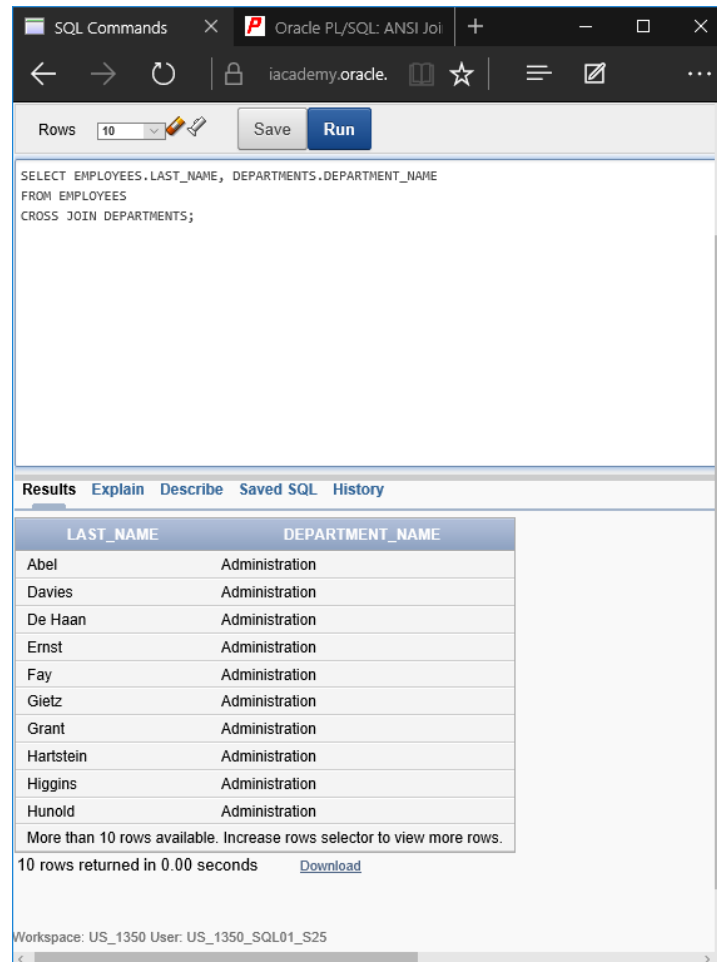


## Section 3 Lesson 1: Cross Joins and Natural Joins

### Try It / Solve It

Use the Oracle database for problems 1-4.

1. Create a cross-join that displays the last name and department name from the employees and departments tables.



The screenshot shows the Oracle PL/SQL Developer interface. The top pane displays the following SQL query:

```
SELECT EMPLOYEES.LAST_NAME, DEPARTMENTS.DEPARTMENT_NAME
FROM EMPLOYEES
CROSS JOIN DEPARTMENTS;
```

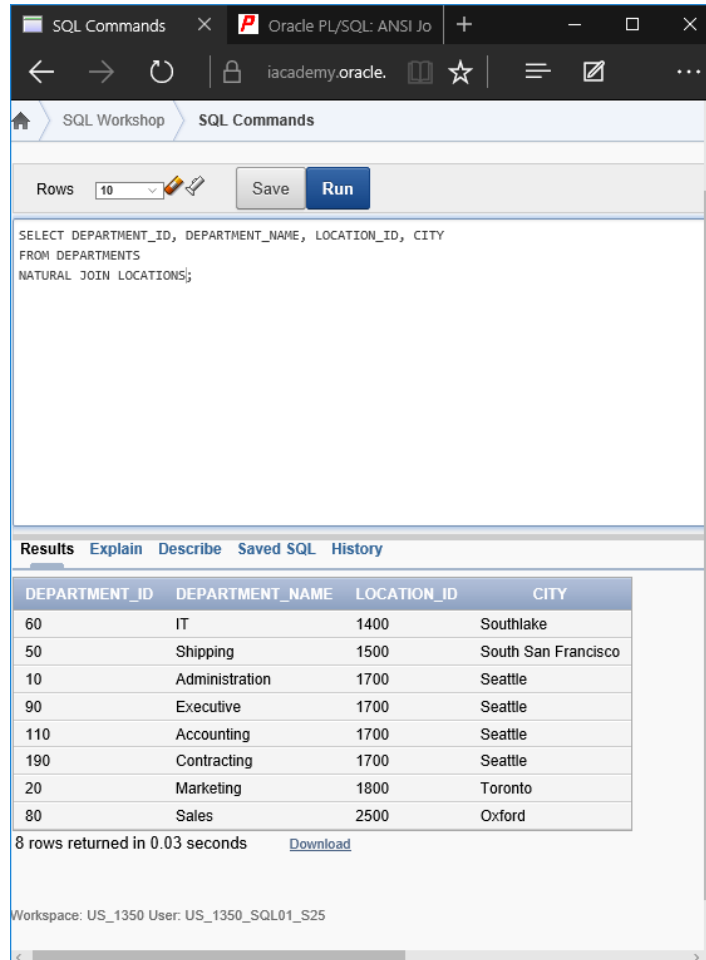
The bottom pane shows the results of the query in a table with two columns: LAST\_NAME and DEPARTMENT\_NAME. The results are as follows:

LAST_NAME	DEPARTMENT_NAME
Abel	Administration
Davies	Administration
De Haan	Administration
Ernst	Administration
Fay	Administration
Gietz	Administration
Grant	Administration
Hartstein	Administration
Higgins	Administration
Hunold	Administration

Below the table, it states: "More than 10 rows available. Increase rows selector to view more rows." and "10 rows returned in 0.00 seconds". A "Download" link is also present.

2. What is the result of the query that you have used for question 1? **The query returned the Cartesian product of DEPARTMENT\_NAME paired with each value of LAST\_NAME in ascending order from DEPARTMENT\_NAME and then by ascending order from LAST\_NAME.**

3. Create a query that uses a natural join to join the departments table and the locations table by the location\_id column. Display the department id, department name, location id, and city.



The screenshot shows the Oracle SQL Workshop interface. The SQL Commands window contains the following query:

```
SELECT DEPARTMENT_ID, DEPARTMENT_NAME, LOCATION_ID, CITY
FROM DEPARTMENTS
NATURAL JOIN LOCATIONS;
```

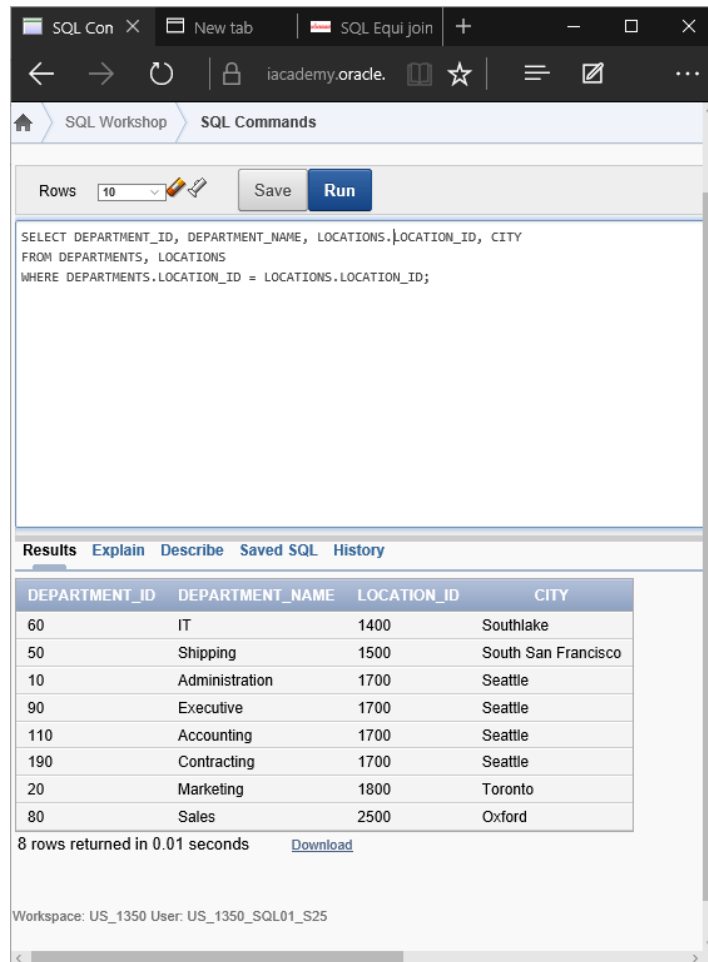
The Results window displays the following data:

DEPARTMENT_ID	DEPARTMENT_NAME	LOCATION_ID	CITY
60	IT	1400	Southlake
50	Shipping	1500	South San Francisco
10	Administration	1700	Seattle
90	Executive	1700	Seattle
110	Accounting	1700	Seattle
190	Contracting	1700	Seattle
20	Marketing	1800	Toronto
80	Sales	2500	Oxford

8 rows returned in 0.03 seconds [Download](#)

Workspace: US\_1350 User: US\_1350\_SQL01\_S25

#### 4. Rewrite problem 2 using equijoin syntax.



The screenshot shows the Oracle SQL Workshop interface. The top navigation bar includes tabs for 'SQL Con', 'New tab', and 'SQL Equi join'. The main area is titled 'SQL Commands' and contains the following SQL query:

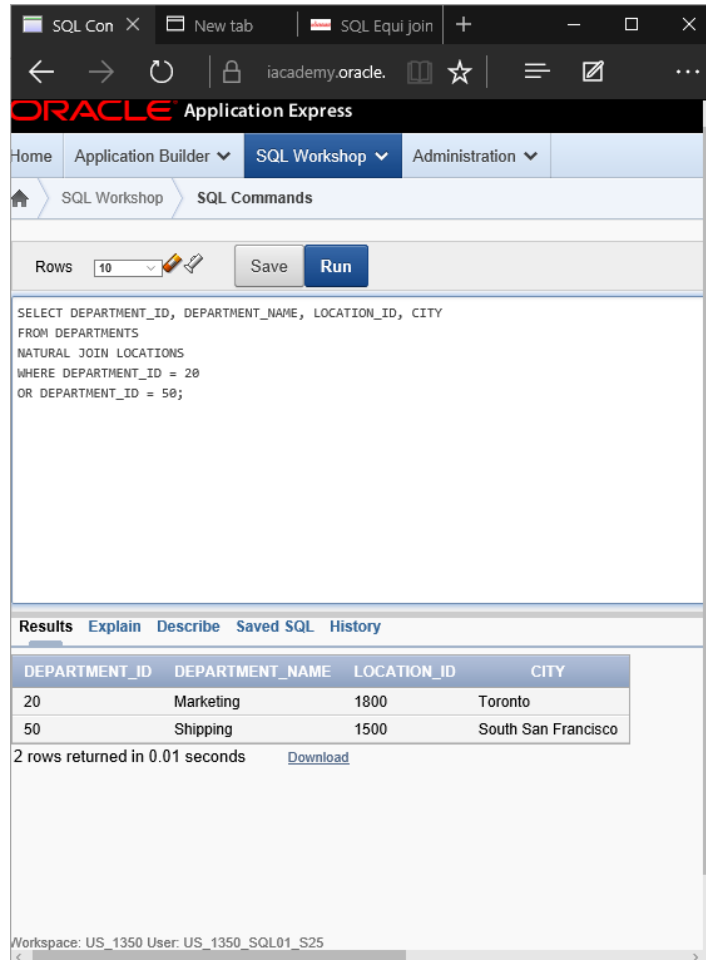
```
SELECT DEPARTMENT_ID, DEPARTMENT_NAME, LOCATIONS.LOCATION_ID, CITY
FROM DEPARTMENTS, LOCATIONS
WHERE DEPARTMENTS.LOCATION_ID = LOCATIONS.LOCATION_ID;
```

Below the query editor, the 'Results' tab is active, displaying a table with 8 rows. The table has the following columns: DEPARTMENT\_ID, DEPARTMENT\_NAME, LOCATION\_ID, and CITY.

DEPARTMENT_ID	DEPARTMENT_NAME	LOCATION_ID	CITY
60	IT	1400	Southlake
50	Shipping	1500	South San Francisco
10	Administration	1700	Seattle
90	Executive	1700	Seattle
110	Accounting	1700	Seattle
190	Contracting	1700	Seattle
20	Marketing	1800	Toronto
80	Sales	2500	Oxford

Below the table, it states '8 rows returned in 0.01 seconds' with a 'Download' link. At the bottom, the workspace information is shown: 'Workspace: US\_1350 User: US\_1350\_SQL01\_S25'.

5. Create a query that uses a natural join to join the departments table by the location\_id column. Restrict the output to only department IDs of 20 and 50. Display the department id, department name, location id, and city.



The screenshot shows the Oracle Application Express SQL Workshop interface. The query entered in the SQL Commands pane is:

```
SELECT DEPARTMENT_ID, DEPARTMENT_NAME, LOCATION_ID, CITY
FROM DEPARTMENTS
NATURAL JOIN LOCATIONS
WHERE DEPARTMENT_ID = 20
OR DEPARTMENT_ID = 50;
```

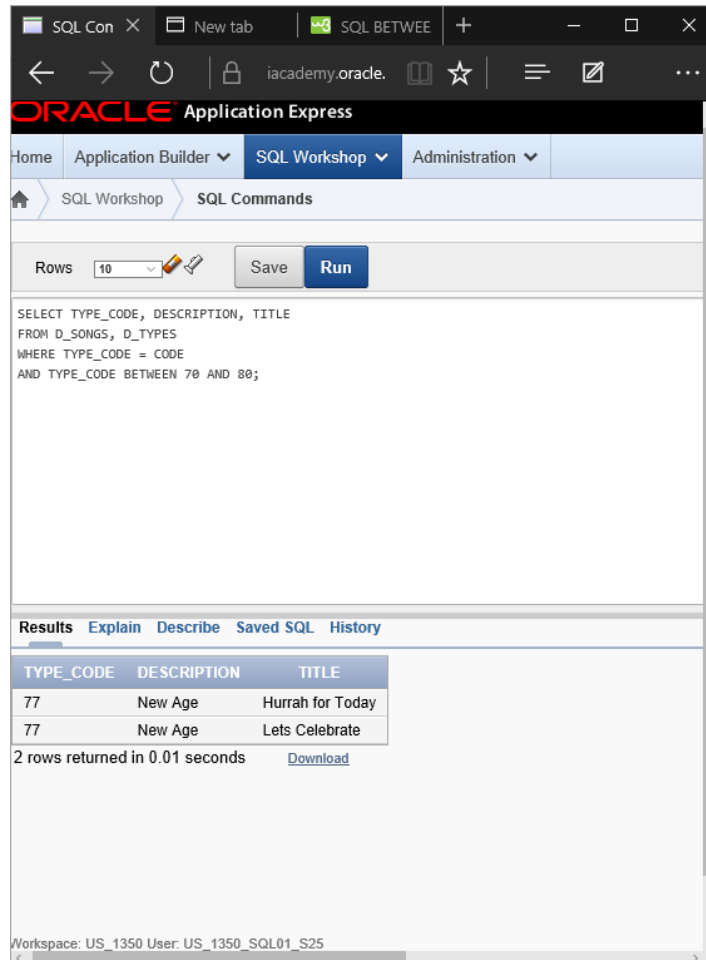
The Results pane displays the following data:

DEPARTMENT_ID	DEPARTMENT_NAME	LOCATION_ID	CITY
20	Marketing	1800	Toronto
50	Shipping	1500	South San Francisco

2 rows returned in 0.01 seconds [Download](#)

Workspace: US\_1350 User: US\_1350\_SQL01\_S25

6. Use an equijoin between the two DJs on Demand database tables: d\_songs and d\_types. Display the type code, description, and title. Limit the rows returned to those type codes between 70 and 80.



The screenshot shows the Oracle Application Express SQL Workshop interface. The SQL command entered is:

```
SELECT TYPE_CODE, DESCRIPTION, TITLE
FROM D_SONGS, D_TYPES
WHERE TYPE_CODE = CODE
AND TYPE_CODE BETWEEN 70 AND 80;
```

The results are displayed in a table with 2 rows returned in 0.01 seconds:

TYPE_CODE	DESCRIPTION	TITLE
77	New Age	Hurrah for Today
77	New Age	Lets Celebrate

Workspace: US\_1350 User: US\_1350\_SQL01\_S25

7. When using Oracle proprietary syntax, the join condition is always placed in the **WHERE** clause of the SELECT statement.
8. When using ANSI/ISO SQL: 1999 syntax, the join condition is always placed in the **ON/USING** clause of the SELECT statement.
9. What is the advantage of learning ANSI/ISO SQL: 1999 syntax? **ANSI syntax removes the need to add a WHERE clause for table joins which allows the WHERE clause to be only used to filter results. ANSI syntax also removes the need to explicitly state the table each column resides in when using the SELECT clause.**
10. A/an **table** can be used to preface the column name in order to clarify which table and column are participating in the join.
11. Table aliases are created in the **FROM** clause of the SELECT statement.

## Section 3 Lesson 2: Join Clauses

### Try It / Solve It

Use the Oracle database for problems 1-6.

1. Join the Oracle database locations and departments table using the location\_id column.  
Limit the results to location 1400 only.

The screenshot displays the Oracle Application Express SQL Workshop interface. The top navigation bar includes 'Home', 'Application Builder', 'SQL Workshop', and 'Administration'. The 'SQL Workshop' tab is active, showing the 'SQL Commands' section. The schema is set to 'US\_1350\_SQL01\_S25'. The SQL command area contains the following query:

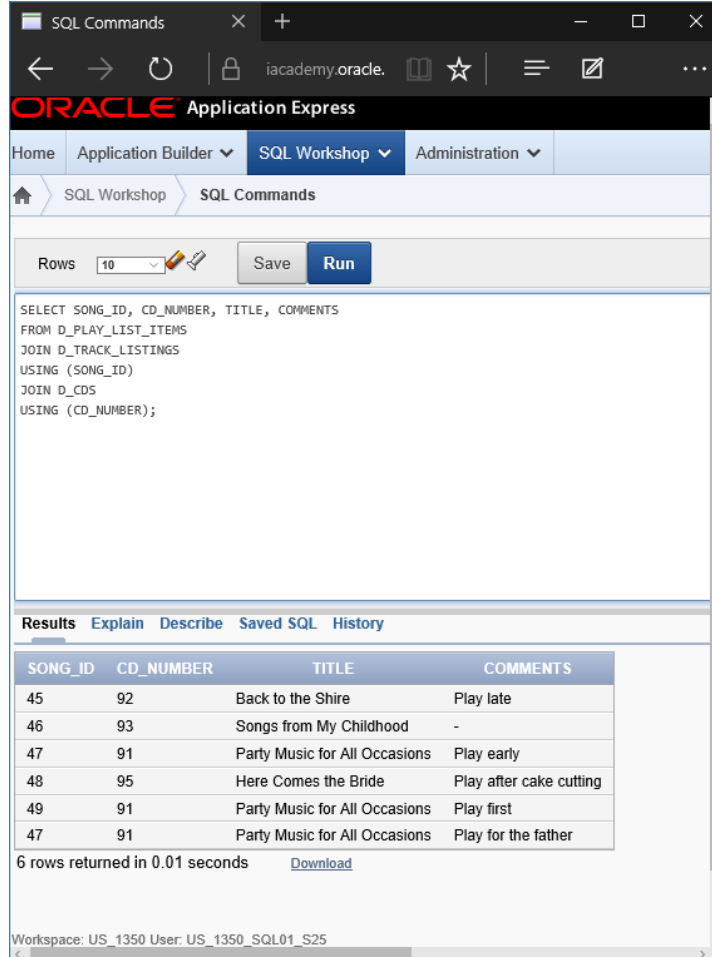
```
SELECT *  
FROM DEPARTMENTS  
NATURAL JOIN LOCATIONS  
WHERE LOCATION_ID = 1400;
```

Below the command area, the 'Results' tab is selected, displaying a table with the following data:

LOCATION_ID	DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	STREET_ADDRESS	POSTAL_CODE	CITY	STATE_PROVINCE	COUNTRY_ID
1400	60	IT	103	2014 Jabbenwocky Rd	26192	Southlake	Texas	US

Below the table, it states '1 rows returned in 0.01 seconds' and provides a 'Download' link. The footer of the interface shows 'Workspace: US\_1350 User: US\_1350\_SQL01\_S25' and 'Application Express 4.2.5.00.08'.

- Join DJs on Demand d\_play\_list\_items, d\_track\_listings, and d\_cds tables with the JOIN USING syntax. Include the song ID, CD number, title, and comments in the output.



The screenshot shows the Oracle Application Express SQL Workshop interface. The SQL Commands window contains the following query:

```
SELECT SONG_ID, CD_NUMBER, TITLE, COMMENTS
FROM D_PLAY_LIST_ITEMS
JOIN D_TRACK_LISTINGS
USING (SONG_ID)
JOIN D_CDS
USING (CD_NUMBER);
```

The Results window displays the output of the query, showing 6 rows returned in 0.01 seconds. The results are as follows:

SONG_ID	CD_NUMBER	TITLE	COMMENTS
45	92	Back to the Shire	Play late
46	93	Songs from My Childhood	-
47	91	Party Music for All Occasions	Play early
48	95	Here Comes the Bride	Play after cake cutting
49	91	Party Music for All Occasions	Play first
47	91	Party Music for All Occasions	Play for the father

Workspace: US\_1350 User: US\_1350\_SQL01\_S25

- Display the city, department name, location ID, and department ID for departments 10, 20, and 30 for the city of Seattle.



The screenshot shows the Oracle Application Express SQL Workshop interface. The SQL Commands window contains the following query:

```
SELECT CITY, DEPARTMENT_NAME, LOCATION_ID, DEPARTMENT_ID
FROM DEPARTMENTS
NATURAL JOIN LOCATIONS
WHERE (DEPARTMENT_ID = 10
OR DEPARTMENT_ID = 20
OR DEPARTMENT_ID = 30)
AND CITY = INITCAP('SEATTLE');
```

The Results tab shows the following data:

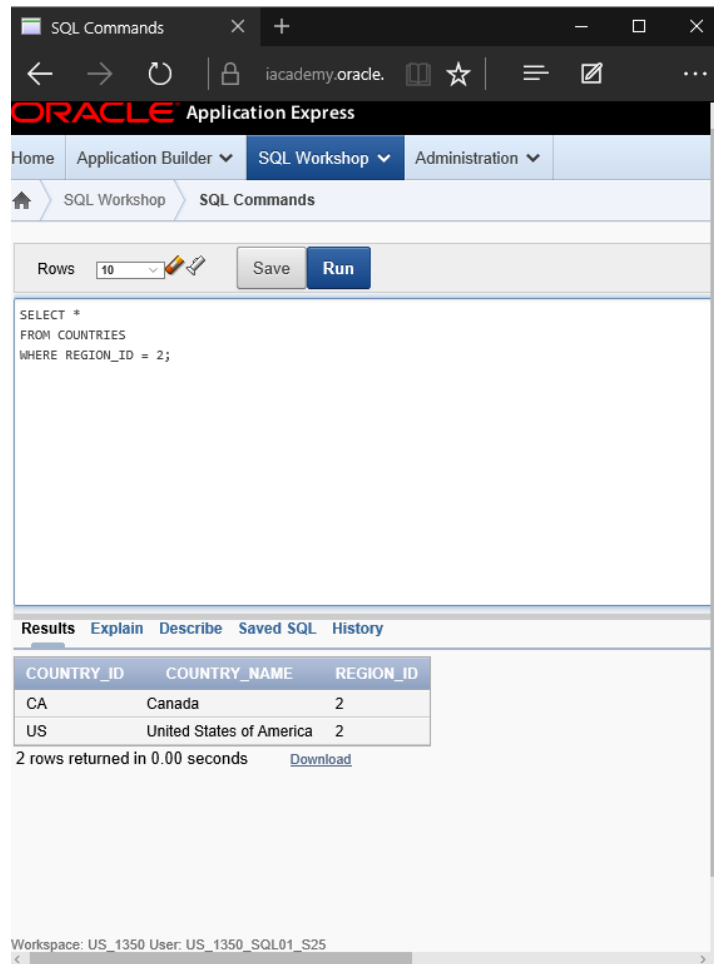
CITY	DEPARTMENT_NAME	LOCATION_ID	DEPARTMENT_ID
Seattle	Administration	1700	10

1 rows returned in 0.01 seconds [Download](#)

Workspace: US\_1350 User: US\_1350\_SQL01\_S25



4. Display country name, region ID, and region name for Americas.



The screenshot shows the Oracle Application Express SQL Workshop interface. The top navigation bar includes 'Home', 'Application Builder', 'SQL Workshop', and 'Administration'. The 'SQL Workshop' tab is active, and the 'SQL Commands' sub-tab is selected. Below the navigation bar, there is a 'Rows' dropdown set to '10', a 'Save' button, and a 'Run' button. The SQL command area contains the following query:

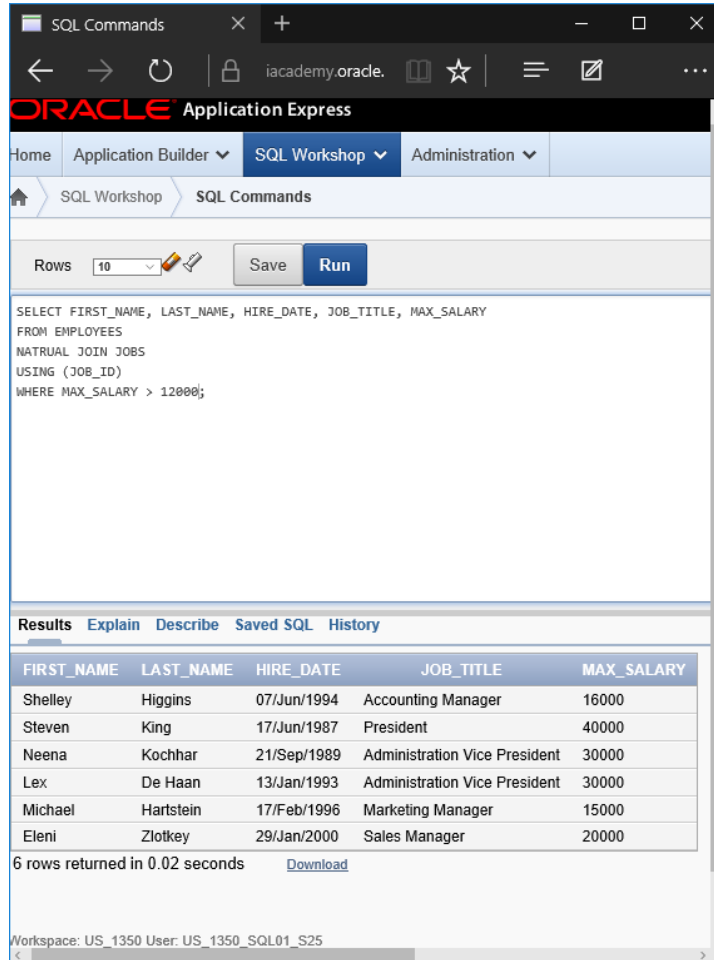
```
SELECT *  
FROM COUNTRIES  
WHERE REGION_ID = 2;
```

Below the command area, the 'Results' tab is active, displaying a table with the following data:

COUNTRY_ID	COUNTRY_NAME	REGION_ID
CA	Canada	2
US	United States of America	2

Below the table, it states '2 rows returned in 0.00 seconds' and provides a 'Download' link. The bottom status bar shows 'Workspace: US\_1350 User: US\_1350\_SQL01\_S25'.

- Write a statement joining the employees and jobs tables. Display the first and last names, hire date, job id, job title, and maximum salary. Limit the query to those employees who are in jobs that can earn more than \$12,000.



The screenshot shows the Oracle SQL Workshop interface. The SQL Commands window contains the following query:

```
SELECT FIRST_NAME, LAST_NAME, HIRE_DATE, JOB_TITLE, MAX_SALARY
FROM EMPLOYEES
NATURAL JOIN JOBS
USING (JOB_ID)
WHERE MAX_SALARY > 12000;
```

The Results tab shows the following data:

FIRST_NAME	LAST_NAME	HIRE_DATE	JOB_TITLE	MAX_SALARY
Shelley	Higgins	07/Jun/1994	Accounting Manager	16000
Steven	King	17/Jun/1987	President	40000
Neena	Kochhar	21/Sep/1989	Administration Vice President	30000
Lex	De Haan	13/Jan/1993	Administration Vice President	30000
Michael	Hartstein	17/Feb/1996	Marketing Manager	15000
Eleni	Zlotkey	29/Jan/2000	Sales Manager	20000

6 rows returned in 0.02 seconds [Download](#)

Workspace: US\_1350 User: US\_1350\_SQL01\_S25

6. Display job title, employee first name, last name, and email for all employees who are stock clerks.



The screenshot shows the Oracle Application Express SQL Workshop interface. The top navigation bar includes 'Home', 'Application Builder', 'SQL Workshop', and 'Administration'. The 'SQL Workshop' tab is active, and the 'SQL Commands' sub-tab is selected. Below the navigation bar, there is a 'Rows' dropdown set to '5000', a 'Save' button, and a 'Run' button. The SQL command area contains the following query:

```
SELECT JOB_TITLE, FIRST_NAME, LAST_NAME, EMAIL
FROM EMPLOYEES
NATURAL JOIN JOBS
WHERE JOB_TITLE = INITCAP('STOCK CLERK');
```

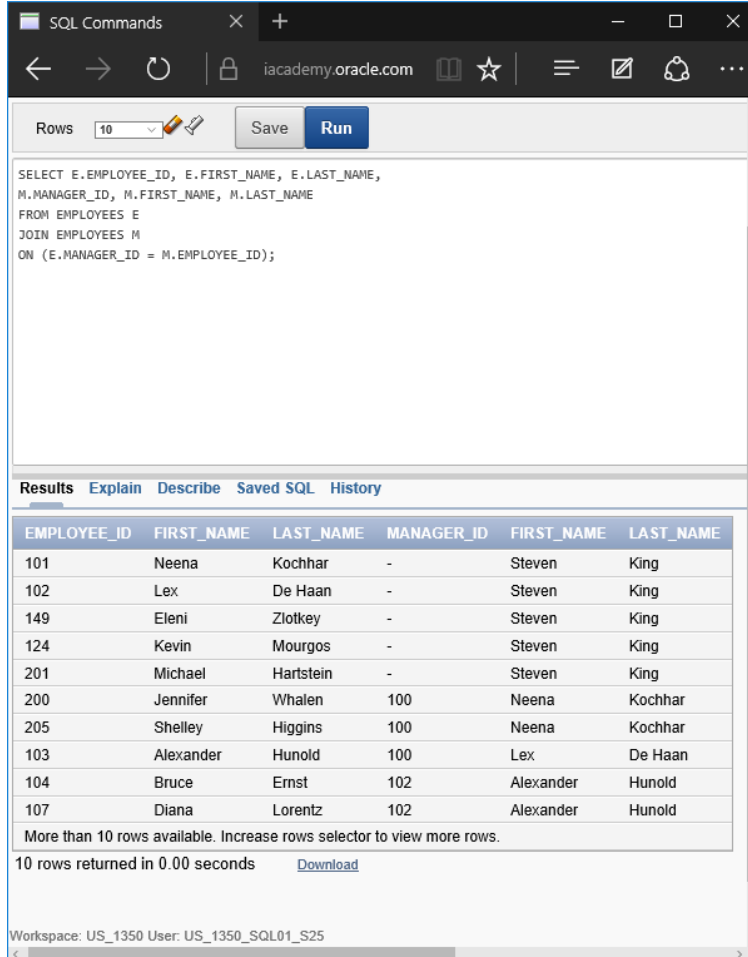
Below the SQL command area, the 'Results' tab is active, displaying a table with the following data:

JOB_TITLE	FIRST_NAME	LAST_NAME	EMAIL
Stock Clerk	Trenna	Rajs	TRAJS
Stock Clerk	Curtis	Davies	CDAVIES
Stock Clerk	Randall	Matos	RMATOS
Stock Clerk	Peter	Vargas	PVARGAS

Below the table, it states '4 rows returned in 0.01 seconds' with a 'Download' link.

The following questions use the JOIN...ON syntax:

7. Write a statement that displays the employee ID, first name, last name, manager ID, manager first name, and manager last name for every employee in the employees table. Hint: this is a self-join.



The screenshot shows the SQL Commands window in Oracle Academy. The query is a self-join on the EMPLOYEES table. The results table displays the employee ID, first name, last name, manager ID, manager first name, and manager last name for 10 rows. The first 5 rows show employees without managers (manager ID is -), and the next 5 rows show employees with managers (manager ID is 100, 102, 102, 102, 102).

```

SELECT E.EMPLOYEE_ID, E.FIRST_NAME, E.LAST_NAME,
M.MANAGER_ID, M.FIRST_NAME, M.LAST_NAME
FROM EMPLOYEES E
JOIN EMPLOYEES M
ON (E.MANAGER_ID = M.EMPLOYEE_ID);

```

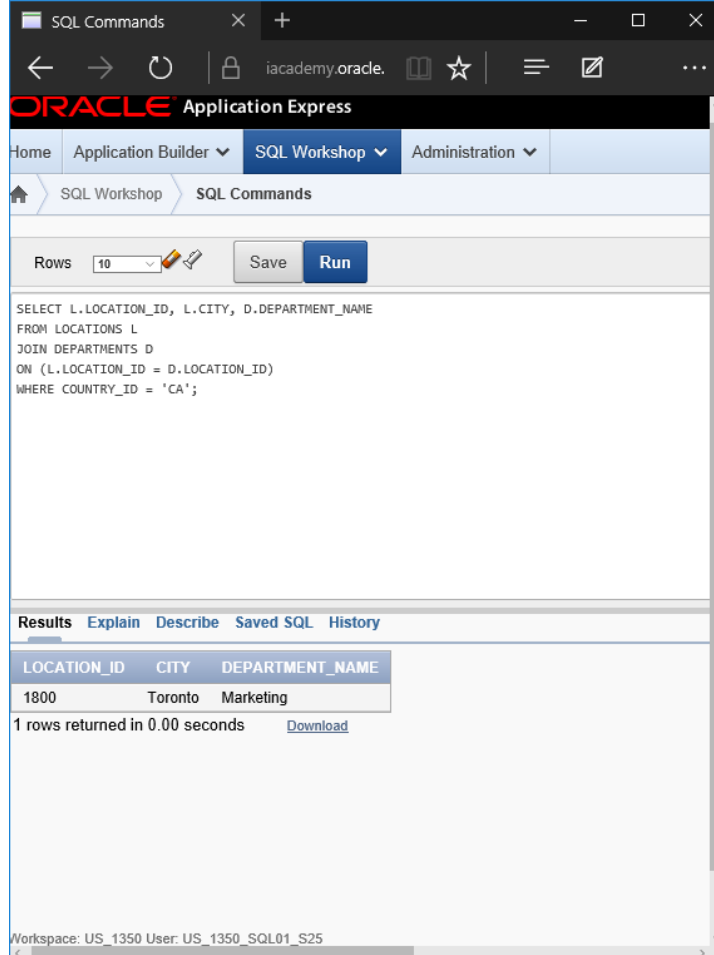
EMPLOYEE_ID	FIRST_NAME	LAST_NAME	MANAGER_ID	FIRST_NAME	LAST_NAME
101	Neena	Kochhar	-	Steven	King
102	Lex	De Haan	-	Steven	King
149	Eleni	Zlotkey	-	Steven	King
124	Kevin	Mourgos	-	Steven	King
201	Michael	Hartstein	-	Steven	King
200	Jennifer	Whalen	100	Neena	Kochhar
205	Shelley	Higgins	100	Neena	Kochhar
103	Alexander	Hunold	100	Lex	De Haan
104	Bruce	Ernst	102	Alexander	Hunold
107	Diana	Lorentz	102	Alexander	Hunold

More than 10 rows available. Increase rows selector to view more rows.

10 rows returned in 0.00 seconds [Download](#)

Workspace: US\_1350 User: US\_1350\_SQL01\_S25

8. Use JOIN ON syntax to query and display the location ID, city, and department name for all Canadian locations.



The screenshot shows the Oracle SQL Workshop interface. The top navigation bar includes 'Home', 'Application Builder', 'SQL Workshop', and 'Administration'. The 'SQL Workshop' tab is active, and the 'SQL Commands' sub-tab is selected. Below the navigation bar, there is a 'Rows' dropdown set to '10', a 'Save' button, and a 'Run' button. The SQL command entered is:

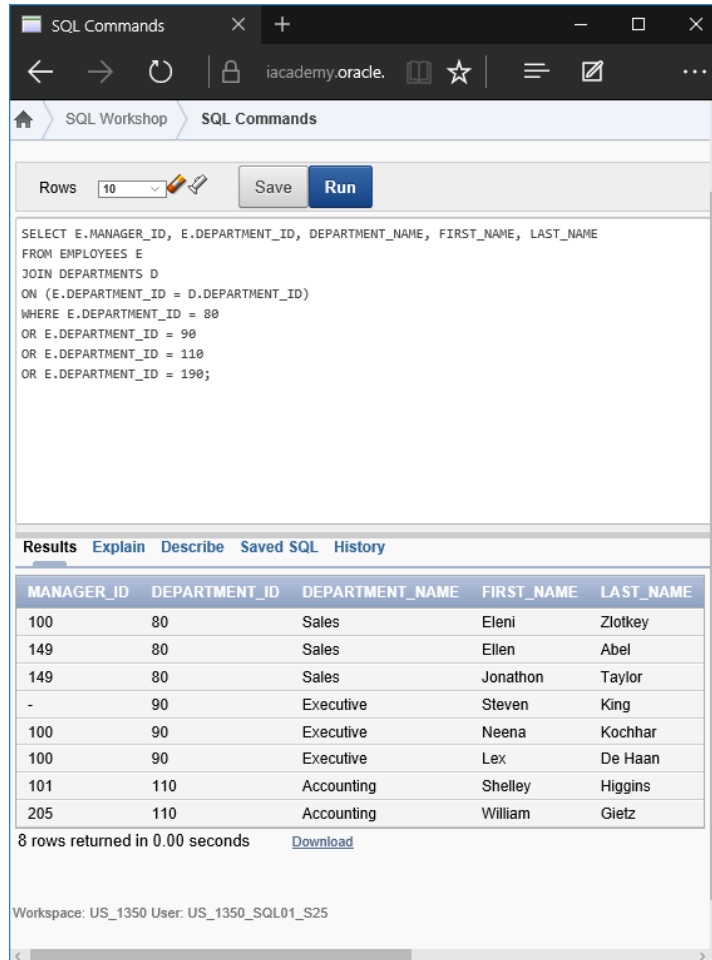
```
SELECT L.LOCATION_ID, L.CITY, D.DEPARTMENT_NAME
FROM LOCATIONS L
JOIN DEPARTMENTS D
ON (L.LOCATION_ID = D.LOCATION_ID)
WHERE COUNTRY_ID = 'CA';
```

Below the command, the 'Results' tab is active, displaying a table with the following data:

LOCATION_ID	CITY	DEPARTMENT_NAME
1800	Toronto	Marketing

Below the table, it states '1 rows returned in 0.00 seconds' and provides a 'Download' link. The bottom status bar shows 'Workspace: US\_1350 User: US\_1350\_SQL01\_S25'.

9. Query and display manager ID, department ID, department name, first name, and last name for all employees in departments 80, 90, 110, and 190.



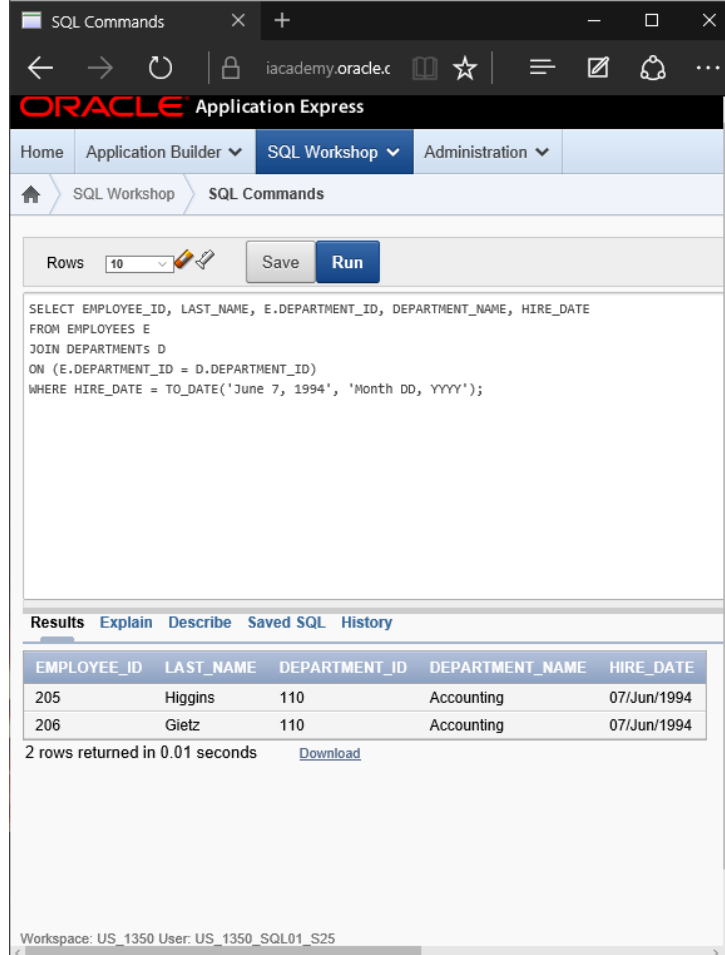
The screenshot shows the SQL Workshop interface in a web browser. The top bar indicates the user is logged in as 'iacademy.oracle'. The main area is titled 'SQL Commands' and contains a text editor with the following SQL query:

```
SELECT E.MANAGER_ID, E.DEPARTMENT_ID, DEPARTMENT_NAME, FIRST_NAME, LAST_NAME
FROM EMPLOYEES E
JOIN DEPARTMENTS D
ON (E.DEPARTMENT_ID = D.DEPARTMENT_ID)
WHERE E.DEPARTMENT_ID = 80
OR E.DEPARTMENT_ID = 90
OR E.DEPARTMENT_ID = 110
OR E.DEPARTMENT_ID = 190;
```

Below the query editor, the 'Results' tab is active, displaying the query results in a table. The table has five columns: MANAGER\_ID, DEPARTMENT\_ID, DEPARTMENT\_NAME, FIRST\_NAME, and LAST\_NAME. There are 8 rows of data returned. At the bottom of the results section, it states '8 rows returned in 0.00 seconds' and provides a 'Download' link. The workspace information at the bottom reads 'Workspace: US\_1350 User: US\_1350\_SQL01\_S25'.

MANAGER_ID	DEPARTMENT_ID	DEPARTMENT_NAME	FIRST_NAME	LAST_NAME
100	80	Sales	Eleni	Zlotkey
149	80	Sales	Ellen	Abel
149	80	Sales	Jonathon	Taylor
-	90	Executive	Steven	King
100	90	Executive	Neena	Kochhar
100	90	Executive	Lex	De Haan
101	110	Accounting	Shelley	Higgins
205	110	Accounting	William	Gietz

10. Display employee ID, last name, department ID, department name, and hire date for those employees whose hire date was June 7, 1994.



The screenshot shows the Oracle SQL Workshop interface. The top navigation bar includes 'Home', 'Application Builder', 'SQL Workshop', and 'Administration'. The 'SQL Workshop' tab is active, and the 'SQL Commands' sub-tab is selected. Below the navigation bar, there is a 'Rows' dropdown set to '10', a 'Save' button, and a 'Run' button. The SQL command area contains the following query:

```
SELECT EMPLOYEE_ID, LAST_NAME, E.DEPARTMENT_ID, DEPARTMENT_NAME, HIRE_DATE
FROM EMPLOYEES E
JOIN DEPARTMENTS D
ON (E.DEPARTMENT_ID = D.DEPARTMENT_ID)
WHERE HIRE_DATE = TO_DATE('June 7, 1994', 'Month DD, YYYY');
```

Below the query, the 'Results' tab is active, displaying a table with 2 rows. The table has the following columns: EMPLOYEE\_ID, LAST\_NAME, DEPARTMENT\_ID, DEPARTMENT\_NAME, and HIRE\_DATE.

EMPLOYEE_ID	LAST_NAME	DEPARTMENT_ID	DEPARTMENT_NAME	HIRE_DATE
205	Higgins	110	Accounting	07/Jun/1994
206	Gietz	110	Accounting	07/Jun/1994

Below the table, it states '2 rows returned in 0.01 seconds' and provides a 'Download' link. The bottom status bar shows 'Workspace: US\_1350 User: US\_1350\_SQL01\_S25'.

11. What are the ANSI standard JOINS that are equivalent to:

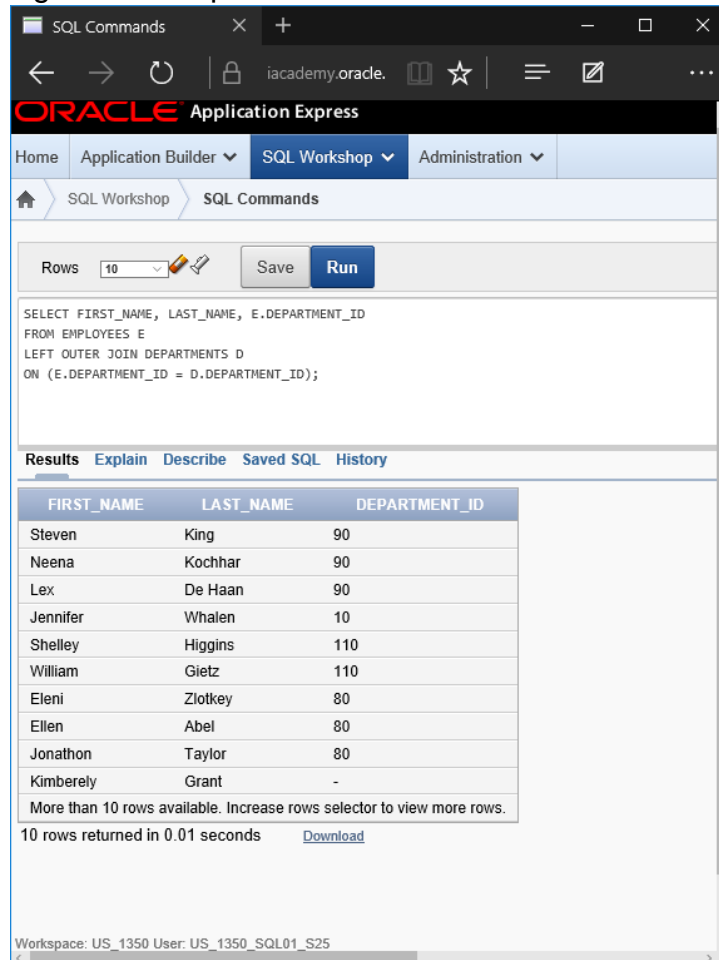
- A Cartesian product
- An equijoin
- A non equijoin** ←

## Section 3 Lesson 3: Inner versus Outer Joins

### Try It / Solve It

Use the Oracle database for problems 1-7.

1. Return the first name, last name, and department name for all employees including those employees not assigned to a department.



The screenshot shows the Oracle Application Express SQL Workshop interface. The SQL Commands window contains the following query:

```
SELECT FIRST_NAME, LAST_NAME, E.DEPARTMENT_ID
FROM EMPLOYEES E
LEFT OUTER JOIN DEPARTMENTS D
ON (E.DEPARTMENT_ID = D.DEPARTMENT_ID);
```

The Results tab displays the following data:

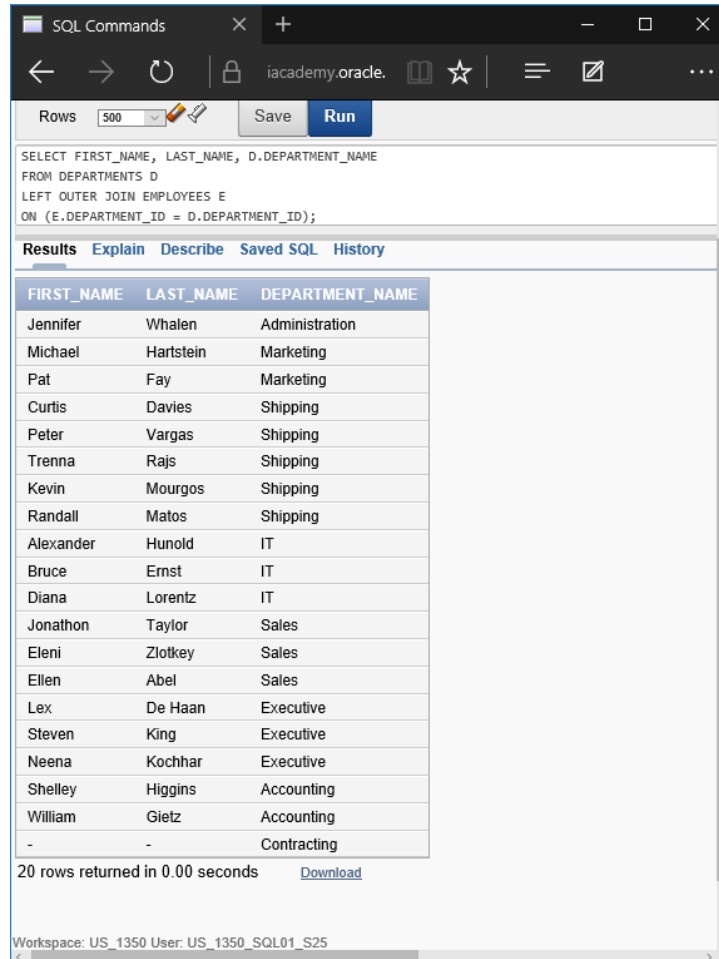
FIRST_NAME	LAST_NAME	DEPARTMENT_ID
Steven	King	90
Neena	Kochhar	90
Lex	De Haan	90
Jennifer	Whalen	10
Shelley	Higgins	110
William	Gietz	110
Eleni	Zlotkey	80
Ellen	Abel	80
Jonathon	Taylor	80
Kimberely	Grant	-

More than 10 rows available. Increase rows selector to view more rows.  
10 rows returned in 0.01 seconds [Download](#)

Workspace: US\_1350 User: US\_1350\_SQL01\_S25



- Return the first name, last name, and department name for all employees including those departments that do not have an employee assigned to them.



The screenshot shows the SQL Commands window in Oracle Academy. The query is a LEFT OUTER JOIN between the DEPARTMENTS table (D) and the EMPLOYEES table (E) on the DEPARTMENT\_ID column. The results show 20 rows, including employees and departments without employees.

```

SELECT FIRST_NAME, LAST_NAME, D.DEPARTMENT_NAME
FROM DEPARTMENTS D
LEFT OUTER JOIN EMPLOYEES E
ON (E.DEPARTMENT_ID = D.DEPARTMENT_ID);

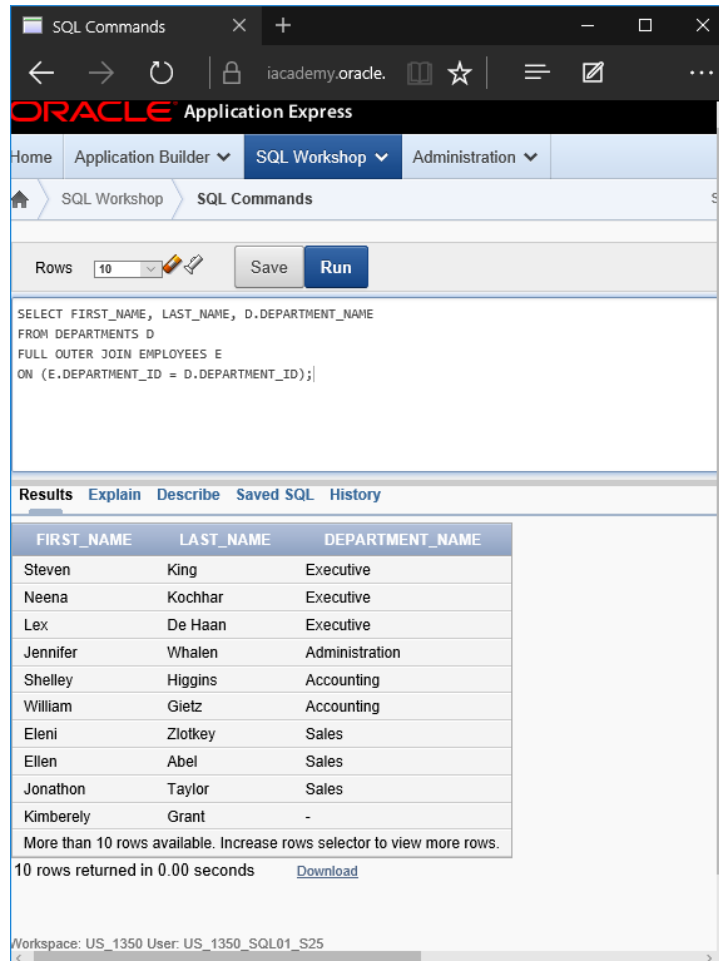
```

FIRST_NAME	LAST_NAME	DEPARTMENT_NAME
Jennifer	Whalen	Administration
Michael	Hartstein	Marketing
Pat	Fay	Marketing
Curtis	Davies	Shipping
Peter	Vargas	Shipping
Trenna	Rajs	Shipping
Kevin	Mourgos	Shipping
Randall	Matos	Shipping
Alexander	Hunold	IT
Bruce	Ernst	IT
Diana	Lorentz	IT
Jonathon	Taylor	Sales
Eleni	Zlotkey	Sales
Ellen	Abel	Sales
Lex	De Haan	Executive
Steven	King	Executive
Neena	Kochhar	Executive
Shelley	Higgins	Accounting
William	Gietz	Accounting
-	-	Contracting

20 rows returned in 0.00 seconds [Download](#)

Workspace: US\_1350 User: US\_1350\_SQL01\_S25

- Return the first name, last name, and department name for all employees including those departments that do not have an employee assigned to them and those employees not assigned to a department.



The screenshot shows the Oracle SQL Workshop interface. The top navigation bar includes 'Home', 'Application Builder', 'SQL Workshop', and 'Administration'. The 'SQL Workshop' tab is active, and the 'SQL Commands' sub-tab is selected. Below the navigation bar, there is a 'Rows' selector set to 10, and 'Save' and 'Run' buttons. The SQL command area contains the following query:

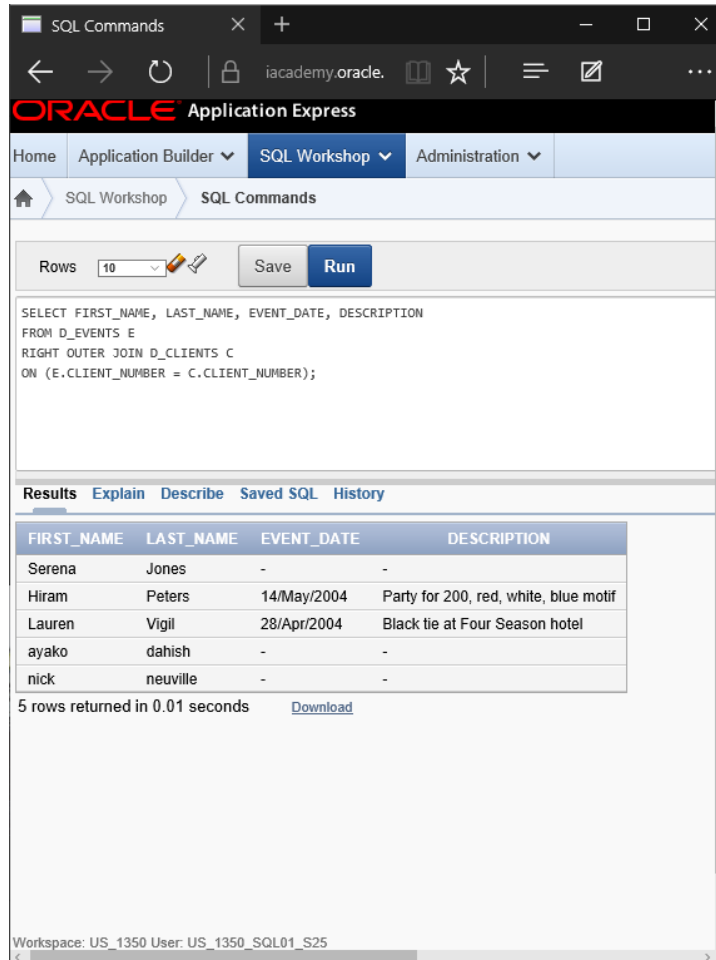
```
SELECT FIRST_NAME, LAST_NAME, D.DEPARTMENT_NAME
FROM DEPARTMENTS D
FULL OUTER JOIN EMPLOYEES E
ON (E.DEPARTMENT_ID = D.DEPARTMENT_ID);
```

Below the query, the 'Results' tab is active, displaying a table with the following data:

FIRST_NAME	LAST_NAME	DEPARTMENT_NAME
Steven	King	Executive
Neena	Kochhar	Executive
Lex	De Haan	Executive
Jennifer	Whalen	Administration
Shelley	Higgins	Accounting
William	Gietz	Accounting
Eleni	Zlotkey	Sales
Ellen	Abel	Sales
Jonathon	Taylor	Sales
Kimberely	Grant	-

Below the table, it states 'More than 10 rows available. Increase rows selector to view more rows.' and '10 rows returned in 0.00 seconds'. A 'Download' link is also present. The bottom status bar shows 'Workspace: US\_1350 User: US\_1350\_SQL01\_S25'.

4. Create a query of the DJs on Demand database to return the first name, last name, event date, and description of the event the client held. Include all the clients even if they have not had an event scheduled.



The screenshot shows the Oracle Application Express SQL Workshop interface. The top navigation bar includes 'Home', 'Application Builder', 'SQL Workshop', and 'Administration'. The 'SQL Workshop' tab is active, and the 'SQL Commands' sub-tab is selected. Below the navigation bar, there is a 'Rows' dropdown set to '10', a 'Save' button, and a 'Run' button. The SQL command area contains the following query:

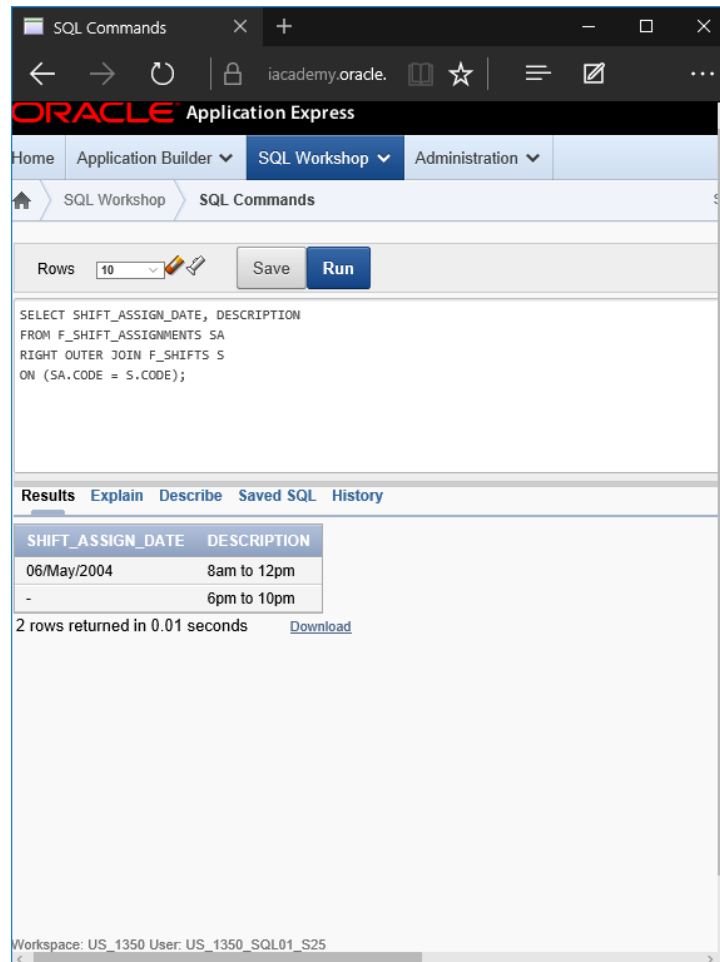
```
SELECT FIRST_NAME, LAST_NAME, EVENT_DATE, DESCRIPTION
FROM D_EVENTS E
RIGHT OUTER JOIN D_CLIENTS C
ON (E.CLIENT_NUMBER = C.CLIENT_NUMBER);
```

Below the query, the 'Results' tab is active, displaying a table with the following data:

FIRST_NAME	LAST_NAME	EVENT_DATE	DESCRIPTION
Serena	Jones	-	-
Hiram	Peters	14/May/2004	Party for 200, red, white, blue motif
Lauren	Vigil	28/Apr/2004	Black tie at Four Season hotel
ayako	dahish	-	-
nick	neuville	-	-

Below the table, it states '5 rows returned in 0.01 seconds' with a 'Download' link. The bottom status bar shows 'Workspace: US\_1350 User: US\_1350\_SQL01\_S25'.

5. Using the Global Fast Foods database, show the shift description and shift assignment date even if there is no date assigned for each shift description.



The screenshot shows the Oracle SQL Workshop interface. The top navigation bar includes 'Home', 'Application Builder', 'SQL Workshop', and 'Administration'. The 'SQL Workshop' tab is active, and the 'SQL Commands' sub-tab is selected. Below the navigation bar, there is a 'Rows' dropdown set to '10', and 'Save' and 'Run' buttons. The SQL command area contains the following query:

```
SELECT SHIFT_ASSIGN_DATE, DESCRIPTION
FROM F_SHIFT_ASSIGNMENTS SA
RIGHT OUTER JOIN F_SHIFTS S
ON (SA.CODE = S.CODE);
```

Below the query, the 'Results' tab is active, displaying a table with two columns: 'SHIFT\_ASSIGN\_DATE' and 'DESCRIPTION'. The table contains two rows of data:

SHIFT_ASSIGN_DATE	DESCRIPTION
06/May/2004	8am to 12pm
-	6pm to 10pm

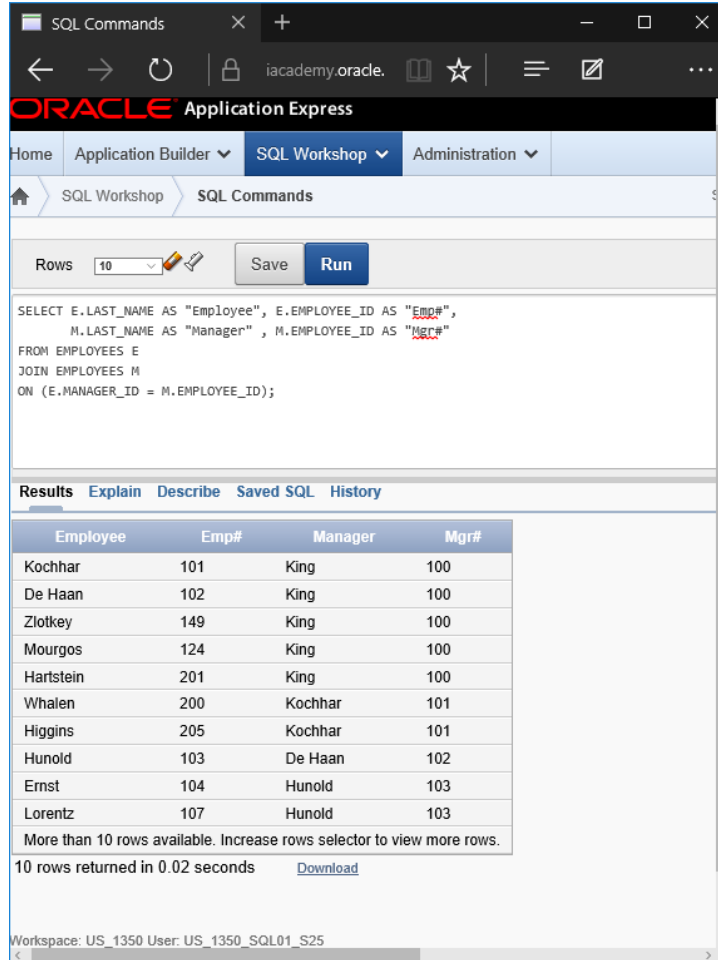
Below the table, it states '2 rows returned in 0.01 seconds' and provides a 'Download' link. The bottom status bar shows 'Workspace: US\_1350 User: US\_1350\_SQL01\_S25'.

## Section 3 Lesson 4: Self Joins and Hierarchical Queries

### Try It / Solve It

For each problem, use the Oracle database.

1. Display the employee's last name and employee number along with the manager's last name and manager number. Label the columns: Employee, Emp#, Manager, and Mgr#, respectively.



The screenshot shows the Oracle Application Express SQL Workshop interface. The SQL Commands window contains the following query:


```
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);
```

The Results tab displays the following data:

Employee	Emp#	Manager	Mgr#
Kochhar	101	King	100
De Haan	102	King	100
Zlotkey	149	King	100
Mourgos	124	King	100
Hartstein	201	King	100
Whalen	200	Kochhar	101
Higgins	205	Kochhar	101
Hunold	103	De Haan	102
Ernst	104	Hunold	103
Lorentz	107	Hunold	103

Below the table, it states: "More than 10 rows available. Increase rows selector to view more rows." and "10 rows returned in 0.02 seconds".

2. Modify question 1 to display all employees and their managers, even if the employee does not have a manager. Order the list alphabetically by the last name of the employee.



The screenshot shows the Oracle Application Express SQL Workshop interface. The SQL Commands tab is active, displaying a query that performs a right outer join between the EMPLOYEES table and itself to show all employees and their managers. The query is executed, and the results are displayed in a table format. The table has four columns: Employee, Emp#, Manager, and Mgr#. The results show 10 rows of data, including employees like Zlotkey, Whalen, Vargas, Taylor, Rajs, Mourgos, Matos, Lorentz, Kochhar, and King. The King employee is shown with a null manager.

```

SELECT E.LAST_NAME AS "Employee", E.EMPLOYEE_ID AS "Emp#",
       M.LAST_NAME AS "Manager", M.EMPLOYEE_ID AS "Mgr#"
FROM EMPLOYEES M RIGHT OUTER JOIN EMPLOYEES E
ON (E.MANAGER_ID = M.EMPLOYEE_ID)

```

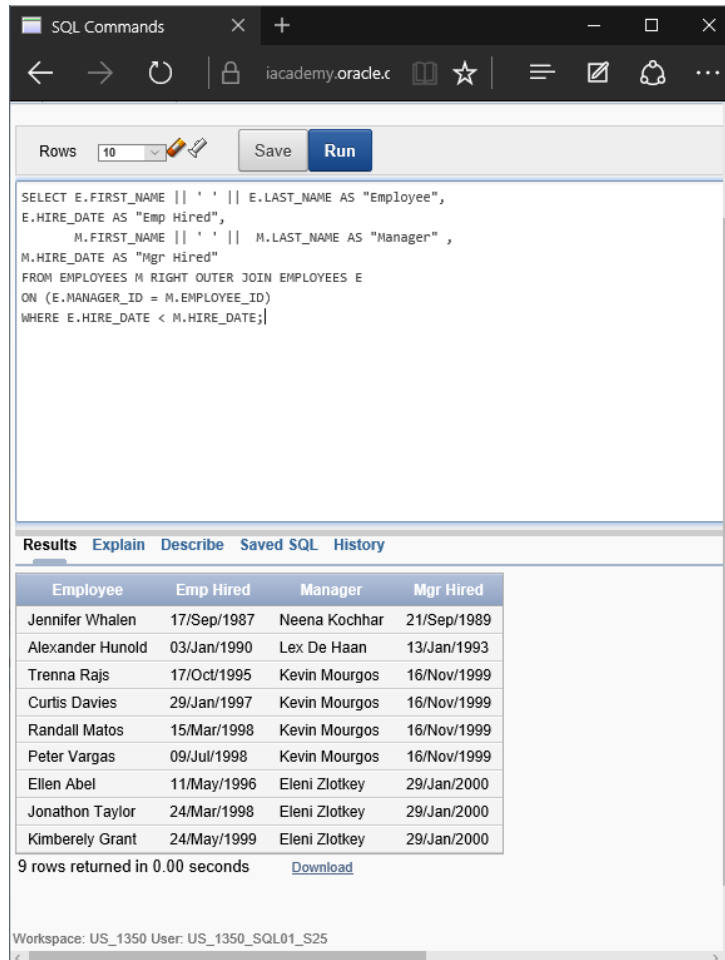
Employee	Emp#	Manager	Mgr#
Zlotkey	149	King	100
Whalen	200	Kochhar	101
Vargas	144	Mourgos	124
Taylor	176	Zlotkey	149
Rajs	141	Mourgos	124
Mourgos	124	King	100
Matos	143	Mourgos	124
Lorentz	107	Hunold	103
Kochhar	101	King	100
King	100	-	-

More than 10 rows available. Increase rows selector to view more rows.

10 rows returned in 0.00 seconds [Download](#)

Workspace: US\_1350 User: US\_1350\_SQL01\_S25

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



The screenshot shows the SQL Developer interface with a query window titled "SQL Commands". The query is as follows:

```
SELECT E.FIRST_NAME || ' ' || E.LAST_NAME AS "Employee",
E.HIRE_DATE AS "Emp Hired",
      M.FIRST_NAME || ' ' || M.LAST_NAME AS "Manager" ,
M.HIRE_DATE AS "Mgr Hired"
FROM EMPLOYEES M RIGHT OUTER JOIN EMPLOYEES E
ON (E.MANAGER_ID = M.EMPLOYEE_ID)
WHERE E.HIRE_DATE < M.HIRE_DATE;
```

The results are displayed in a table with the following columns: Employee, Emp Hired, Manager, and Mgr Hired. There are 9 rows returned.

Employee	Emp Hired	Manager	Mgr Hired
Jennifer Whalen	17/Sep/1987	Neena Kochhar	21/Sep/1989
Alexander Hunold	03/Jan/1990	Lex De Haan	13/Jan/1993
Trenna Rajs	17/Oct/1995	Kevin Mourgog	16/Nov/1999
Curtis Davies	29/Jan/1997	Kevin Mourgog	16/Nov/1999
Randall Matos	15/Mar/1998	Kevin Mourgog	16/Nov/1999
Peter Vargas	09/Jul/1998	Kevin Mourgog	16/Nov/1999
Ellen Abel	11/May/1996	Eleni Zlotkey	29/Jan/2000
Jonathon Taylor	24/Mar/1998	Eleni Zlotkey	29/Jan/2000
Kimberely Grant	24/May/1999	Eleni Zlotkey	29/Jan/2000

9 rows returned in 0.00 seconds [Download](#)

Workspace: US\_1350 User: US\_1350\_SQL01\_S25

4. Write a report that shows the hierarchy for Lex De Haans department. Include last name, salary, and department id in the report.

The screenshot shows the Oracle Application Express SQL Workshop interface. The top navigation bar includes 'Home', 'Application Builder', 'SQL Workshop', and 'Administration'. The 'SQL Workshop' tab is active, and the 'SQL Commands' sub-tab is selected. Below the navigation bar, there is a 'Rows' dropdown set to '10', a 'Save' button, and a 'Run' button. The SQL command area contains the following query:

```
SELECT E.LAST_NAME, E.SALARY, E.DEPARTMENT_ID
FROM EMPLOYEES M
RIGHT OUTER JOIN EMPLOYEES E
ON (E.MANAGER_ID = M.EMPLOYEE_ID)
WHERE M.LAST_NAME = INITCAP('DE HAAN');
```

Below the SQL command area, the 'Results' tab is active, displaying a table with the following data:

LAST_NAME	SALARY	DEPARTMENT_ID
Hunold	9000	60

Below the table, it states '1 rows returned in 0.01 seconds' and provides a 'Download' link. The bottom status bar shows 'Workspace: US\_1350 User: US\_1350\_SQL01\_S25'.



5. What is wrong in the following statement?

```
SELECT last_name, department_id, salary
FROM employees
START WITH last_name = 'King'
CONNECT BY PRIOR manager_id = employee_id;
```

The **CONNECT BY PRIOR** clause should say 'employee\_id = manger\_id'

6. Create a report that shows the organization chart for the entire employee table. Write the report so that each level will indent each employee 2 spaces. Since Oracle Application Express cannot display the spaces in front of the column, use - (minus) instead.



The screenshot shows the Oracle Application Express interface. The SQL Commands window contains the following query:

```
SELECT LPAD(LAST_NAME,
           LENGTH(LAST_NAME) +
           (LEVEL*2)-2, '-')
AS ORG_CHART
FROM EMPLOYEES
START WITH EMPLOYEE_ID = 100
CONNECT BY PRIOR EMPLOYEE_ID = MANAGER_ID;
```

The Results tab shows the output of the query, which is an organization chart. The results are displayed in a table with the following data:

ORG_CHART
King
--Kochhar
----Whalen
----Higgins
-----Gietz
--De Haan
----Hunold
-----Ernst
-----Lorentz
--Mourgos

More than 10 rows available. Increase rows selector to view more rows.

10 rows returned in 0.01 seconds [Download](#)

Workspace: US\_1350 User: US\_1350\_SQL01\_S25

7. Re-write the report from 6 to exclude De Haan and all the people working for him.

The screenshot shows the Oracle Application Express SQL Workshop interface. The browser address bar shows 'iacademy.oracle.'. The navigation tabs include 'Home', 'Application Builder', 'SQL Workshop', and 'Administration'. The 'SQL Workshop' tab is active, and the 'SQL Commands' sub-tab is selected. The 'Rows' selector is set to 10. The SQL query is as follows:

```
SELECT LPAD(LAST_NAME,
            LENGTH(LAST_NAME) +
            (LEVEL*2)-2, '-')
AS ORG_CHART
FROM EMPLOYEES
START WITH EMPLOYEE_ID = 100
CONNECT BY PRIOR EMPLOYEE_ID = MANAGER_ID
AND LAST_NAME != INITCAP('DE HAAN');
```

The results are displayed in a table titled 'ORG\_CHART'. The table contains 10 rows of data, showing the organizational chart for the employee with ID 100, excluding De Haan and his subordinates. The results are as follows:

ORG_CHART
King
--Kochhar
----Whalen
----Higgins
-----Gietz
--Mourgos
----Rajs
----Davies
----Matos
----Vargas

More than 10 rows available. Increase rows selector to view more rows.

10 rows returned in 0.01 seconds [Download](#)

Workspace: US\_1350 User: US\_1350\_SQL01\_S25