A
Practice Solutions

Practice 1: Solutions

Part 1

Test your knowledge:

1. The following `SELECT` statement executes successfully:

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

True/False

2. The following `SELECT` statement executes successfully:

```
SELECT *
FROM   job_grades;
```

True/False

3. There are four coding errors in this statement. Can you identify them?

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

- **The `EMPLOYEES` table does not contain a column called `sal`. The column is called `SALARY`.**
- **The multiplication operator is *, not x, as shown in line 2.**
- **The `ANNUAL SALARY` alias cannot include spaces. The alias should read `ANNUAL_SALARY` or should be enclosed in double quotation marks.**
- **A comma is missing after the `LAST_NAME` column.**

Part 2

Note the following location for the lab files:

\home\oracle\labs\SQL1\labs

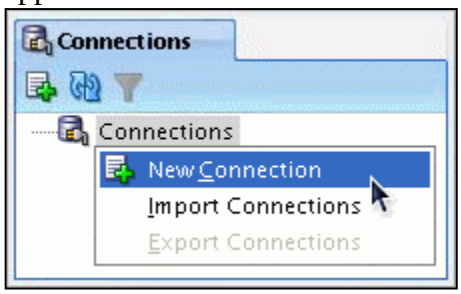
If you are asked to save any lab files, save them at this location.

To start Oracle SQL Developer, double-click the SQL Developer desktop icon.

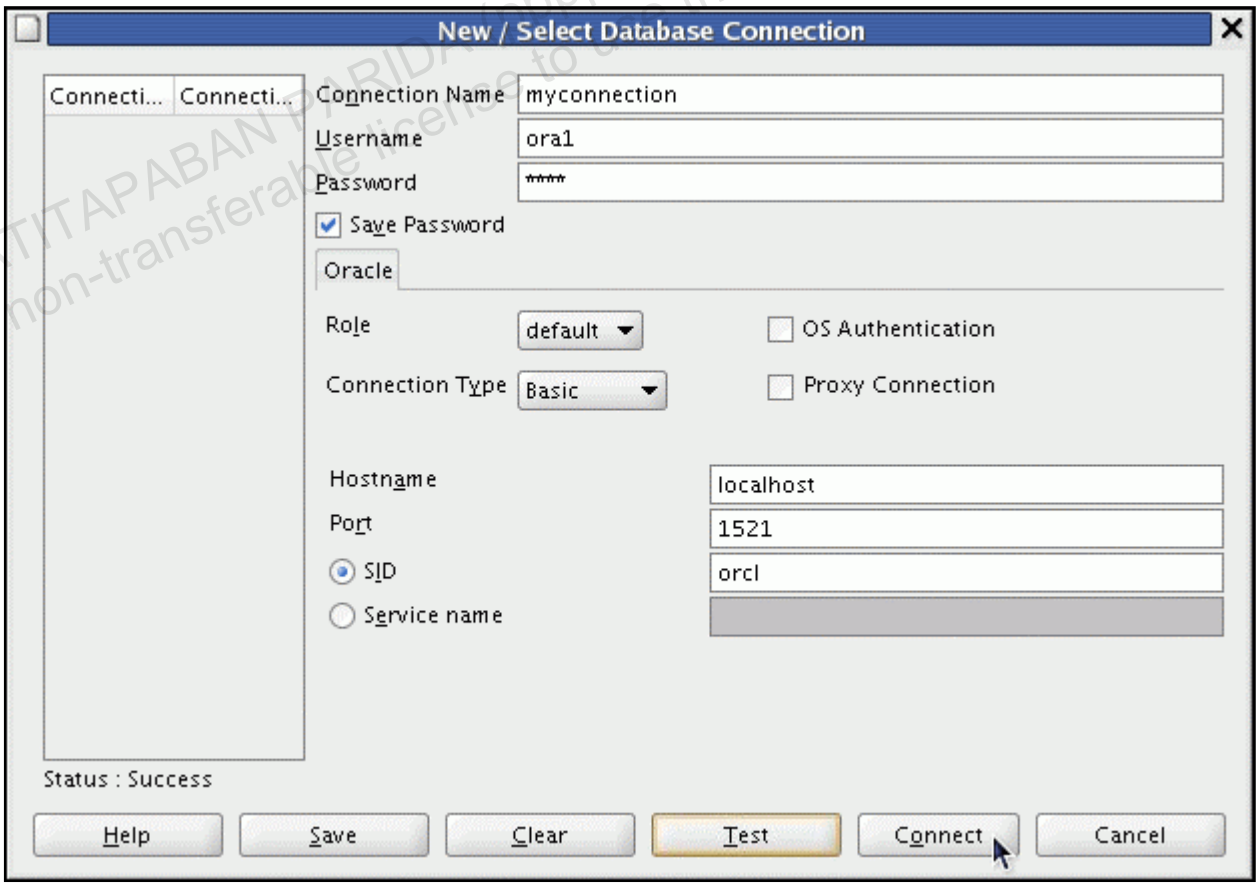
Before you begin with the practices, you need a database connection to be able to connect to the database and issue SQL queries.

Practice 1: Solutions (continued)

4. To create a new database connection in the Connections Navigator, right-click Connections. Select New Connection from the menu. The New/Select Database Connection dialog box appears.



5. Create a database connection using the following information:
   a. Connection Name: `myconnection`
   b. Username: `ora1`
   c. Password: `ora1`
   d. Hostname: localhost
   e. Port: 1521
   f. SID: ORCL
   g. Ensure that you select the Save Password check box.



Practice 1: Solutions (continued)

You have been hired as a SQL programmer for Acme Corporation. Your first task is to create some reports based on data from the Human Resources tables.

6. Your first task is to determine the structure of the DEPARTMENTS table and its contents.

```
DESCRIBE departments

SELECT *
FROM   departments;
```

7. You need to determine the structure of the EMPLOYEES table.

```
DESCRIBE employees
```

The HR department wants a query to display the last name, job code, hire date, and employee number for each employee, with the employee number appearing first. Provide an alias STARTDATE for the HIRE_DATE column. Save your SQL statement to a file named lab_01_07.sql so that you can dispatch this file to the HR department.

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

8. Test your query in the lab_01_07.sql file to ensure that it runs correctly.

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

9. The HR department needs a query to display all unique job codes from the EMPLOYEES table.

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

Part 3

If you have time, complete the following exercises:

10. The HR department wants more descriptive column headings for its report on employees. Copy the statement from lab_01_07.sql to the SQL Developer text box. Name the column headings Emp #, Employee, Job, and Hire Date, respectively. Then run your query again.

```
SELECT employee_id "Emp #", last_name "Employee",
       job_id "Job", hire_date "Hire Date"
FROM   employees;
```

Practice 1: Solutions (continued)

11. 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`.

```
SELECT last_name||', '||job_id "Employee and Title"
FROM   employees;
```

If you want an extra challenge, complete the following exercise:

12. To familiarize yourself with the data in the `EMPLOYEES` table, create a query to display all the data from the `EMPLOYEES` table. Separate each column output with a comma. Name the column `THE_OUTPUT`.

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

Practice 2: Solutions

The HR department needs your assistance with creating some queries.

1. Because of budget issues, the HR department needs a report that displays the last name and salary of employees earning more than $12,000. Place your SQL statement in a text file named `lab_02_01.sql`. Run your query.

```
SELECT  last_name, salary
FROM    employees
WHERE   salary > 12000;
```

2. Create a report that displays the last name and department number for employee number 176.

```
SELECT  last_name, department_id
FROM    employees
WHERE   employee_id = 176;
```

3. The HR departments needs to find high-salary and low-salary employees. Modify `lab_02_01.sql` to display the last name and salary for all employees whose salary is not in the $5,000–$12,000 range. Place your SQL statement in a text file named `lab_02_03.sql`.

```
SELECT  last_name, salary
FROM    employees
WHERE   salary NOT BETWEEN 5000 AND 12000;
```

4. Create a report to display the last name, job ID, and start date for the employees whose last names are Matos and Taylor. Order the query in ascending order by start date.

```
SELECT   last_name, job_id, hire_date
FROM     employees
WHERE    last_name IN ('Matos', 'Taylor')
ORDER BY hire_date;
```

5. Display the last name and department number of all employees in departments 20 or 50 in ascending alphabetical order by name.

```
SELECT   last_name, department_id
FROM     employees
WHERE    department_id IN (20, 50)
ORDER BY last_name ASC;
```

Practice 2: Solutions (continued)

6. Modify `lab_02_03.sql` to list the last name and salary of employees who earn between $5,000 and $12,000, and are in department 20 or 50. Label the columns `Employee` and `Monthly Salary`, respectively. Resave `lab_02_03.sql` as `lab_02_06.sql`. Run the statement in `lab_02_06.sql`.

```
SELECT   last_name "Employee", salary "Monthly Salary"
FROM     employees
WHERE    salary  BETWEEN 5000 AND 12000
AND      department_id IN (20, 50);
```

7. The HR department needs a report that displays the last name and hire date for all employees who were hired in 1994.

```
SELECT   last_name, hire_date
FROM     employees
WHERE    hire_date LIKE '%94';
```

8. Create a report to display the last name and job title of all employees who do not have a manager.

```
SELECT   last_name, job_id
FROM     employees
WHERE    manager_id IS NULL;
```

9. Display the last name, salary, and commission for all employees who earn commissions. Sort data in descending order of salary and commissions.

```
SELECT   last_name, salary, commission_pct
FROM     employees
WHERE    commission_pct IS NOT NULL
ORDER BY salary DESC, commission_pct DESC;
```

10. Members of the HR department want to have more flexibility with the queries that you are writing. They would like a report that displays the last name and salary of employees who earn more than an amount that the user specifies after a prompt. (You can use the query created in practice exercise 1 and modify it.) Save this query to a file named `lab_02_10.sql`.

```
SELECT  last_name, salary
FROM    employees
WHERE   salary > &sal_amt;
```

Practice 2: Solutions (continued)

11. The HR department wants to run reports based on a manager. Create a query that prompts the user for a manager ID and generates the employee ID, last name, salary, and department for that manager's employees. The HR department wants the ability to sort the report on a selected column. You can test the data with the following values:

    manager ID = 103, sorted by employee last name

    manager ID = 201, sorted by salary

    manager ID = 124, sorted by employee ID

```
SELECT employee_id, last_name, salary, department_id
FROM employees
WHERE manager_id = &mgr_num
ORDER BY &order_col;
```

If you have time, complete the following exercises:

12. Display all employee last names in which the third letter of the name is *a*.

```
SELECT   last_name
FROM     employees
WHERE    last_name LIKE '__a%';
```

13. Display the last names of all employees who have both an *a* and an *e* in their last names.

```
SELECT   last_name
FROM     employees
WHERE    last_name LIKE '%a%'
AND      last_name LIKE '%e%';
```

If you want an extra challenge, complete the following exercises:

14. Display the last name, job, and salary for all employees whose job is either that of a sales representative or a stock clerk, and whose salary is not equal to $2,500, $3,500, or $7,000.

```
SELECT   last_name, job_id, salary
FROM     employees
WHERE    job_id IN ('SA_REP', 'ST_CLERK')
AND      salary NOT IN (2500, 3500, 7000);
```

15. Modify `lab_02_06.sql` to display the last name, salary, and commission for all employees whose commission amount is 20%. Resave `lab_02_06.sql` as `lab_02_15.sql`. Rerun the statement in `lab_02_15.sql`.

```
SELECT   last_name "Employee", salary "Monthly Salary",
         commission_pct
FROM     employees
WHERE    commission_pct = .20;
```

Practice 3: Solutions

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

```
SELECT  sysdate "Date"
FROM    dual;
```

2. The HR department needs a report to display the employee number, last name, salary, and salary increased by 15.5% (expressed as a whole number) for each employee. Label the column `New Salary`. Place your SQL statement in a text file named `lab_03_02.sql`.

```
SELECT  employee_id, last_name, salary,
        ROUND(salary * 1.155, 0) "New Salary"
FROM    employees;
```

3. Run your query in the `lab_03_02.sql` file.

```
SELECT  employee_id, last_name, salary,
        ROUND(salary * 1.155, 0) "New Salary"
FROM    employees;
```

4. Modify your `lab_03_02.sql` query to add a column that subtracts the old salary from the new salary. Label the column `Increase`. Save the contents of the file as `lab_03_04.sql`. Run the revised query.

```
SELECT  employee_id, last_name, salary,
        ROUND(salary * 1.155, 0) "New Salary",
        ROUND(salary * 1.155, 0) - salary "Increase"
FROM    employees;
```

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

```
SELECT  INITCAP(last_name) "Name",
        LENGTH(last_name) "Length"
FROM    employees
WHERE   last_name LIKE 'J%'
OR      last_name LIKE 'M%'
OR      last_name LIKE 'A%'
ORDER BY last_name ;
```

Practice 3: Solutions (continued)

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

```
SELECT  INITCAP(last_name) "Name",
        LENGTH(last_name) "Length"
FROM    employees
WHERE   last_name LIKE '&start_letter%'
ORDER BY last_name;
```

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

   Note: Your results will differ.

```
SELECT last_name, ROUND(MONTHS_BETWEEN(
       SYSDATE, hire_date)) MONTHS_WORKED
FROM   employees
ORDER BY months_worked;
```

7. Create a report that produces the following for each employee:
   <employee last name> earns <salary> monthly but wants <3 times salary>.

   Label the column Dream Salaries.

```
SELECT  last_name || ' earns '
        || TO_CHAR(salary, 'fm$99,999.00')
        || ' monthly but wants '
        || TO_CHAR(salary * 3, 'fm$99,999.00')
        || '.' "Dream Salaries"
FROM    employees;
```

If you have time, complete the following exercises:

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

```
SELECT last_name,
       LPAD(salary, 15, '$') SALARY
FROM   employees;
```

Practice 3: Solutions (continued)

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

```
SELECT last_name, hire_date,
       TO_CHAR(NEXT_DAY(ADD_MONTHS(hire_date, 6),'MONDAY'),
       'fmDay, "the" Ddspth "of" Month, YYYY') REVIEW
FROM    employees;
```

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

```
SELECT last_name, hire_date,
       TO_CHAR(hire_date, 'DAY') DAY
FROM     employees
ORDER BY TO_CHAR(hire_date - 1, 'd');
```

If you want an extra challenge, complete the following exercises:

11. Create a query that displays the employees' last names and commission amounts. If an employee does not earn commission, show "No Commission." Label the column COMM.

```
SELECT last_name,
       NVL(TO_CHAR(commission_pct), 'No Commission') COMM
FROM   employees;
```

12. Create a query that displays the first eight characters of the employees' last names and indicates the amounts of their salaries with asterisks. Each asterisk signifies a thousand dollars. Sort the data in descending order of salary. Label the column EMPLOYEES_AND_THEIR_SALARIES.

```
SELECT rpad(last_name, 8)||' '||
       rpad(' ', salary/1000+1, '*')
               EMPLOYEES_AND_THEIR_SALARIES
FROM  employees
ORDER BY salary DESC;
```

Practice 3: Solutions (continued)

13. Using the DECODE function, write a query that displays the grade of all employees based on the value of the column JOB_ID, using the following data:

Job	*Grade*
AD_PRES	A
ST_MAN	B
IT_PROG	C
SA_REP	D
ST_CLERK	E
None of the above	0

```
SELECT job_id, decode (job_id,
                       'ST_CLERK',  'E',
                       'SA_REP',    'D',
                       'IT_PROG',   'C',
                       'ST_MAN',    'B',
                       'AD_PRES',   'A',
                       '0')GRADE
FROM employees;
```

14. Rewrite the statement in the preceding exercise using the CASE syntax.

```
SELECT job_id, CASE job_id
               WHEN 'ST_CLERK' THEN 'E'
               WHEN 'SA_REP'   THEN 'D'
               WHEN 'IT_PROG'  THEN 'C'
               WHEN 'ST_MAN'   THEN 'B'
               WHEN 'AD_PRES'  THEN 'A'
               ELSE '0'  END  GRADE
FROM employees;
```

Practice 4: Solutions

Determine the validity of the following three statements. Circle either True or False.

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

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

3. The `WHERE` clause restricts rows before inclusion in a group calculation.
   True/False

The HR department needs the following reports:

4. Find the highest, lowest, sum, and average salary of all employees. Label the columns `Maximum`, `Minimum`, `Sum`, and `Average`, respectively. Round your results to the nearest whole number. Place your SQL statement in a text file named `lab_04_04.sql`.

```
SELECT ROUND(MAX(salary),0) "Maximum",
       ROUND(MIN(salary),0) "Minimum",
       ROUND(SUM(salary),0) "Sum",
       ROUND(AVG(salary),0) "Average"
FROM   employees;
```

5. Modify the query in `lab_04_04.sql` to display the minimum, maximum, sum, and average salary for each job type. Resave `lab_04_04.sql` as `lab_04_05.sql`. Run the statement in `lab_04_05.sql`.

```
SELECT job_id, ROUND(MAX(salary),0) "Maximum",
               ROUND(MIN(salary),0) "Minimum",
               ROUND(SUM(salary),0) "Sum",
               ROUND(AVG(salary),0) "Average"
FROM   employees
GROUP BY job_id;
```

6. Write a query to display the number of people with the same job.

```
SELECT job_id, COUNT(*)
FROM   employees
GROUP BY job_id;
```

Generalize the query so that the user in the HR department is prompted for a job title. Save the script to a file named `lab_04_06.sql`.

```
SELECT job_id, COUNT(*)
FROM   employees
WHERE  job_id = '&job_title'
GROUP BY job_id;
```

Practice 4: Solutions (continued)

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

```
SELECT COUNT(DISTINCT manager_id) "Number of Managers"
FROM   employees;
```

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

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

If you have time, complete the following exercises:

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

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


If you want an extra challenge, complete the following exercises:

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

```
SELECT  COUNT(*) total,
        SUM(DECODE(TO_CHAR(hire_date, 'YYYY'),1995,1,0))"1995",
        SUM(DECODE(TO_CHAR(hire_date, 'YYYY'),1996,1,0))"1996",
        SUM(DECODE(TO_CHAR(hire_date, 'YYYY'),1997,1,0))"1997",
        SUM(DECODE(TO_CHAR(hire_date, 'YYYY'),1998,1,0))"1998"
FROM    employees;
```

Practice 4: Solutions (continued)

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

```
SELECT   job_id "Job",
         SUM(DECODE(department_id , 20, salary)) "Dept 20",
         SUM(DECODE(department_id , 50, salary)) "Dept 50",
         SUM(DECODE(department_id , 80, salary)) "Dept 80",
         SUM(DECODE(department_id , 90, salary)) "Dept 90",
         SUM(salary) "Total"
FROM     employees
GROUP BY job_id;
```

Practice 5: Solutions

1. Write a query for the HR department to produce the addresses of all the departments. Use the LOCATIONS and COUNTRIES tables. Show the location ID, street address, city, state or province, and country in the output. Use a NATURAL JOIN to produce the results.

```
SELECT location_id, street_address, city, state_province, country_name
FROM   locations
NATURAL JOIN  countries;
```

2. The HR department needs a report of all employees. Write a query to display the last name, department number, and department name for all employees.

```
SELECT last_name, department_id, department_name
FROM   employees
JOIN   departments
USING (department_id);
```

3. The HR department needs a report of employees in Toronto. Display the last name, job, department number, and department name for all employees who work in Toronto.

```
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 LOWER(l.city) = 'toronto';
```

4. Create a report to display the last name and employee number of employees along with their manager's last name and manager number. Label the columns Employee, Emp#, Manager, and Mgr#, respectively. Place your SQL statement in a text file named lab_05_04.sql.

```
SELECT w.last_name "Employee", w.employee_id "EMP#",
       m.last_name "Manager", m.employee_id  "Mgr#"
FROM   employees w join employees m
ON     (w.manager_id = m.employee_id);
```

5. Modify lab_05_04.sql to display all employees, including King, who has no manager. Order the results by the employee number. Place your SQL statement in a text file named lab_05_05.sql. Run the query in lab_05_05.sql.

```
SELECT w.last_name "Employee", w.employee_id "EMP#",
       m.last_name "Manager", m.employee_id  "Mgr#"
FROM   employees w
LEFT   OUTER JOIN employees m
ON     (w.manager_id = m.employee_id);
```

Practice 5: Solutions (continued)

6. Create a report for the HR department that displays employee last names, department numbers, and all the employees who work in the same department as a given employee. Give each column an appropriate label. Save the script to a file named `lab_05_06.sql`.

```
SELECT e.department_id department, e.last_name employee,
       c.last_name colleague
FROM   employees e JOIN employees c
ON     (e.department_id = c.department_id)
WHERE  e.employee_id <> c.employee_id
ORDER BY e.department_id, e.last_name, c.last_name;
```

7. The HR department needs a report on job grades and salaries. To familiarize yourself with the `JOB_GRADES` table, first show the structure of the `JOB_GRADES` table. Then create a query that displays the name, job, department name, salary, and grade for all employees.

```
DESC JOB_GRADES

SELECT e.last_name, e.job_id, d.department_name,
       e.salary, j.grade_level
FROM   employees e JOIN departments d
ON     (e.department_id = d.department_id)
JOIN   job_grades j
ON    (e.salary BETWEEN j.lowest_sal AND j.highest_sal);
```

If you want an extra challenge, complete the following exercises:

8. The HR department wants to determine the names of all employees who were hired after Davies. Create a query to display the name and hire date of any employee hired after employee Davies.

```
SELECT e.last_name, e.hire_date
FROM   employees e JOIN employees davies
ON     (davies.last_name = 'Davies')
WHERE  davies.hire_date < e.hire_date;
```

9. The HR department needs to find the names and hire dates for all employees who were hired before their managers, along with their managers' names and hire dates. Save the script to a file named `lab_05_09.sql`.

```
SELECT w.last_name, w.hire_date, m.last_name, m.hire_date
FROM   employees w JOIN employees m
ON    (w.manager_id = m.employee_id)
WHERE    w.hire_date <  m.hire_date;
```

Practice 6: Solutions

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

```
UNDEFINE Enter_name

SELECT last_name, hire_date
FROM   employees
WHERE  department_id = (SELECT department_id
                        FROM   employees
                        WHERE  last_name = '&&Enter_name')
AND    last_name <> '&Enter_name';
```

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

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

3. Write a query that displays the employee number and last name of all employees who work in a department with any employee whose last name contains a *u*. Place your SQL statement in a text file named `lab_06_03.sql`. Run your query.

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

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

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

Modify the query so that the user is prompted for a location ID. Save this to a file named `lab_06_04.sql`.

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

Practice 6: Solutions (continued)

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

```
SELECT last_name, salary
FROM   employees
WHERE  manager_id = (SELECT employee_id
                     FROM   employees
                     WHERE  last_name = 'King');
```

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

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

If you have time, complete the following exercise:

7. Modify the query in `lab_06_03.sql` to display the employee number, last name, and salary of all employees who earn more than the average salary and who work in a department with any employee whose last name contains a *u*. Resave `lab_06_03.sql` to `lab_06_07.sql`. Run the statement in `lab_06_07.sql`.

```
SELECT employee_id, last_name, salary
FROM   employees
WHERE  department_id IN (SELECT department_id
                         FROM   employees
                         WHERE  last_name like '%u%')
AND    salary > (SELECT AVG(salary)
                 FROM   employees);
```

Practice 7: Solutions

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

```
SELECT department_id
FROM   departments
MINUS
SELECT department_id
FROM   employees
WHERE  job_id = 'ST_CLERK';
```

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

```
SELECT country_id, country_name
FROM   countries
MINUS
SELECT country_id, country_name
FROM   countries
NATURAL JOIN locations
NATURAL JOIN departments;
```

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

```
COLUMN dummy NOPRINT
SELECT  job_id, department_id, 'x' dummy
FROM    employees
WHERE department_id = 10
UNION
SELECT  job_id, department_id, 'y' dummy
FROM    employees
WHERE department_id = 50
UNION
SELECT  job_id, department_id, 'z' dummy
FROM    employees
WHERE department_id = 20
ORDER BY  dummy;
COLUMN dummy PRINT
```

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

```
SELECT    employee_id,job_id
FROM      employees
INTERSECT
SELECT   employee_id,job_id
FROM     job_history;
```

Practice 7: Solutions (continued)

5. The HR department needs a report with the following specifications:

   - Last name and department ID of all the employees from the EMPLOYEES table, regardless of whether or not they belong to a department
   - Department ID and department name of all the departments from the DEPARTMENTS table, regardless of whether or not they have employees working in them

   Write a compound query to accomplish this.

```
SELECT last_name,department_id,TO_CHAR(null)
FROM   employees
UNION
SELECT TO_CHAR(null),department_id,department_name
FROM  departments;
```

Practice 8: Solutions

The HR department wants you to create SQL statements to insert, update, and delete employee data. As a prototype, you use the MY_EMPLOYEE table, before giving the statements to the HR department.

Insert data into the MY_EMPLOYEE table.

1. Run the statement in the lab_08_01.sql script to build the MY_EMPLOYEE table to be used for the lab.

```
CREATE TABLE my_employee
  (id  NUMBER(4) CONSTRAINT my_employee_id_nn NOT NULL,
   last_name VARCHAR2(25),
   first_name VARCHAR2(25),
   userid  VARCHAR2(8),
   salary  NUMBER(9,2));
```

2. Describe the structure of the MY_EMPLOYEE table to identify the column names.

```
DESCRIBE my_employee
```

3. Create an INSERT statement to add the first row of data to the MY_EMPLOYEE table from the following sample data. Do not list the columns in the INSERT clause.

ID	LAST_NAME	FIRST_NAME	USERID	SALARY
1	Patel	Ralph	rpatel	895
2	Dancs	Betty	bdancs	860
3	Biri	Ben	bbiri	1100
4	Newman	Chad	cnewman	750
5	Ropeburn	Audrey	aropebur	1550


```
INSERT INTO my_employee
  VALUES (1, 'Patel', 'Ralph', 'rpatel', 895);
```

Practice 8: Solutions (continued)

4. Populate the MY_EMPLOYEE table with the second row of sample data from the preceding list. This time, list the columns explicitly in the INSERT clause.

```
INSERT INTO my_employee (id, last_name, first_name,
                         userid, salary)
  VALUES (2, 'Dancs', 'Betty', 'bdancs', 860);
```

5. Confirm your addition to the table.

```
SELECT   *
FROM     my_employee;
```

6. Write an INSERT statement in a dynamic reusable script file named loademp.sql to load rows into the MY_EMPLOYEE table. Concatenate the first letter of the first name and the first seven characters of the last name to produce the user ID. Save this script to a file named lab_08_06.sql.

```
SET ECHO OFF
SET VERIFY OFF
INSERT INTO my_employee
VALUES (&p_id, '&&p_last_name', '&&p_first_name',
        lower(substr('&p_first_name', 1, 1) ||
        substr('&p_last_name', 1, 7)), &p_salary);
SET VERIFY ON
SET ECHO ON
UNDEFINE p_first_name
UNDEFINE p_last_name
```


7. Populate the table with the next two rows of sample data listed in step 3 by running the INSERT statement in the script that you created.

```
SET ECHO OFF
SET VERIFY OFF
INSERT INTO my_employee
VALUES (&p_id, '&&p_last_name', '&&p_first_name',
       lower(substr('&p_first_name', 1, 1) ||
       substr('&p_last_name', 1, 7)), &p_salary);
SET VERIFY ON
SET ECHO ON
UNDEFINE p_first_name
UNDEFINE p_last_name
```

8. Confirm your additions to the table.

```
SELECT   *
FROM my_employee;
```

9. Make the data additions permanent.

```
COMMIT;
```

Practice 8: Solutions (continued)

Update and delete data in the MY_EMPLOYEE table.

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

```
UPDATE  my_employee
SET     last_name = 'Drexler'
WHERE   id = 3;
```

11. Change the salary to $1,000 for all employees with a salary less than $900.

```
UPDATE  my_employee
SET     salary = 1000
WHERE   salary < 900;
```

12. Verify your changes to the table.

```
SELECT  last_name, salary
FROM    my_employee;
```

13. Delete Betty Dancs from the MY_EMPLOYEE table.

```
DELETE
FROM  my_employee
WHERE last_name = 'Dancs';
```

14. Confirm your changes to the table.

```
SELECT  *
FROM    my_employee;
```

15. Commit all pending changes.

```
COMMIT;
```

Control data transaction to the MY_EMPLOYEE table.

16. Populate the table with the last row of sample data listed in step 3 by using the statements in the script that you created in step 6. Run the statements in the script.

```
SET ECHO OFF
SET VERIFY OFF
INSERT INTO my_employee
VALUES (&p_id, '&&p_last_name', '&&p_first_name',
   lower(substr('&p_first_name', 1, 1) ||
   substr('&p_last_name', 1, 7)), &p_salary);
SET VERIFY ON
SET ECHO ON
UNDEFINE p_first_name
UNDEFINE p_last_name
```

Practice 8: Solutions (continued)

17. Confirm your addition to the table.

```
SELECT  *
FROM    my_employee;
```

18. Mark an intermediate point in the processing of the transaction.

```
SAVEPOINT step_18;
```

19. Empty the entire table.

```
DELETE
FROM  my_employee;
```

20. Confirm that the table is empty.

```
SELECT *
FROM   my_employee;
```

21. Discard the most recent `DELETE` operation without discarding the earlier `INSERT` operation.

```
ROLLBACK TO step_18;
```

22. Confirm that the new row is still intact.

```
SELECT *
FROM   my_employee;
```

23. Make the data addition permanent.

```
COMMIT;
```

Practice 9: Solutions

1. Create the DEPT table based on the following table instance chart. Place the syntax in a script called lab_09_01.sql, and then execute the statement in the script to create the table. Confirm that the table is created.

```
CREATE TABLE dept
 (id   NUMBER(7)CONSTRAINT department_id_pk PRIMARY KEY,
  name VARCHAR2(25));

DESCRIBE dept
```

2. Populate the DEPT table with data from the DEPARTMENTS table. Include only columns that you need.

```
INSERT INTO dept
  SELECT  department_id, department_name
  FROM    departments;
```

3. Create the EMP table based on the following table instance chart. Place the syntax in a script called lab_09_03.sql, and then execute the statement in the script to create the table. Confirm that the table is created.

```
CREATE TABLE  emp
  (id           NUMBER(7),
   last_name     VARCHAR2(25),
   first_name    VARCHAR2(25),
   dept_id       NUMBER(7)
     CONSTRAINT emp_dept_id_FK REFERENCES dept (id)
   );

DESCRIBE emp
```

4. Create the EMPLOYEES2 table based on the structure of the EMPLOYEES table. Include only the EMPLOYEE_ID, FIRST_NAME, LAST_NAME, SALARY, and DEPARTMENT_ID columns. Name the columns in your new table ID, FIRST_NAME, LAST_NAME, SALARY, and DEPT_ID, respectively.

```
CREATE TABLE employees2 AS
  SELECT  employee_id id, first_name, last_name, salary,
          department_id dept_id
  FROM    employees;
```

5. Drop the EMP table.

```
DROP TABLE emp;
```

Practice 10: Solutions
Part 1

1. The staff in the HR department wants to hide some of the data in the EMPLOYEES table. They want a view called EMPLOYEES_VU based on the employee numbers, employee last names, and department numbers from the EMPLOYEES table. They want the heading for the employee name to be EMPLOYEE.

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

2. Confirm that the view works. Display the contents of the EMPLOYEES_VU view.

```
SELECT   *
FROM     employees_vu;
```

3. Using your EMPLOYEES_VU view, write a query for the HR department to display all employee names and department numbers.

```
SELECT   employee, department_id
FROM     employees_vu;
```

4. Department 50 needs access to its employee data. Create a view named DEPT50 that contains the employee numbers, employee last names, and department numbers for all employees in department 50. They have requested that you label the view columns EMPNO, EMPLOYEE, and DEPTNO. For security purposes, do not allow an employee to be reassigned to another department through the view.

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

5. Display the structure and contents of the DEPT50 view.

```
DESCRIBE dept50

SELECT   *
FROM     dept50;
```

6. Test your view. Attempt to reassign Matos to department 80.

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

The error is due to the fact that the view "DEPT50" is created with CHECK OPTION CONSTRAINT. This ensures that the deptno column in the view is protected from being changed.

Practice 10: Solutions (continued)

You cannot make modifications to the `deptno` column that will result in the row being removed from the view.

Part 2

7. You need a sequence that can be used with the primary key column of the `DEPT` table. The sequence should start at 200 and have a maximum value of 1000. Have your sequence increment by 10. Name the sequence `DEPT_ID_SEQ`.

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

8. To test your sequence, write a script to insert two rows in the `DEPT` table. Name your script `lab_10_08.sql`. Be sure to use the sequence that you created for the ID column. Add two departments: Education and Administration. Confirm your additions. Run the commands in your script.

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

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

9. Create a nonunique index on the `NAME` column in the `DEPT` table.

```
CREATE INDEX dept_name_idx ON dept (name);
```

10. Create a synonym for your `EMPLOYEES` table. Call it `EMP`.

```
CREATE SYNONYM emp FOR EMPLOYEES;
```

Practice 11: Solutions

1. For a specified table, create a script that reports the column names, data types, and lengths of data types, as well as whether nulls are allowed. Prompt the user to enter the table name. Give appropriate aliases to the columns DATA_PRECISION and DATA_SCALE. Save this script in a file named lab_11_01.sql.

```
SELECT column_name, data_type, data_length,
       data_precision PRECISION, data_scale SCALE, nullable
FROM   user_tab_columns
WHERE  table_name = UPPER('&tab_name');
```

2. Create a script that reports the column name, constraint name, constraint type, search condition, and status for a specified table. You must join the USER_CONSTRAINTS and USER_CONS_COLUMNS tables to obtain all of this information. Prompt the user to enter the table name. Save the script in a file named lab_11_02.sql.

```
SELECT ucc.column_name, uc.constraint_name, uc.constraint_type,
       uc.search_condition, uc.status
FROM   user_constraints uc JOIN user_cons_columns ucc
ON     uc.table_name = ucc.table_name
AND    uc.constraint_name = ucc.constraint_name
AND    uc.table_name = UPPER('&tab_name');
```

3. Add a comment to the DEPARTMENTS table. Then query the USER_TAB_COMMENTS view to verify that the comment is present.

```
COMMENT ON TABLE departments IS
  'Company department information including name, code, and location.';

SELECT COMMENTS
FROM   user_tab_comments
WHERE  table_name = 'DEPARTMENTS';
```

4. Find the names of all synonyms that are in your schema.

```
SELECT *
FROM   user_synonyms;
```

Practice 11: Solutions (continued)

5. You need to determine the names and definitions of all the views in your schema. Create a report that retrieves view information (the view name and text) from the `USER_VIEWS` data dictionary view.

   Note: Another view already exists. The `EMP_DETAILS_VIEW` was created as part of your schema. Also, if you completed practice 10, you see the `DEPT50` view.

   Note: To see more contents of a `LONG` column, use the command `SET LONG` *n*, where *n* is the value of the number of characters of the `LONG` column that you want to see.

```
SET LONG 600

SELECT   view_name, text
FROM     user_views;
```

6. Find the names of your sequences. Write a query in a script to display the following information about your sequences: sequence name, maximum value, increment size, and last number. Name the script `lab_11_06.sql`. Run the statement in your script.

```
SELECT   sequence_name, max_value, increment_by, last_number
FROM     user_sequences;
```

Practice C: Solutions

1. Write a query for the HR department to produce the addresses of all the departments. Use the `LOCATIONS` and `COUNTRIES` tables. Show the location ID, street address, city, state or province, and country in the output.

```
SELECT location_id, street_address, city, state_province, country_name
FROM   locations, countries
WHERE  locations.country_id = countries.country_id;
```

2. The HR department needs a report of all employees. Write a query to display the last name, department number, and department name for all employees.

```
SELECT e.last_name, e.department_id, d.department_name
FROM   employees e, departments d
WHERE  e.department_id = d.department_id;
```

3. The HR department needs a report of employees in Toronto. Display the last name, job, department number, and department name for all employees who work in Toronto.

```
SELECT e.last_name, e.job_id, e.department_id, d.department_name
FROM   employees e, departments d , locations l
WHERE  e.department_id = d.department_id
AND    d.location_id = l.location_id
AND    LOWER(l.city) = 'toronto';
```

4. Create a report to display the employee last name and employee number along with the last name of the employee's manager and the manager number. Label the columns `Employee`, `Emp#`, `Manager`, and `Mgr#`, respectively. Place your SQL statement in a text file named `lab_c_04.sql`.

```
SELECT w.last_name "Employee", w.employee_id "EMP#",
       m.last_name "Manager", m.employee_id  "Mgr#"
FROM   employees w, employees m
WHERE  w.manager_id = m.employee_id;
```

5. Modify `lab_c_04.sql` to display all employees, including King, who has no manager. Order the results by the employee number. Place your SQL statement in a text file named `lab_c_05.sql`. Run the query in `lab_c_05.sql`.

```
SELECT w.last_name "Employee", w.employee_id "EMP#",
       m.last_name "Manager", m.employee_id  "Mgr#"
FROM   employees w, employees m
WHERE  w.manager_id  = m.employee_id (+);
```

Practice C: Solutions (continued)

6. Create a report for the HR department that displays employee last names, department numbers, and all the employees who work in the same department as a given employee. Give each column an appropriate label. Save the script to a file named `lab_c_06.sql`.

```
SELECT e.department_id department, e.last_name employee,
       c.last_name colleague
FROM   employees e, employees c
WHERE  e.department_id = c.department_id
AND    e.employee_id <> c.employee_id
ORDER BY e.department_id, e.last_name, c.last_name;
```

7. The HR department needs a report on job grades and salaries. To familiarize yourself with the `JOB_GRADES` table, first show the structure of the `JOB_GRADES` table. Then create a query that displays the name, job, department name, salary, and grade for all employees.

```
DESC JOB_GRADES

SELECT e.last_name, e.job_id, d.department_name,
       e.salary, j.grade_level
FROM   employees e, departments d, job_grades j
WHERE  e.department_id = d.department_id
AND    e.salary BETWEEN j.lowest_sal AND j.highest_sal;
```

If you want an extra challenge, complete the following exercises:

8. The HR department wants to determine the names of all employees hired after Davies. Create a query to display the name and hire date of any employee hired after employee Davies.

```
SELECT e.last_name, e.hire_date
FROM   employees e , employees davies
WHERE  davies.last_name = 'Davies'
AND    davies.hire_date < e.hire_date;
```

9. The HR department needs to find the names and hire dates for all employees who were hired before their managers, along with their manager's names and hire dates. Label the columns `Employee`, `Emp Hired`, `Manager`, and `Mgr Hired`, respectively. Save the script to a file named `lab_c_09.sql`.

```
SELECT w.last_name, w.hire_date, m.last_name, m.hire_date
FROM   employees w , employees m
WHERE  w.manager_id = m.employee_id
AND    w.hire_date <  m.hire_date;
```