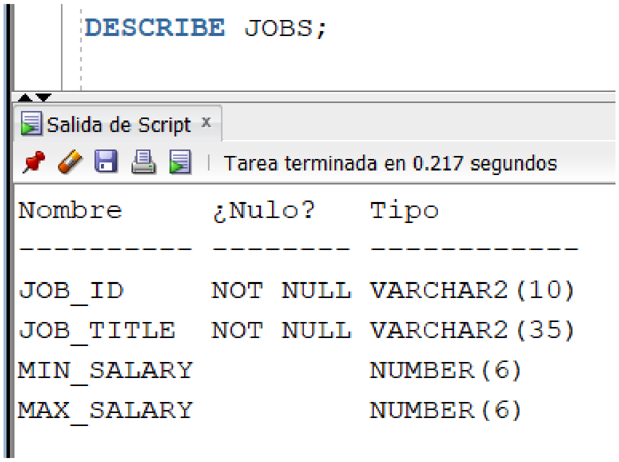
Figure 11: *HR Scheme.*

**2.** Navigate to the SQL Editor, which is the section titled Enter SQL Statement.

**3.** Type in the command: DESCRIBE JOBS. Terminating this command with a semicolon is optional.

**4.** Execute the DESCRIBE command, either by pressing the F5 key or by clicking the solid green triangular arrow icon located on the toolbar above the SQL Editor.

**5.** The JOBS table description appears in the Results frame as shown in the following illustration, see **figure 12**.



```
DESCRIBE JOBS;
```

Tarea terminada en 0.217 segundos

```
Nombre      ¿Nulo?   Tipo
----------- -------- ------------
JOB_ID      NOT NULL VARCHAR2(10)
JOB_TITLE   NOT NULL VARCHAR2(35)
MIN_SALARY           NUMBER(6)
MAX_SALARY           NUMBER(6)
```

Figure 12: *Structure description, JOBS table.*

**6.** Steps 3 to 5 can be repeated to describe the remaining JOB_HISTORY, LOCATIONS, COUNTRIES, and REGIONS tables.

**7.** SQL Developer provides an alternative to the DESCRIBE command when it comes to obtaining the structural information of tables.

**8.** Navigate to the LOCATIONS table using the Tree navigator located on the left frame underneath the connection name, see **figure 13**.

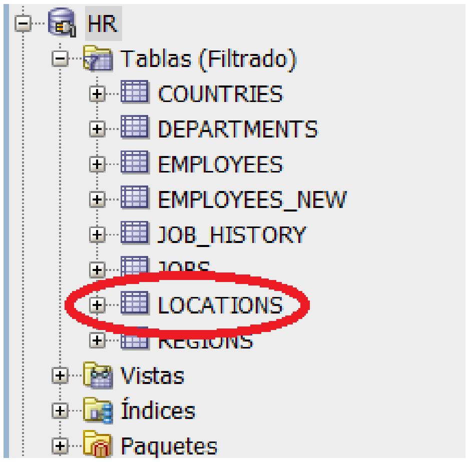
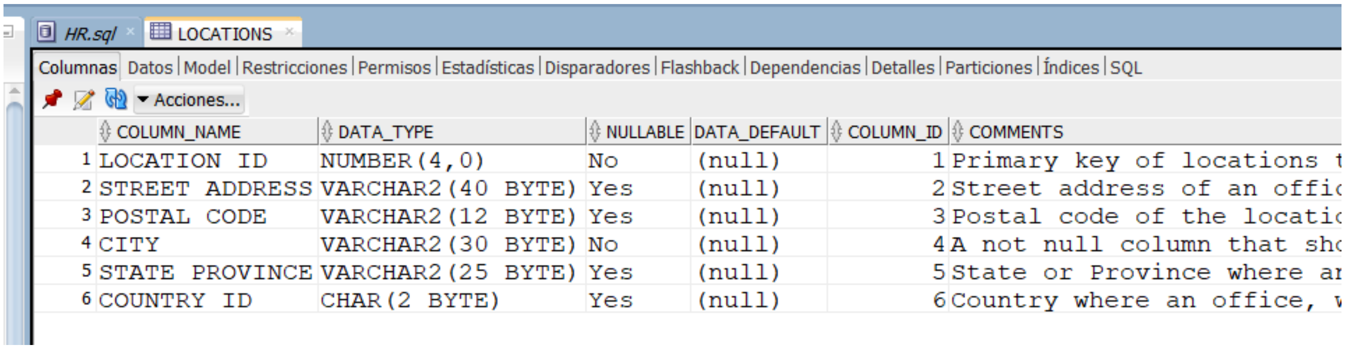


Figure 13: *HR Scheme.*

**9.** SQL Developer describes the table automatically on the right side of the tool as shown in the following illustration, see **figure 14**.



| | COLUMN_NAME | DATA_TYPE | NULLABLE | DATA_DEFAULT | COLUMN_ID | COMMENTS |
|---|---|---|---|---|---|---|
| 1 | LOCATION ID | NUMBER(4,0) | No | (null) | 1 | Primary key of locations t |
| 2 | STREET ADDRESS | VARCHAR2(40 BYTE) | Yes | (null) | 2 | Street address of an offic |
| 3 | POSTAL CODE | VARCHAR2(12 BYTE) | Yes | (null) | 3 | Postal code of the locatic |
| 4 | CITY | VARCHAR2(30 BYTE) | No | (null) | 4 | A not null column that shc |
| 5 | STATE PROVINCE | VARCHAR2(25 BYTE) | Yes | (null) | 5 | State or Province where ar |
| 6 | COUNTRY ID | CHAR(2 BYTE) | Yes | (null) | 6 | Country where an office, v |

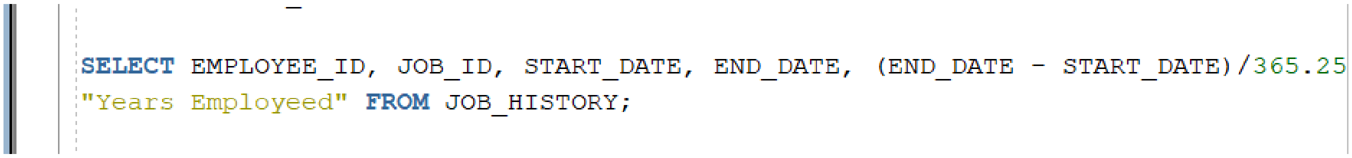
Figure 14: *Structure description, LOCATIONS table.*

**Question 4:** It was demonstrated earlier how the number of days for which staff were employed in a job could be calculated. For how many years were staff employed while fulfilling these job roles and what were their EMPLOYEE_ID, JOB_ID, START_DATE, and END_DATE values? Alias the expression column in your query with the alias Years Employed. Assume that a year consists of 365.25 days.

**1.** Start SQL Developer and connect to the HR schema.

**2.** The projection of columns required includes EMPLOYEE_ID, JOB_ID, START_DATE, END_DATE, and an expression called "Years Employed" from the JOB_HISTORY table.

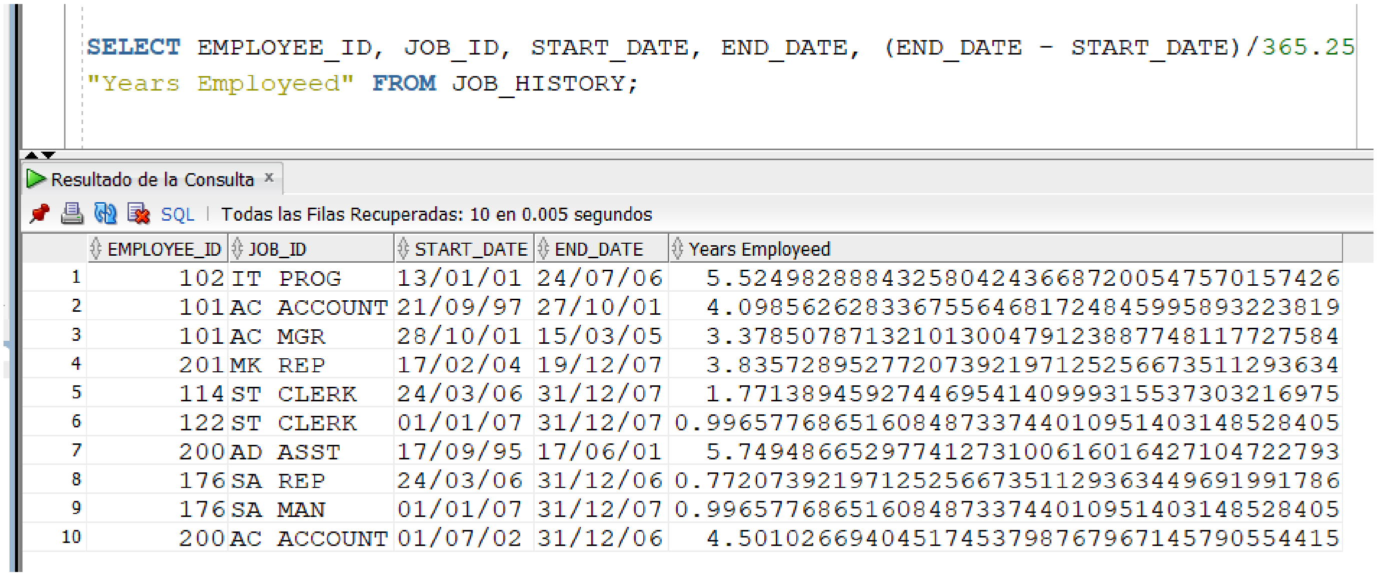
**3.** The expression can be calculated by dividing one plus the difference between END_DATE and START_DATE by 365.25 days, as shown next:



```
SELECT EMPLOYEE_ID, JOB_ID, START_DATE, END_DATE, (END_DATE - START_DATE)/365.25
"Years Employeed" FROM JOB_HISTORY;
```

Figure 15: *SELECT statement.*

**4.** Execute the statement y show the results, see **figure 16**.



```
SELECT EMPLOYEE_ID, JOB_ID, START_DATE, END_DATE, (END_DATE - START_DATE)/365.25
"Years Employeed" FROM JOB_HISTORY;
```

Todas las Filas Recuperadas: 10 en 0.005 segundos

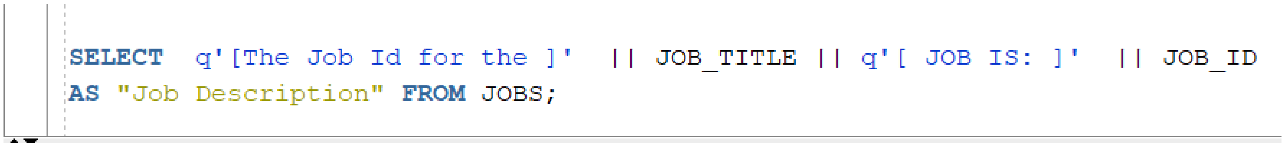
|  | EMPLOYEE_ID | JOB_ID | START_DATE | END_DATE | Years Employeed |
|---|---|---|---|---|---|
| 1 | 102 | IT PROG | 13/01/01 | 24/07/06 | 5.5249828884325804243668720054757015742б |
| 2 | 101 | AC ACCOUNT | 21/09/97 | 27/10/01 | 4.09856262833675564681724845995893223819 |
| 3 | 101 | AC MGR | 28/10/01 | 15/03/05 | 3.37850787132101300479123887748117727584 |
| 4 | 201 | MK REP | 17/02/04 | 19/12/07 | 3.83572895277207392197125256673511293634 |
| 5 | 114 | ST CLERK | 24/03/06 | 31/12/07 | 1.7713894592744695414099315537303216975 |
| 6 | 122 | ST CLERK | 01/01/07 | 31/12/07 | 0.9965776865160848733744010951403148528405 |
| 7 | 200 | AD ASST | 17/09/95 | 17/06/01 | 5.74948665297741273100616016427104722793 |
| 8 | 176 | SA REP | 24/03/06 | 31/12/06 | 0.7720739219712525667351129363449691991786 |
| 9 | 176 | SA MAN | 01/01/07 | 31/12/07 | 0.9965776865160848733744010951403148528405 |
| 10 | 200 | AC ACCOUNT | 01/07/02 | 31/12/06 | 4.50102669404517453798767967145790554415 |

Figure 16: *Execution of the SELECT statement.*

**Question 5:** Query the JOBS table and return a single expression of the form The Job Id for the job_title's job is: job_id. Take note that the job_title should have an apostrophe and an "s" appended to it to read more naturally. A sample of this output for the organization president is: "The Job Id for the President's job is: AD_PRES." Alias this column expression as "Job Description" using the AS keyword.

**1.** There are multiple solutions to this problem. The approach chosen here is to handle the naturally occurring single quotation marks with an additional single quote.

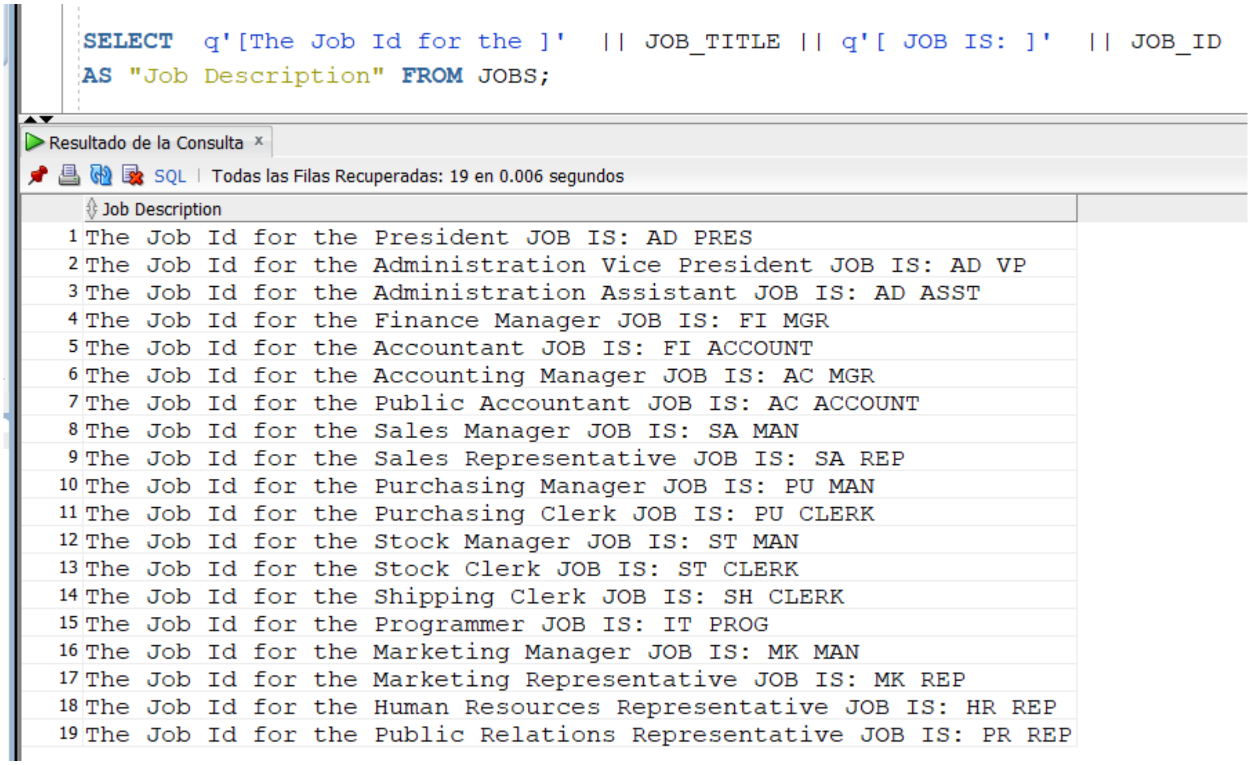
**2.** A single expression aliased as "Job Description" is required and may be constructed by dissecting the requirement into the literal "The Job Id for the" being concatenated to the JOB_TITLE column. This string is then concatenated to the literal "'s job is:," which is further concatenated to the JOB_ID column. An additional single quotation mark is added to yield the SELECT statement that follows:



```
SELECT  q'[The Job Id for the ]'  || JOB_TITLE || q'[ JOB IS: ]'  || JOB_ID
AS "Job Description" FROM JOBS;
```

Figure 17: *SELECT statement.*

**3.** Execute the statement y show the results, see **figure 18**.



```
SELECT  q'[The Job Id for the ]'  || JOB_TITLE || q'[ JOB IS: ]'  || JOB_ID
AS "Job Description" FROM JOBS;
```

Resultado de la Consulta ×
SQL | Todas las Filas Recuperadas: 19 en 0.006 segundos

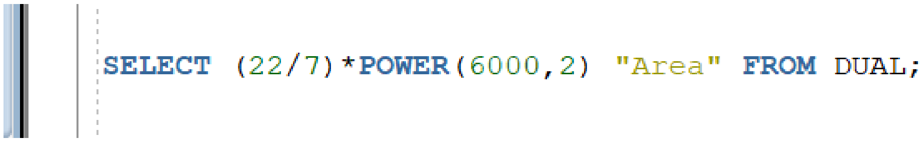
```
   Job Description
 1 The Job Id for the President JOB IS: AD PRES
 2 The Job Id for the Administration Vice President JOB IS: AD VP
 3 The Job Id for the Administration Assistant JOB IS: AD ASST
 4 The Job Id for the Finance Manager JOB IS: FI MGR
 5 The Job Id for the Accountant JOB IS: FI ACCOUNT
 6 The Job Id for the Accounting Manager JOB IS: AC MGR
 7 The Job Id for the Public Accountant JOB IS: AC ACCOUNT
 8 The Job Id for the Sales Manager JOB IS: SA MAN
 9 The Job Id for the Sales Representative JOB IS: SA REP
10 The Job Id for the Purchasing Manager JOB IS: PU MAN
11 The Job Id for the Purchasing Clerk JOB IS: PU CLERK
12 The Job Id for the Stock Manager JOB IS: ST MAN
13 The Job Id for the Stock Clerk JOB IS: ST CLERK
14 The Job Id for the Shipping Clerk JOB IS: SH CLERK
15 The Job Id for the Programmer JOB IS: IT PROG
16 The Job Id for the Marketing Manager JOB IS: MK MAN
17 The Job Id for the Marketing Representative JOB IS: MK REP
18 The Job Id for the Human Resources Representative JOB IS: HR REP
19 The Job Id for the Public Relations Representative JOB IS: PR REP
```

Figure 18: *Execution of the SELECT statement.*

**Question 6:** Using the DUAL table, calculate the area of a circle with radius 6000 units, with pi being approximately 22/7. Use the formula: Area = pi × radius × radius. Alias the result as “Area.”

**1.** Working with the DUAL table may initially seem curious. You get used to it as its functionality becomes more apparent. This question involves selecting a literal arithmetic expression from the DUAL table to yield a single row calculated answer that is not based on the column values in any table. Name the result column “Area”.

**2.** The expression may be calculated using the following SQL statement:

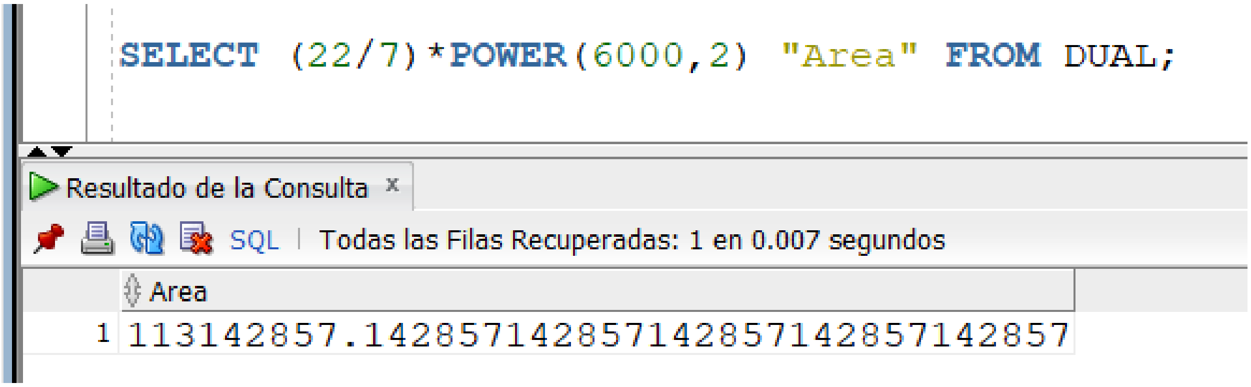


```
SELECT (22/7)*POWER(6000,2) "Area" FROM DUAL;
```

Figure 19: *SELECT statement.*

**3.** The results returned show the approximate area of the circle as 113142857.14 square units.

**4.** Show your own results, see **figure 20**.



```
SELECT (22/7)*POWER(6000,2) "Area" FROM DUAL;
```

Todas las Filas Recuperadas: 1 en 0.007 segundos

|   | Area |
|---|---|
| 1 | 113142857.142857142857142857142857 |

Figure 20: *Execution of the SELECT statement.*

**Activity 5:** In this practice, you write simple SELECT queries. The queries cover most of the SELECT clauses and operations that you learned in this lesson.

**Part 1:**

Test your knowledge:

**1.** The following SELECT statement executes successfully:

*SELECT last_name, job_id, salary AS Sal FROM employees;*

**R =** TRUE.

**Explanation:** The statement is executed correctly since there are no errors in it.

**2.** The following SELECT statement executes successfully:

*SELECT * FROM job_grades;*

**R =** FALSE.

**Explanation:** This statement fails as the job_grades table does not exist in the HR schema.

**3.** There are four coding errors in the following statement. Can you identify them?

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

**1-** The x operator is misspelled, it would be an asterisk for multiplication (*).

**2-** The SALARY header is not in the query, it must go after the last_name example: employee_id, last_name, salary * 12 ...

**3-** The SAL column does not exist in the table.

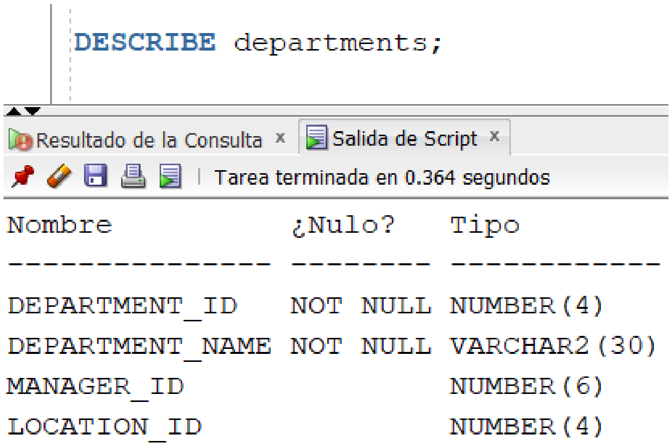
**4-** The alias ANNUAL SALARY is also wrong as it contains more than two words so it should be enclosed in double quotes.

**Part 2:**

You have been hired as a SQL programmer for Antiguo Maestro Corporation.

Your first task is to create some reports based on data from the Human Resources tables.

**4.** Your first task is to determine the structure of the DEPARTMENTS table and its contents, see **figure 21 and 22**.

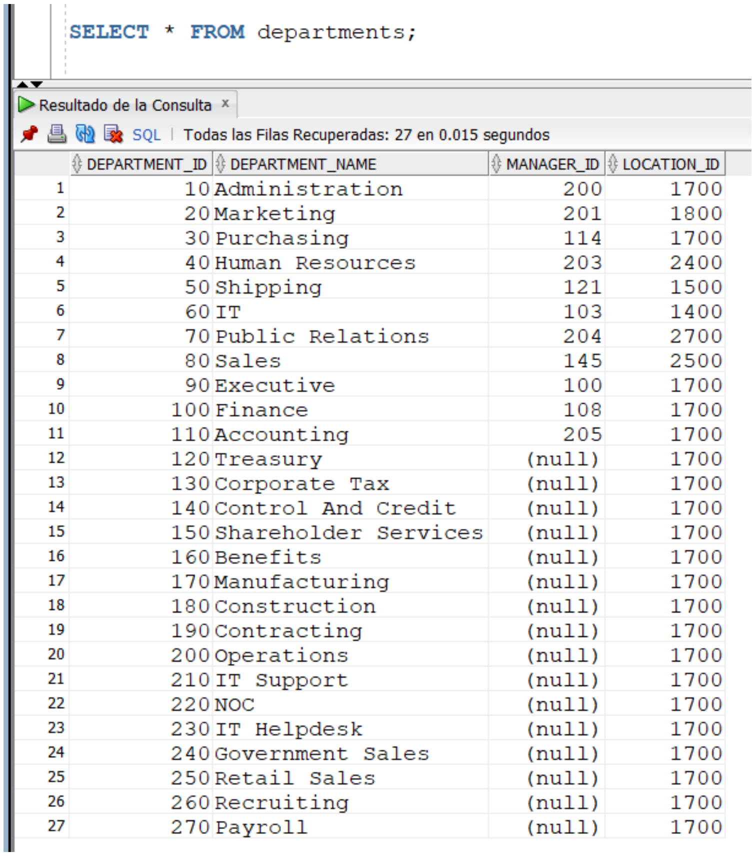


```
DESCRIBE departments;
```

Tarea terminada en 0.364 segundos

```
Nombre          ¿Nulo?   Tipo
--------------- -------- ------------
DEPARTMENT_ID   NOT NULL NUMBER(4)
DEPARTMENT_NAME NOT NULL VARCHAR2(30)
MANAGER_ID               NUMBER(6)
LOCATION_ID              NUMBER(4)
```

Figure 21: *Description of the structure of the DEPARTMENTS table.*



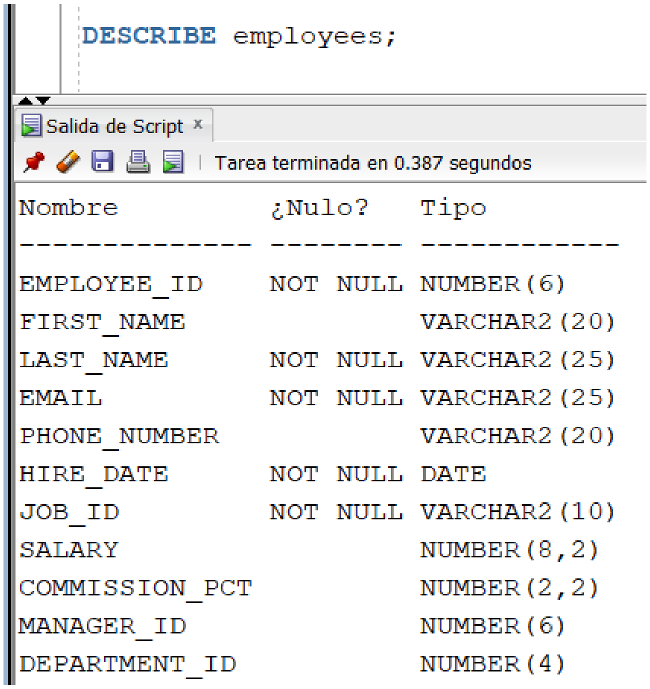
```
SELECT * FROM departments;
```

Todas las Filas Recuperadas: 27 en 0.015 segundos

| | DEPARTMENT_ID | DEPARTMENT_NAME | MANAGER_ID | LOCATION_ID |
|---|---|---|---|---|
| 1 | 10 | Administration | 200 | 1700 |
| 2 | 20 | Marketing | 201 | 1800 |
| 3 | 30 | Purchasing | 114 | 1700 |
| 4 | 40 | Human Resources | 203 | 2400 |
| 5 | 50 | Shipping | 121 | 1500 |
| 6 | 60 | IT | 103 | 1400 |
| 7 | 70 | Public Relations | 204 | 2700 |
| 8 | 80 | Sales | 145 | 2500 |
| 9 | 90 | Executive | 100 | 1700 |
| 10 | 100 | Finance | 108 | 1700 |
| 11 | 110 | Accounting | 205 | 1700 |
| 12 | 120 | Treasury | (null) | 1700 |
| 13 | 130 | Corporate Tax | (null) | 1700 |
| 14 | 140 | Control And Credit | (null) | 1700 |
| 15 | 150 | Shareholder Services | (null) | 1700 |
| 16 | 160 | Benefits | (null) | 1700 |
| 17 | 170 | Manufacturing | (null) | 1700 |
| 18 | 180 | Construction | (null) | 1700 |
| 19 | 190 | Contracting | (null) | 1700 |
| 20 | 200 | Operations | (null) | 1700 |
| 21 | 210 | IT Support | (null) | 1700 |
| 22 | 220 | NOC | (null) | 1700 |
| 23 | 230 | IT Helpdesk | (null) | 1700 |
| 24 | 240 | Government Sales | (null) | 1700 |
| 25 | 250 | Retail Sales | (null) | 1700 |
| 26 | 260 | Recruiting | (null) | 1700 |
| 27 | 270 | Payroll | (null) | 1700 |

Figure 22: *Content of the DEPARTMENTS table.*

**5.** Determine the structure of the EMPLOYEES table, see **figure 23**.



```
DESCRIBE employees;
```

Tarea terminada en 0.387 segundos

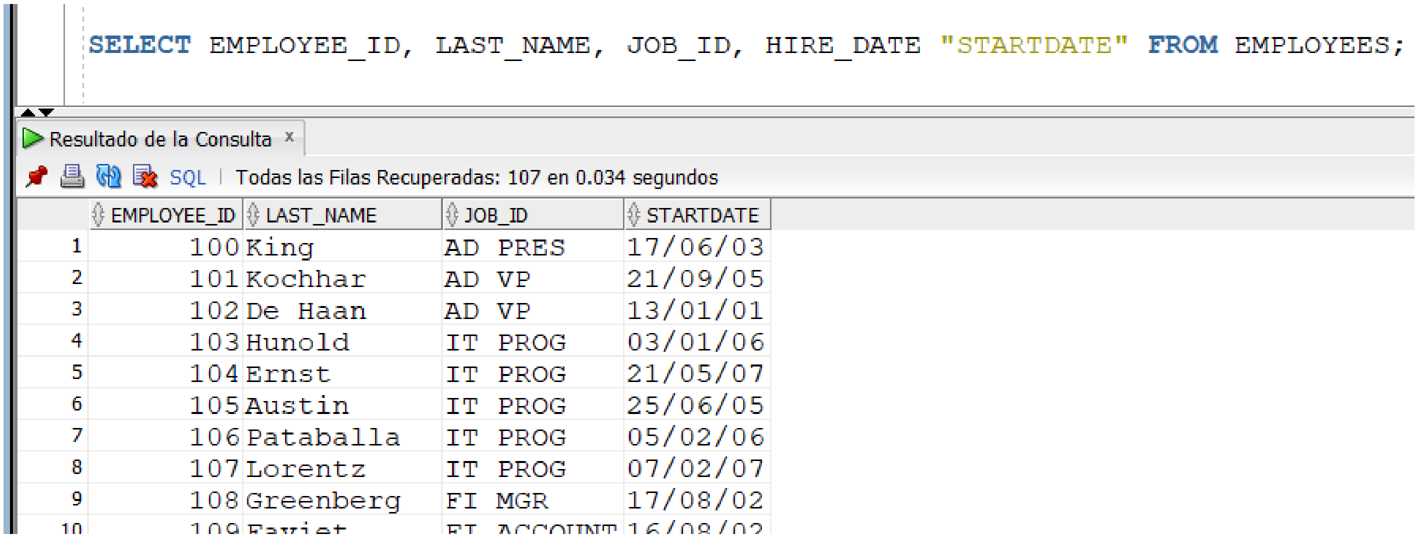
```
Nombre          ¿Nulo?   Tipo
--------------- -------- ------------
EMPLOYEE_ID     NOT NULL NUMBER(6)
FIRST_NAME               VARCHAR2(20)
LAST_NAME       NOT NULL VARCHAR2(25)
EMAIL           NOT NULL VARCHAR2(25)
PHONE_NUMBER             VARCHAR2(20)
HIRE_DATE       NOT NULL DATE
JOB_ID          NOT NULL VARCHAR2(10)
SALARY                   NUMBER(8,2)
COMMISSION_PCT           NUMBER(2,2)
MANAGER_ID               NUMBER(6)
DEPARTMENT_ID            NUMBER(4)
```

Figure 23: *Description of the structure of the EMPLOYEES table.*

The HR department wants a query to display the last name, job ID, hire date, and employee ID for each employee, with the employee ID appearing first. Provide an alias STARTDATE for the HIRE_DATE column. Save your SQL statement to a file named lab_7_05.sqlso that you can dispatch this file to the HR department.

**6.** Test your query in the lab_7_05.sql file to ensure that it runs correctly, see **figure 24**.

**Note:** After you have executed the query, make sure that you do not enter your next query in the same worksheet. Open a new worksheet.



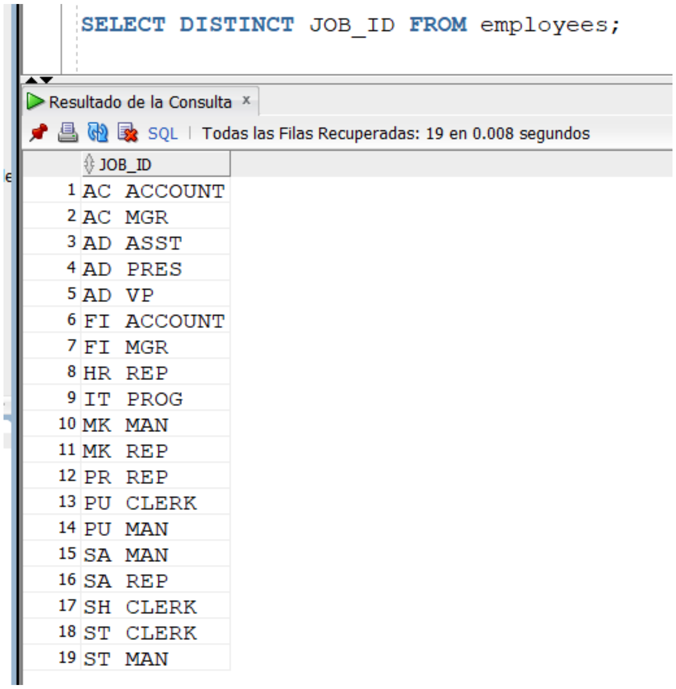
```sql
SELECT EMPLOYEE_ID, LAST_NAME, JOB_ID, HIRE_DATE "STARTDATE" FROM EMPLOYEES;
```

Todas las Filas Recuperadas: 107 en 0.034 segundos

| | EMPLOYEE_ID | LAST_NAME | JOB_ID | STARTDATE |
|---|---|---|---|---|
| 1 | 100 | King | AD_PRES | 17/06/03 |
| 2 | 101 | Kochhar | AD_VP | 21/09/05 |
| 3 | 102 | De Haan | AD_VP | 13/01/01 |
| 4 | 103 | Hunold | IT_PROG | 03/01/06 |
| 5 | 104 | Ernst | IT_PROG | 21/05/07 |
| 6 | 105 | Austin | IT_PROG | 25/06/05 |
| 7 | 106 | Pataballa | IT_PROG | 05/02/06 |
| 8 | 107 | Lorentz | IT_PROG | 07/02/07 |
| 9 | 108 | Greenberg | FI_MGR | 17/08/02 |
| 10 | 109 | Faviet | FI_ACCOUNT | 16/08/02 |

Figure 24: *Data query: EMPLOYEES table.*

**7.** The HR department wants a query to display all unique job IDs from the EMPLOYEES table, see **figure 25**.



```sql
SELECT DISTINCT JOB_ID FROM employees;
```

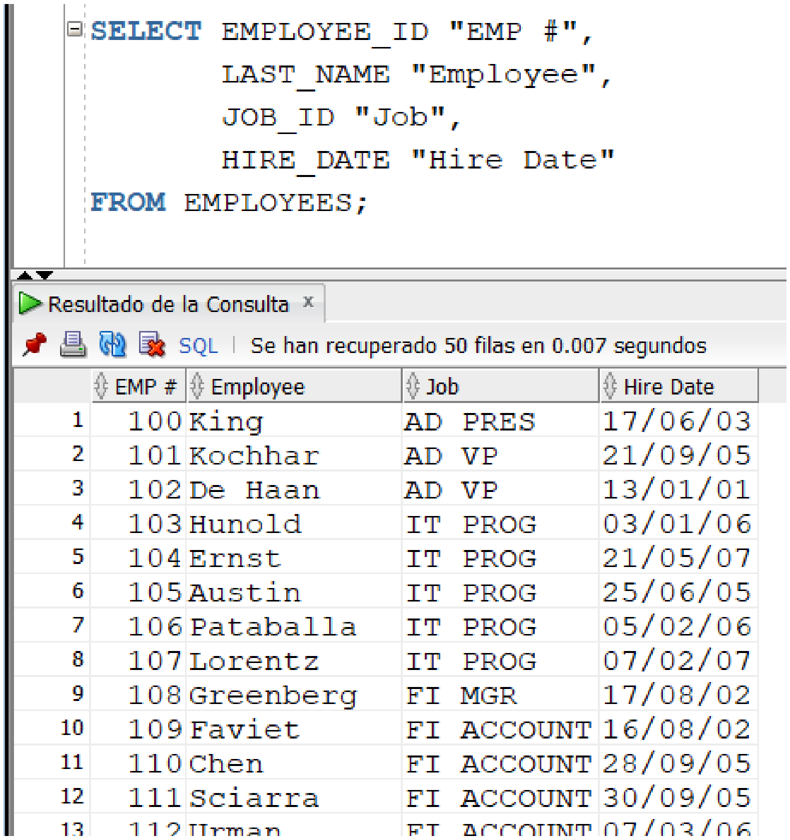
Todas las Filas Recuperadas: 19 en 0.008 segundos

| | JOB_ID |
|---|---|
| 1 | AC_ACCOUNT |
| 2 | AC_MGR |
| 3 | AD_ASST |
| 4 | AD_PRES |
| 5 | AD_VP |
| 6 | FI_ACCOUNT |
| 7 | FI_MGR |
| 8 | HR_REP |
| 9 | IT_PROG |
| 10 | MK_MAN |
| 11 | MK_REP |
| 12 | PR_REP |
| 13 | PU_CLERK |
| 14 | PU_MAN |
| 15 | SA_MAN |
| 16 | SA_REP |
| 17 | SH_CLERK |
| 18 | ST_CLERK |
| 19 | ST_MAN |

Figure 25: *Data query: EMPLOYEES table.*

**Part 3:**

**8.** The HR department wants more descriptive column headings for its report on employees. Copy the statement from lab_7_05.sql to a new SQL Worksheet. Name the column headings Emp #, Employee, Job, and Hire Date, respectively. Then run your query again, see **figure 26**.



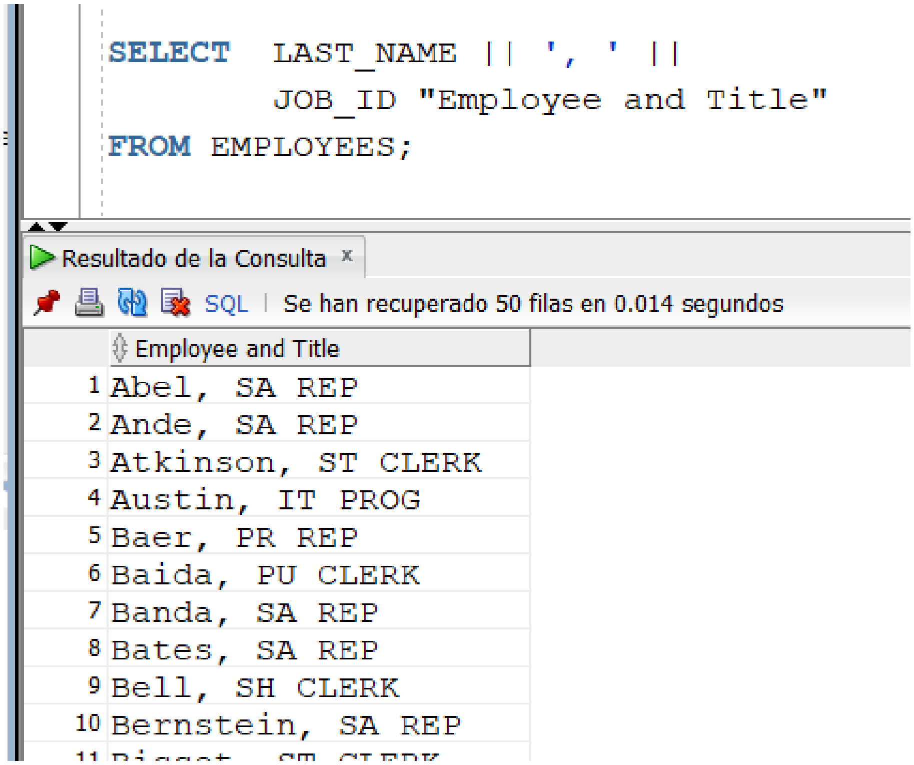
```
SELECT EMPLOYEE_ID "EMP #",
       LAST_NAME "Employee",
       JOB_ID "Job",
       HIRE_DATE "Hire Date"
FROM EMPLOYEES;
```

Se han recuperado 50 filas en 0.007 segundos

|  | EMP # | Employee | Job | Hire Date |
|---|---|---|---|---|
| 1 | 100 | King | AD PRES | 17/06/03 |
| 2 | 101 | Kochhar | AD VP | 21/09/05 |
| 3 | 102 | De Haan | AD VP | 13/01/01 |
| 4 | 103 | Hunold | IT PROG | 03/01/06 |
| 5 | 104 | Ernst | IT PROG | 21/05/07 |
| 6 | 105 | Austin | IT PROG | 25/06/05 |
| 7 | 106 | Pataballa | IT PROG | 05/02/06 |
| 8 | 107 | Lorentz | IT PROG | 07/02/07 |
| 9 | 108 | Greenberg | FI MGR | 17/08/02 |
| 10 | 109 | Faviet | FI ACCOUNT | 16/08/02 |
| 11 | 110 | Chen | FI ACCOUNT | 28/09/05 |
| 12 | 111 | Sciarra | FI ACCOUNT | 30/09/05 |
| 13 | 112 | Urman | FI ACCOUNT | 07/03/06 |

Figure 26: *Data query: EMPLOYEES table.*

**9.** The HR department has requested a report of all employees and their job IDs. Display the last name concatenated with the job ID (separated by a comma and space) and name the column Employee and Title, see **figure 27**.



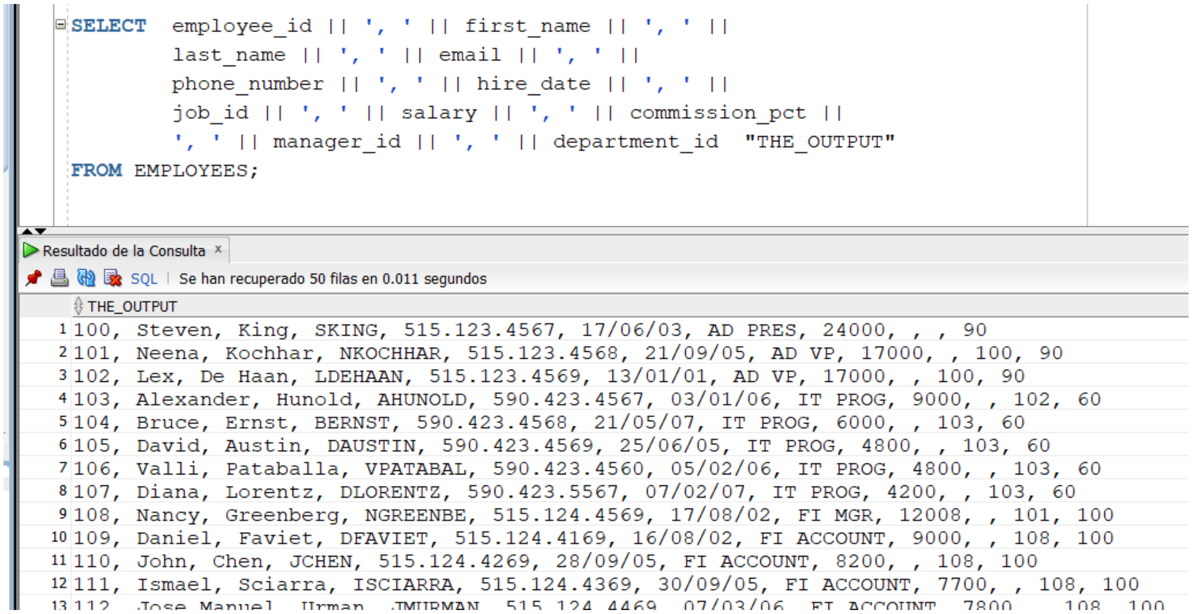
```
SELECT  LAST_NAME || ', ' ||
        JOB_ID "Employee and Title"
FROM EMPLOYEES;
```

Se han recuperado 50 filas en 0.014 segundos

```
   Employee and Title
 1 Abel, SA REP
 2 Ande, SA REP
 3 Atkinson, ST CLERK
 4 Austin, IT PROG
 5 Baer, PR REP
 6 Baida, PU CLERK
 7 Banda, SA REP
 8 Bates, SA REP
 9 Bell, SH CLERK
10 Bernstein, SA REP
11 Bissot, ST CLERK
```

Figure 27: *Data query: EMPLOYEES table.*

**10.** To familiarize yourself with the data in the EMPLOYEES table, create a query to display all the data from that table. Separate each column output by a comma. Name the column title THE_OUTPUT, see **figure 28**.



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

Se han recuperado 50 filas en 0.011 segundos

```
THE_OUTPUT
100, Steven, King, SKING, 515.123.4567, 17/06/03, AD PRES, 24000, , , 90
101, Neena, Kochhar, NKOCHHAR, 515.123.4568, 21/09/05, AD VP, 17000, , 100, 90
102, Lex, De Haan, LDEHAAN, 515.123.4569, 13/01/01, AD VP, 17000, , 100, 90
103, Alexander, Hunold, AHUNOLD, 590.423.4567, 03/01/06, IT PROG, 9000, , 102, 60
104, Bruce, Ernst, BERNST, 590.423.4568, 21/05/07, IT PROG, 6000, , 103, 60
105, David, Austin, DAUSTIN, 590.423.4569, 25/06/05, IT PROG, 4800, , 103, 60
106, Valli, Pataballa, VPATABAL, 590.423.4560, 05/02/06, IT PROG, 4800, , 103, 60
107, Diana, Lorentz, DLORENTZ, 590.423.5567, 07/02/07, IT PROG, 4200, , 103, 60
108, Nancy, Greenberg, NGREENBE, 515.124.4569, 17/08/02, FI MGR, 12008, , 101, 100
109, Daniel, Faviet, DFAVIET, 515.124.4169, 16/08/02, FI ACCOUNT, 9000, , 108, 100
110, John, Chen, JCHEN, 515.124.4269, 28/09/05, FI ACCOUNT, 8200, , 108, 100
111, Ismael, Sciarra, ISCIARRA, 515.124.4369, 30/09/05, FI ACCOUNT, 7700, , 108, 100
112, Jose Manuel, Urman, JMURMAN, 515.124.4469, 07/03/06, FI ACCOUNT, 7800, , 108, 100
```

Figure 28: *Data query: EMPLOYEES table.*

# 4 Pre-assessment

In this section you will find the Pre-assessment.

| Criteria to be evaluate | Does it comply? | (%) |
|---|---|---|
| COMPLIES WITH THE REQUESTED FUNCTIONALITY | YES | |
| HAS THE CORRECT INDENTATION | YES | |
| HAS AN EASY WAY TO ACCESS THE PROVIDED FILES | YES | |
| HAS A REPORT WITH IDC FORMAT | YES | |
| REPORT INFORMATION IS FREE OF SPELLING ERRORS | YES | |
| DELIVERED IN TIME AND FORM | YES | |
| IS FULLY COMPLETED (SPECIFY THE PERCENTAGE COMPLETED) | YES | 100% |

# 5 Conclusion

The Oracle DML statements are transcendental in the handling of SQL statements at the level of both administrator and database programmer, since they allow the data manipulation of database schemes regardless of the platform used to generate it. This kind of statements can provide you data treatment mechanisms during daily programmer's days.

This practice number 7 helped me to practice the uses of the SELECT statement for data retrieval. Finally, an important thing to mention is that the SQL language allows the projection and selection of data to satisfy the needs of reports that may be necessary for a programmer, developer or end user.