UNIVERSITY OF CHITTAGONG

Department of Computer Science and Engineering

Session: 2021-2022
4th semester

Assignment No.	: 1
Course Title	: Database Systems
Course Code No.	: CSE-413

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Date: Jul 02, 2024

Chapter 1

Part 1

Test your knowledge:

1. The following SELECT statement executes successfully:

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

   Answer: True

2. The following SELECT statement executes successfully:

```
SELECT * FROM job_grades;
```

   Answer: True

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

```
SELECT employee_id, last_name salx12 ANNUAL SALARY
FROM employees;
```

   Errors:

   (a) Missing comma between `last_name` and `sal`.

   (b) `x` should be `*` for multiplication.

   (c) Alias `ANNUAL SALARY` needs to be quoted due to the space.

   (d) Missing `AS` keyword before the alias `ANNUAL SALARY`.

Part 2

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.

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

```
DESCRIBE departments
Name                           Null     Type
------------------------------ -------- ----------------
DEPARTMENT_ID                  NOT NULL NUMBER(4)
DEPARTMENT_NAME                NOT NULL VARCHAR2(30)
MANAGER_ID                              NUMBER(6)
LOCATION_ID                             NUMBER(4)

4 rows selected
```

	DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
1	10	Administration	200	1700
2	20	Marketing	201	1800
3	50	Shipping	124	1500
4	60	IT	103	1400
5	80	Sales	149	2500
6	90	Executive	100	1700
7	110	Accounting	205	1700
8	190	Contracting	(null)	1700

   Solution:

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

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

```
DESCRIBE employees
Name                          Null     Type
----------------------------- -------- --------------------
EMPLOYEE_ID                   NOT NULL NUMBER(6)
FIRST_NAME                             VARCHAR2(20)
LAST_NAME                     NOT NULL VARCHAR2(25)
EMAIL                         NOT NULL VARCHAR2(25)
PHONE_NUMBER                           VARCHAR2(20)
HIRE_DATE                     NOT NULL DATE
JOB_ID                        NOT NULL VARCHAR2(10)
SALARY                                 NUMBER(8,2)
COMMISSION_PCT                         NUMBER(2,2)
MANAGER_ID                             NUMBER(6)
DEPARTMENT_ID                          NUMBER(4)

11 rows selected
```

Solution:

```
1 DESCRIBE HR.EMPLOYEES;
```

6. 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. Test your query in the `lab_01_05.sql` file to ensure that it runs correctly.

	EMPLOYEE_ID	LAST_NAME	JOB_ID	STARTDATE
1	100	King	AD_PRES	17-JUN-87
2	101	Kochhar	AD_VP	21-SEP-89
3	102	De Haan	AD_VP	13-JAN-93
4	103	Hunold	IT_PROG	03-JAN-90
5	104	Ernst	IT_PROG	21-MAY-91
6	107	Lorentz	IT_PROG	07-FEB-99
7	124	Mourgos	ST_MAN	16-NOV-99
8	141	Rajs	ST_CLERK	17-OCT-95
9	142	Davies	ST_CLERK	29-JAN-97
10	143	Matos	ST_CLERK	15-MAR-98
...				
19	205	Higgins	AC_MGR	07-JUN-94
20	206	Gietz	AC_ACCOUNT	07-JUN-94

Solution:

```
1 SELECT EMPLOYEE_ID, LAST_NAME, JOB_ID, HIRE_DATE
2 AS STARTDATE
3 FROM EMPLOYEES;
```

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

Solution:

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

Part 3

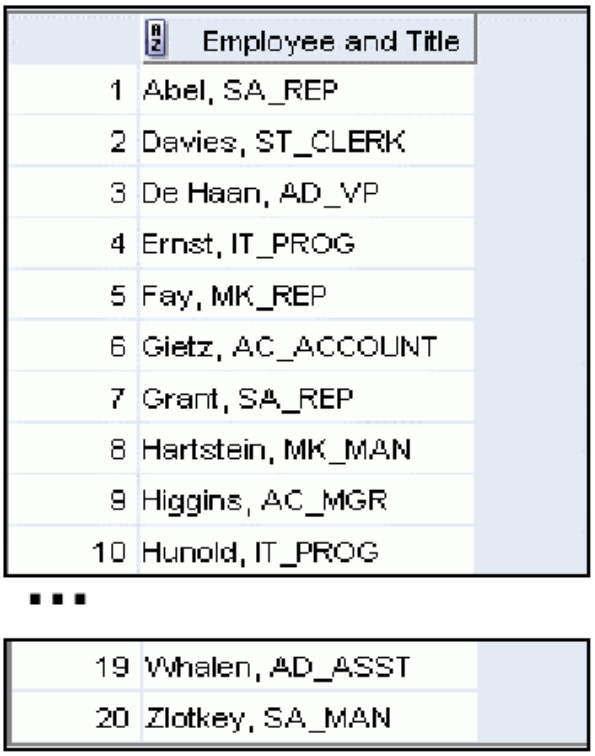
8. The HR department wants more descriptive column headings for its report on employees. Copy the statement from `lab_01_05.sql` to a new SQL Worksheet. Name the column headings `Emp #`, Employee, Job, and Hire Date, respectively. Then run your query again.

	Emp #	Employee	Job	Hire Date
1	100	King	AD_PRES	17-JUN-87
2	101	Kochhar	AD_VP	21-SEP-89
3	102	De Haan	AD_VP	13-JAN-93
4	103	Hunold	IT_PROG	03-JAN-90
5	104	Ernst	IT_PROG	21-MAY-91
6	107	Lorentz	IT_PROG	07-FEB-99
7	124	Mourgos	ST_MAN	16-NOV-99
8	141	Rajs	ST_CLERK	17-OCT-95
9	142	Davies	ST_CLERK	29-JAN-97
10	143	Matos	ST_CLERK	15-MAR-98
...				
19	205	Higgins	AC_MGR	07-JUN-94
20	206	Gietz	AC_ACCOUNT	07-JUN-94

Solution:

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

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

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19	Whalen, AD_ASST
20	Zlotkey, SA_MAN

Solution:

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

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.

Solution:

```
SELECT Employee_ID||','||First_Name||','||Last_Name||
','||Email||','||Phone_Number||','||Job_ID||','||
Manager_ID||','||Hire_Date||','||Commission_Pct||','||
Department_ID AS THE_OUTPUT
FROM HR.EMPLOYEES;
```

Chapter 2

Practice 2

1. 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

Solution:

```
SELECT Last_Name, Salary
FROM HR.employees
WHERE salary > 12000;
```

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

Solution:

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

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`.

	LAST_NAME	SALARY
1	King	24000
2	Kochhar	17000
3	De Haan	17000
4	Lorentz	4200
5	Rajs	3500
6	Davies	3100
7	Matos	2600
8	Vargas	2500
9	Whalen	4400
10	Hartstein	13000

Solution:

```
SELECT Last_name, Salary
FROM hr.employees
WHERE salary NOT BETWEEN 5000 AND 12000;
```

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

Solution:

```
SELECT  LAST_NAME, JOB_ID, HIRE_DATE
FROM hr.employees
WHERE last_name IN ('Matos', 'Taylor')
ORDER BY hire_date ASC;
```

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

	LAST_NAME	DEPARTMENT_ID
1	Davies	50
2	Fay	20
3	Hartstein	20
4	Matos	50
5	Mourgos	50
6	Rajs	50
7	Vargas	50

Solution:

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

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 textttlab_02_06.sql. Run the statement in `lab_02_06.sql`.

	Employee	Monthly Salary
1	Fay	6000
2	Mourgos	5800

Solution:

```
SELECT last_name AS Employee, salary AS "Monthly␣Salary"
FROM hr.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.

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

Solution:

```
SELECT last_name, hire_date
FROM hr.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.

	LAST_NAME	JOB_ID
1	King	AD_PRES

Solution:

```
SELECT LAST_NAME, JOB_ID
FROM hr.employees
WHERE manager_id IS NULL;
```

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 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

Solution:

```
SELECT last_name, salary, commission_pct
FROM hr.employees
WHERE commission_pct IS NOT NULL
ORDER BY 2 DESC, 3 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. Save this query to a file named `lab_02_10.sql`. If you enter 12000 when prompted, the report displays the following results:

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

Solution: skipped

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 last_name:

	EMPLOYEE_ID	LAST_NAME	SALARY	DEPARTMENT_ID
1	104	Ernst	6000	60
2	107	Lorentz	4200	60

manager_id = 201, sorted by salary:

	EMPLOYEE_ID	LAST_NAME	SALARY	DEPARTMENT_ID
1	202	Fay	6000	20

manager_id = 124, sorted by employee_id:

	EMPLOYEE_ID	LAST_NAME	SALARY	DEPARTMENT_ID
1	141	Rajs	3500	50
2	142	Davies	3100	50
3	143	Matos	2600	50
4	144	Vargas	2500	50

Solution: skipped

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

	LAST_NAME
1	Grant
2	Whalen

Solution:

```
1 SELECT last_name
2 FROM hr.employees
3 WHERE last_name LIKE '__a%';
```

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

Solution:

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

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

Solution:

```
SELECT last_name, job_id, salary
FROM hr.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 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

Solution:

```
SELECT last_name AS Employee, salary AS "Monthly␣Salary",
commission_pct
FROM hr.employees
WHERE commission_pct = 0.20;
```

Chapter 3

Practice 3

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

Date
02-JUL-24

Solution:

```
SELECT SYSDATE AS "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. Save your SQL statement in a file named `lab_03_02.sql`.

Solution:

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

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

Solution:

```
-- lab_03_02.sql file
SELECT employee_id, last_name, salary ,
ROUND(salary * 1.155) AS "New Salary"
FROM hr.employees;
```

	EMPLOYEE_ID	LAST_NAME	SALARY	New Salary
1	100	King	24000	27720
2	101	Kochhar	17000	19635
3	102	De Haan	17000	19635
4	103	Hunold	9000	10395
5	104	Ernst	6000	6930
6	107	Lorentz	4200	4851
7	124	Mourgos	5800	6699
8	141	Rajs	3500	4043
9	142	Davies	3100	3581
10	143	Matos	2600	3003
...				
19	205	Higgins	12000	13860
20	206	Gietz	8300	9587

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.

	EMPLOYEE_ID	LAST_NAME	SALARY	New Salary	Increase
1	100	King	24000	27720	3720
2	101	Kochhar	17000	19635	2635
3	102	De Haan	17000	19635	2635
4	103	Hunold	9000	10395	1395
5	104	Ernst	6000	6930	930
...					
20	206	Gietz	8300	9587	1287

Solution:

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

5. 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

Solution:

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

Rest skipped

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 up to the closest whole number.

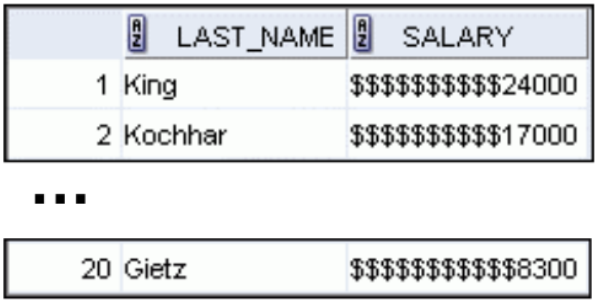
	LAST_NAME	MONTHS_WORKED
1	Zlotkey	88
2	Mourgos	90
3	Grant	96
4	Lorentz	100
5	Vargas	107
6	Taylor	110
7	Matos	111
8	Fay	117
9	Davies	124
10	Abel	133
11	Hartstein	135
12	Rajs	139
13	Higgins	156
14	Gietz	156
15	De Haan	173
16	Ernst	192
17	Hunold	209
18	Kochhar	212
19	Whalen	236
20	King	239

Solution:

```
SELECT last_name AS "Last Name",
    Round(MONTHS_BETWEEN(SYSDATE, hire_date))
    AS "MONTHS_WORKED"
FROM hr.employees
ORDER BY "MONTHS_WORKED";
```

Last Name	MONTHS_WORKED
Kumar	194
Banda	194
Ande	195
Markle	196
Lee	196
Philtanker	197
Marvins	197

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.

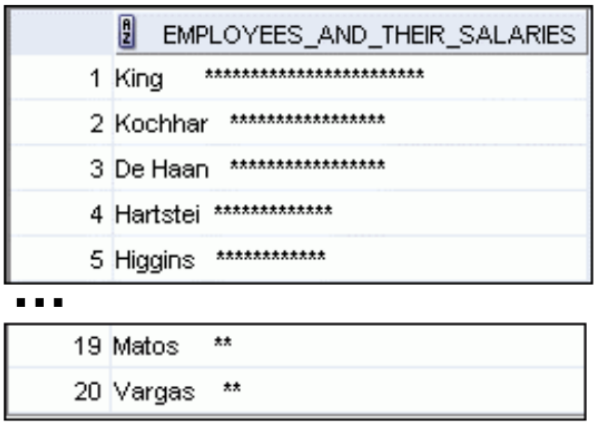


	LAST_NAME	SALARY
1	King	$$$$$$$$$24000
2	Kochhar	$$$$$$$$$17000
...		
20	Gietz	$$$$$$$$$$8300

Solution:

```
SELECT last_name
    LPAD('$' || salary, 15, '$') AS "SALARY"
FROM hr.employees;
```

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`.

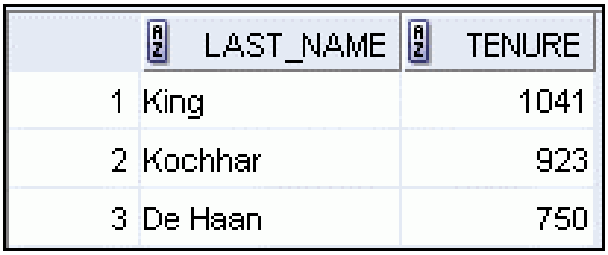


	EMPLOYEES_AND_THEIR_SALARIES
1	King ************************
2	Kochhar *****************
3	De Haan *****************
4	Hartstei **************
5	Higgins **********
...	
19	Matos **
20	Vargas **

Solution:

```
SELECT SUBSTR(last_name, 1, 8) ||
    RPAD('*', salary / 1000, '*')
    AS "EMPLOYEES_AND_THEIR_SALARIES"
FROM hr.employees
ORDER BY salary DESC;
```

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.

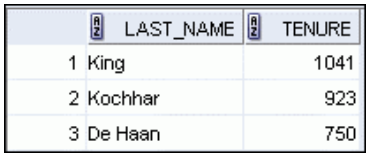


	LAST_NAME	TENURE
1	King	1041
2	Kochhar	923
3	De Haan	750

Solution:

```
SELECT last_name AS "Last Name",
    TRUNC((SYSDATE - hire_date) / 7, 0) AS "TENURE"
FROM hr.employees
WHERE department_id = 90
ORDER BY "TENURE" DESC;
```

10. 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

Solution:

```
SELECT last_name AS "Last Name",
    TRUNC((SYSDATE - hire_date) / 7, 0) AS "TENURE"
FROM hr.employees
WHERE department_id = 90
ORDER BY "TENURE" DESC;
```

Last Name	TENURE
De Haan	1224
King	1098
Kochhar	979