



UNIVERSITY OF CHITTAGONG

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SQL Exercises

Database Systems Exercises

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1 Chapter - 01 - Retrieving Data Using SQL SELECT Statement

Question 1

The following SELECT statement executes successfully:

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

True/False

Answer 1

False

The correct statement should be:

```
1 SELECT last_name, job_id, salary AS Sal
2 FROM HR.EMPLOYEES;
```

Question 2

The following SELECT statement executes successfully:

```
1 SELECT *
2 FROM job_grades;
```

True/False

Answer 2

False

No Table Named job_grades.

Question 3

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

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

Answer 3

Corrected Code:

```
1 SELECT employee_id, last_name, SALARY * 12 AS "ANNUAL SALARY"
2 FROM HR.employees;
```

Question 4

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.

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

```

1 DESCRIBE departments
2 Name                               Null    Type
3 -----
4 DEPARTMENT_ID                     NOT NULL NUMBER (4)
5 DEPARTMENT_NAME                     NOT NULL VARCHAR2 (30)
6 MANAGER_ID                         NUMBER (6)
7 LOCATION_ID                       NUMBER (4)
8
9 4 rows selected

```

Answer 4

Command to view table structure:

```
1 DESCRIBE HR.DEPARTMENTS;
```

Command to view table contents:

```
1 SELECT * FROM HR.DEPARTMENTS;
```

Question 5

```

1 DESCRIBE employees
2 Name                               Null    Type
3 -----
4 EMPLOYEE_ID                       NOT NULL NUMBER (6)
5 FIRST_NAME                         VARCHAR2 (20)
6 LAST_NAME                         NOT NULL VARCHAR2 (25)
7 EMAIL                             NOT NULL VARCHAR2 (25)
8 PHONE_NUMBER                       VARCHAR2 (20)
9 HIRE_DATE                         NOT NULL DATE
10 JOB_ID                            NOT NULL VARCHAR2 (10)
11 SALARY                            NUMBER (8,2)
12 COMMISSION_PCT                     NUMBER (2,2)
13 MANAGER_ID                         NUMBER (6)
14 DEPARTMENT_ID                     NUMBER (4)
15
16 11 rows selected

```

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_01_05.sql so that you can dispatch this file to the HR department.

Answer 5

Command:

```
1 SELECT EMPLOYEE_ID, LAST_NAME, JOB_ID, HIRE_DATE AS "STARTDATE"  
2 FROM HR.EMPLOYEES;
```

Question 7

The HR department wants a query to display all unique job IDs from the EMPLOYEES table.

#	JOB_ID
1	AC_ACCOUNT
2	AC_MGR
3	AD_ASST
4	AD_PRES
5	AD_VP
6	IT_PROG
7	MK_MAN
8	MK_REP
9	SA_MAN
10	SA_REP
11	ST_CLERK
12	ST_MAN

Answer 7

Command:

```
1 SELECT DISTINCT JOB_ID  
2 FROM HR.EMPLOYEES;
```

Question 8

The HR department wants more descriptive column headings for its report on employees. Copy the statement from lab_01_05.sql to a new SQL Worksheet. Name the column headings Emp #, Employee, Job, and Hire Date, respectively. Then run your query again.

Emp #	Employee	Job	Hire Date
100	King	AD_PRES	17-JUN-87
101	Kochhar	AD_VP	21-SEP-89
102	De Haan	AD_VP	13-JAN-93
103	Hunold	IT_PROG	03-JAN-90
104	Ernst	IT_PROG	21-MAY-91
107	Lorentz	IT_PROG	07-FEB-99
124	Mourgos	ST_MAN	16-NOV-99
141	Rajs	ST_CLERK	17-OCT-95
142	Davies	ST_CLERK	29-JAN-97
143	Matos	ST_CLERK	15-MAR-98
...			
205	Higgins	AC_MGR	07-JUN-94
206	Gietz	AC_ACCOUNT	07-JUN-94

Answer 8

Command:

```
1 SELECT EMPLOYEE_ID AS "Emp #", LAST_NAME AS "Employee", JOB_ID as "Job", HIRE_DATE AS "Hire
   Date"
2 FROM HR.EMPLOYEES;
```

Question 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.

#	Employee and Title
1	Abel, SA_REP
2	Davies, ST_CLERK
3	De Haan, AD_VP
4	Ernst, IT_PROG
5	Fay, MK_REP
6	Gietz, AC_ACCOUNT
7	Grant, SA_REP
8	Hartstein, MK_MAN
9	Higgins, AC_MGR
10	Hunold, IT_PROG
...	
19	Whalen, AD_ASST
20	Zlotkey, SA_MAN

Answer 9

Command:

```
1 SELECT LAST_NAME || ', ' || JOB_ID AS "Employee and Title"
2 FROM HR.EMPLOYEES;
```

Question 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.

Answer 10

Command:

```
1 SELECT EMPLOYEE_ID || ', ' || FIRST_NAME || ', ' || LAST_NAME || ', ' || EMAIL || ', ' ||
   PHONE_NUMBER || ', ' || JOB_ID || ', ' || HIRE_DATE || ', ' || SALARY || ', ' ||
   DEPARTMENT_ID AS "THE_OUTPUT"
2 FROM HR.EMPLOYEES;
```

2 Chapter - 02 - Restricting and Sorting Data

Question 1

The HR department needs your assistance in creating some queries. Because of budget issues, the HR department needs a report that displays the last name and salary of employees who earn more than \$12,000. Save your SQL statement as a file named lab_02.01.sql. Run your query.

#	LAST_NAME	SALARY
1	King	24000
2	Kochhar	17000
3	De Haan	17000
4	Hartstein	13000

Answer 1

Command:

```
1 SELECT LAST_NAME, SALARY
2 FROM HR.EMPLOYEES
3 WHERE SALARY > 12000;
```

Question 2

Open a new SQL Worksheet. Create a report that displays the last name and department number for employee number 176. Run the query.

#	LAST_NAME	DEPARTMENT_ID
1	Taylor	80

Answer 2

Command:

```
1 SELECT LAST_NAME, DEPARTMENT_ID
2 FROM HR.EMPLOYEES
3 WHERE EMPLOYEE_ID = 176;
```

Question 3

The HR department needs to find high-salary and low-salary employees. Modify lab_02.01.sql to display the last name and salary for any employee whose salary is not in the range of \$5,000 to \$12,000. Save your SQL statement as lab_02.03.sql.

Answer 3

Command:

```
1 SELECT LAST_NAME, SALARY
2 FROM HR.EMPLOYEES
3 WHERE SALARY NOT BETWEEN 5000 AND 12000;
```

Question 4

Create a report to display the last name, job ID, and hire date for employees with the last names of Matos and Taylor. Order the query in ascending order by the hire date.

#	LAST_NAME	JOB_ID	HIRE_DATE
1	Matos	ST_CLERK	15-MAR-98
2	Taylor	SA_REP	24-MAR-98

Answer 4

Command (using IN operator):

```
1 SELECT LAST_NAME, JOB_ID, HIRE_DATE
2 FROM HR.EMPLOYEES
3 WHERE LAST_NAME IN ('Matos', 'Taylor')
4 ORDER BY HIRE_DATE;
```

Alternative Command (using OR operator):

```
1 SELECT LAST_NAME, JOB_ID, HIRE_DATE
2 FROM HR.EMPLOYEES
3 WHERE LAST_NAME = 'Matos' OR LAST_NAME = 'Taylor'
4 ORDER BY HIRE_DATE;
```

Question 5

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

Answer 5

Command:

```
1 SELECT LAST_NAME, DEPARTMENT_ID
2 FROM HR.EMPLOYEES
3 WHERE DEPARTMENT_ID IN (20,50)
4 ORDER BY LAST_NAME;
```

Question 6

Modify lab_02_03.sql to display 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.

#	Employee	Monthly Salary
1	Fay	6000
2	Mourgos	5800

Answer 6

Command:

```
1 SELECT LAST_NAME AS "Employee", SALARY AS "Monthly Salary"
2 FROM HR.EMPLOYEES
3 WHERE SALARY BETWEEN 5000 AND 12000
4 AND DEPARTMENT_ID IN (20, 50);
```

Question 7

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

#	LAST_NAME	HIRE_DATE
1	Higgins	07-JUN-94
2	Gietz	07-JUN-94

Answer 7

Command:

```
1 SELECT LAST_NAME, HIRE_DATE
2 FROM HR.EMPLOYEES
3 WHERE HIRE_DATE LIKE '%94%';
```

Question 8

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

#	LAST_NAME	JOB_ID
1	King	AD-PRES

Answer 8

Command:

```
1 SELECT LAST_NAME, JOB_ID
2 FROM HR.EMPLOYEES
3 WHERE MANAGER_ID IS NULL;
```

Question 9

Create a report to display the last name, salary, and commission of all employees who earn commissions. Sort data in descending order of salary and commissions. Use the column's numeric position in the ORDER BY clause.

#	LAST_NAME	SALARY	COMMISSION_PCT
1	Abel	11000	0.3
2	Zlotkey	10500	0.2
3	Taylor	8600	0.2
4	Grant	7000	0.15

Answer 9

Command:

```
1 SELECT LAST_NAME, SALARY, COMMISSION_PCT
2 FROM HR.EMPLOYEES
3 WHERE COMMISSION_PCT IS NOT NULL
4 ORDER BY 2 DESC, 3 DESC;
```

Question 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. Save this query to a file named lab_02_10.sql. If you enter 12000 when prompted, the report displays the following results:

Answer 10

Command:

```
1 SELECT LAST_NAME, SALARY
2 FROM HR.EMPLOYEES
3 WHERE SALARY > &User_Prompt;
```

Question 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:

Answer 11

Command:

```
1 SELECT EMPLOYEE_ID, LAST_NAME, SALARY, DEPARTMENT_ID
2 FROM HR.EMPLOYEES
3 WHERE MANAGER_ID = &manager_ID
4 ORDER BY &User_Choice;
```

Question 12

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

#	LAST_NAME
1	Grant
2	Whalen

Answer 12

Command:

```
1 SELECT LAST_NAME
2 FROM HR.EMPLOYEES
3 WHERE LAST_NAME LIKE '___a%';
```

Question 13

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

#	LAST_NAME
1	Davies
2	De Haan
3	Hartstein
4	Whalen

Answer 13

Command:

```
1 SELECT LAST_NAME
2 FROM HR.EMPLOYEES
3 WHERE LAST_NAME LIKE '%a%' AND LAST_NAME LIKE '%e%';
```

Question 14

Display the last name, job, and salary for all employees whose jobs are either those of a sales representative or of a stock clerk, and whose salaries are not equal to \$2,500, \$3,500, or \$7,000.

#	LAST_NAME	JOB_ID	SALARY
1	Abel	SA_REP	11000
2	Taylor	SA_REP	8600
3	Davies	ST_CLERK	3100
4	Matos	ST_CLERK	2600

Answer 14

Command:

```
1 SELECT LAST_NAME, JOB_ID, SALARY
2 FROM HR.EMPLOYEES
3 WHERE (JOB_ID LIKE 'S%REP' OR JOB_ID LIKE 'ST%CLERK') AND SALARY NOT IN (2500, 3500, 7000);
```

Question 15

Modify lab_02.06.sql to display the last name, salary, and commission for all employees whose commission is 20%. Resave lab_02.06.sql as lab_02.15.sql. Rerun the statement in lab_02.15.sql.

#	Employee	Monthly Salary	COMMISSION_PCT
1	Zlotkey	10500	0.2
2	Taylor	8600	0.2

Answer 15

Command:

```
1 SELECT LAST_NAME AS "Employee", SALARY AS "Monthly Salary", COMMISSION_PCT
2 FROM HR.EMPLOYEES
3 WHERE (SALARY BETWEEN 5000 AND 12000) AND (COMMISSION_PCT = 0.2);
```

3 Chapter - 03 - Using Single Row Functions To Customize Outputs

Question 1

Write a query to display the system date. Label the column as Date.

Note: If your database is remotely located in a different time zone, the output will be the date for the operating system on which the database resides.

Date
31-MAY-07

Answer 1

Command:

```
1 SELECT sysdate AS "Date";
```

Question 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. Save your SQL statement in a file named lab_03_02.sql.

Answer 2

Command:

```
1 SELECT EMPLOYEE_ID, LAST_NAME, SALARY, ROUND(SALARY + (SALARY * 0.155)) AS "New Salary"
2 FROM HR.EMPLOYEES;
```

Question 3

Run your query in the lab_03_02.sql file.

Answer 3

Command (from lab_03_02.sql):

```
1 SELECT EMPLOYEE_ID, LAST_NAME, SALARY, ROUND(SALARY + (SALARY * 0.155)) AS "New Salary"  
2 FROM HR.EMPLOYEES;
```

Results (first 5 rows):

EMPLOYEE_ID	LAST_NAME	SALARY	NEW SALARY
100	King	24000	27720
101	Yang	17000	19635
102	Garcia	17000	19635
103	James	9000	10395
104	Miller	6000	6930

Question 4

Modify your query lab_03_02.sql 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.

Answer 4

Command:

```
1 SELECT EMPLOYEE_ID, LAST_NAME, SALARY, ROUND(SALARY + (SALARY * 0.155)) AS "New Salary",  
    (SALARY * 0.155) AS "Increase"  
2 FROM HR.EMPLOYEES;
```

Question 5 (Chapter 3)

Write a query that displays the last name (with the first letter in uppercase and all the other letters in 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.

#	Name	Length
1	Abel	4
2	Matos	5
3	Mourgos	7

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

#	Name	Length
1	Hartstein	9
2	Higgins	7
3	Hunold	6

Modify the query such that the case of the entered letter does not affect the output. The entered letter must be capitalized before being processed by the SELECT query.

Answer 5 - Part 1

Command for specific letters J, A, or M:

```
1 SELECT INITCAP (LAST_NAME) AS "Name", LENGTH (LAST_NAME) AS "Length"
2 FROM HR.EMPLOYEES
3 WHERE UPPER (LAST_NAME) LIKE 'J%' OR UPPER (LAST_NAME) LIKE 'A%' OR UPPER (LAST_NAME) LIKE 'M%'
4 ORDER BY LAST_NAME;
```

Answer 5 - Part 2

Command with user prompt:

```
1 SELECT INITCAP (LAST_NAME) AS "Name", LENGTH (LAST_NAME) AS "Length"
2 FROM HR.EMPLOYEES
3 WHERE UPPER (LAST_NAME) LIKE '&user_prompt%'
4 ORDER BY LAST_NAME;
```

Answer 5 - Part 3

Command with case-insensitive user prompt:

```
1 SELECT INITCAP (LAST_NAME) AS "Name", LENGTH (LAST_NAME) AS "Length"
2 FROM HR.EMPLOYEES
3 WHERE UPPER (LAST_NAME) LIKE UPPER ('&user_prompt') || '%'
4 ORDER BY LAST_NAME;
```


Question 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 as MONTHS_WORKED. Order your results by the number of months employed. Round the number of months to the closest whole number.

Answer 6

Command:

```
1 SELECT LAST_NAME, ROUND(MONTHS_BETWEEN(SYSDATE, HIRE_DATE)) AS "MONTHS_WORKED"
2 FROM HR.EMPLOYEES
3 ORDER BY MONTHS_WORKED;
```

Question 7

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 as SALARY.

#	LAST_NAME	SALARY
1	King	\$\$\$\$\$\$\$\$\$24000
2	Kochhar	\$\$\$\$\$\$\$\$\$17000
:	:	:
20	Gietz	\$\$\$\$\$\$\$\$\$8300

Answer 7

Command:

```
1 SELECT LAST_NAME, LPAD(SALARY, 15, '$') AS "SALARY"
2 FROM HR.EMPLOYEES;
```

Question 8

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 as EMPLOYEES_AND_THEIR_SALARIES.

#	EMPLOYEES_AND_THEIR_SALARIES
1	King *****
2	Kochhar *****
3	De Haan *****
4	Hartste *****
5	Higgins *****
⋮	⋮
19	Matos **
20	Vargas **

Answer 8

Command:

```
1 SELECT SUBSTR(LAST_NAME,1,8) || ' ' || LPAD(' ', FLOOR(SALARY / 1000), '*') AS
   "EMPLOYEES_AND_THEIR_SALARIES"
2 FROM HR.EMPLOYEES
3 ORDER BY SALARY DESC;
```

Question 9

Create a query to display the last name and the number of weeks employed for all employees in department 90. Label the number of weeks column as TENURE. Truncate the number of weeks value to 0 decimal places. Show the records in descending order of the employee's tenure. Note: The TENURE value will differ as it depends on the date on which you run the query.

#	LAST_NAME	TENURE
1	King	1041
2	Kochhar	923
3	De Haan	750

Answer 9

Command:

```
1 SELECT LAST_NAME, TRUNC((sysdate-HIRE_DATE)/7, 0) AS "TENURE"
2 FROM HR.EMPLOYEES
3 WHERE DEPARTMENT_ID = 90
4 ORDER BY TENURE DESC;
```

4 Chapter - 04 - Using Conversion Functions and Conditional Expressions

Question 1

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.

Answer 1

Command:

```
1 SELECT LAST_NAME || ' earns ' || TO_CHAR(SALARY, 'FM$999G999D00') || ' monthly but wants '
   || TO_CHAR(SALARY * 3, 'FM$999G999D00') || '.' AS "Dream Salaries"
2 FROM HR.EMPLOYEES;
```

Question 2

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."

Answer 2

Command:

```
1 SELECT LAST_NAME, HIRE_DATE, TO_CHAR(NEXT_DAY(ADD_MONTHS(HIRE_DATE, 6), 'MONDAY'), 'FmDay,
   " the "Ddspth" of "Month, YYYY') AS REVIEW
2 FROM HR.EMPLOYEES;
```

Question 3

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.

#	LAST_NAME	HIRE_DATE	DAY
1	Grant	24-MAY-99	MONDAY
2	Gietz	07-JUN-94	TUESDAY
3	Taylor	24-MAR-98	TUESDAY
4	Higgins	07-JUN-94	TUESDAY
5	Rajs	17-OCT-95	TUESDAY
...			
19	Lorentz	07-FEB-99	SUNDAY
20	Fay	17-AUG-97	SUNDAY

Answer 3

Command:

```
1 SELECT last_name, hire_date, TO_CHAR(hire_date, 'FMDay') AS DAY
2 FROM HR.EMPLOYEES
3 ORDER BY TO_CHAR(hire_date, 'D');
```

Question 4

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.

Answer 4

Command:

```
1 SELECT LAST_NAME, NVL2(COMMISSION_PCT, TO_CHAR(COMMISSION_PCT), 'No Commission') AS "COMM"
2 FROM HR.EMPLOYEES
3 ORDER BY LAST_NAME;
```

Question 5

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

Answer 5

Command:

```
1 SELECT JOB_ID, DECODE(JOB_ID, 'AD_PRES', 'A', 'ST_MAN', 'B', 'IT_PROG', 'C', 'SA_REP',
2 FROM HR.EMPLOYEES;
```

Question 6

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

#	JOB_ID	GRADE
1	AC_ACCOUNT	0
2	AC_MGR	0
3	AD_ASST	0
4	AD_PRES	A
5	AD_VP	0
...		
18	ST_CLERK	E
19	ST_CLERK	E
20	ST_MAN	B

Answer 6

Command:

```
1 SELECT JOB_ID,  
2     CASE JOB_ID  
3         WHEN 'AD_PRES' THEN 'A'  
4         WHEN 'ST_MAN'  THEN 'B'  
5         WHEN 'IT_PROG' THEN 'C'  
6         WHEN 'SA_REP'  THEN 'D'  
7         WHEN 'ST_CLERK' THEN 'E'  
8         ELSE '0'  
9     END AS GRADE  
10 FROM HR.EMPLOYEES;
```