

## **Database Management System – cs422 DE**

### **Lab 1 – Wk 3 & 4**

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Solve the questions from 6.32 to 6.40 in the Case Study 2 on page no. 173 (5<sup>th</sup> edition).

You are required to run & test all these queries in SQL Server. Note that you'll need to create and populate the tables first.

To get full credit for this lab, you need to submit the following:

- (1) Screenshots for at least 4 of the queries with output.
- (2) Answer SQL queries for all of the mentioned exercises.

For your quick reference, the schema and the questions are given below.

Employee (**empID**, fName, lName, address, DOB, sex, position, deptNo)

Department (**deptNo**, deptName, mgrEmpID)

Project (**projNo**, projName, deptNo)

WorksOn (**empID**, **projNo**, hoursWorked)

where

- *Employee* contains employee details and *empID* is the key.
- *Department* contains department details and *deptNo* is the key. *mgrEmpID* identifies the employee who is the manager of the department. There is only one manager for each department.
- *Project* contains details of the projects in each department and the key is *projNo* (no two departments can run the same project).
- *WorksOn* contains details of the hours worked by employees on each project, and *empID/projNo* form the key.

Tables I created for this lab with my test data are the followings.

localhost

Administration Schemas

**SCHEMAS**

Filter objects

- > cs544
- > simpsons
- > sys
- winbd**
  - Tables
    - > Department
    - > Employee
    - > Project
    - > WorksOn
  - Views
  - Stored Procedures
  - Functions

100% 1:1

Result Grid Filter Rows: Search Edit: Export/Import:

emplID	fName	lName	address	DOB	sex	position	deptNo
1	James	Adams	100B Grove Street, Northvale, NJ	1997-01-01	Female	Software Engineer	1
2	Welda	Khang	100ON 4th Street, Fairfield, IA	1963-02-02	Female	HR Manager	2
3	Alex	Bin	30 North Street, New York City, NY	1963-03-03	Male	Marketing Manager	3
4	David	Sin	40A Union Street, Fairfield, IA	1993-04-04	Male	Software Developer	1
5	Win	Ei	111 Heaven Rd, Norwood, NJ	1996-05-05	Female	Software Developer	1
6	Khang	Dara	123 A Street, Fortlee, NJ	1990-03-09	Female	QA	1
7	Adam	Don	23S B Street, Burlington, IA	1991-09-08	Male	QA	1
8	Tham	Su	456 C Street, Outwaa, IA	1998-01-03	Male	Software Developer	1
9	Kyaw	Kaung	40 D Street, Tappon, NY	1997-02-03	Male	Software Developer	1
10	Naing	Win	739 E Street, Miami, FL	1995-02-02	Female	Software Developer	1
11	David	Clara	192 F Street, Los Angles, CA	1940-06-01	Male	Software Developer	1
12	Kora	Lin	304 G Street, Huston, TZ	1963-02-02	Female	Software Developer	1
13	Su	Su	563 H Street, New York City, NYC	1970-03-02	Female	QA	1
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Employee 3 Apply Revert

Result Grid Form Editor Field Types Query Stats Execution Plan

Query Completed

localhost

Administration Schemas

**SCHEMAS**

Filter objects

- > cs544
- > simpsons
- > sys
- winbd**
  - Tables
    - > Department
    - > Employee
    - > Project
    - > WorksOn
  - Views
  - Stored Procedures
  - Functions

100% 1:1

Result Grid Filter Rows: Search Edit: Export/Import:

deptNo	deptName	mgrEmpID
1	IT	1
2	HR	2
3	Marketing	3
NULL	NULL	NULL

Department 2 Apply Revert

Result Grid Form Editor Field Types Query Stats Execution Plan

The screenshot shows the MySQL Workbench interface. The top navigation bar includes tabs for Administration, Schemas, Employee, Department, Project, WorksOn, and SQL File 8\*. The left sidebar displays the schema tree under 'SCHEMAS' with 'windb' selected, showing tables like Department, Employee, Project, and WorksOn, as well as Views, Stored Procedures, and Functions. The main area contains a query editor with the following content:

```
1 •  SELECT * FROM windb.Project;
```

The results are displayed in a 'Result Grid' with the following data:

projNo	projName	deptNo
1	Document Management System	1
HULL	HULL	HULL

The bottom left shows 'Object Info' and 'Session' panes, and the bottom right shows a small preview of another window. A vertical toolbar on the right includes icons for Result Grid, Form Editor, Field Types, Query Stats, and Execution Plan.

The screenshot shows the Oracle SQL Developer interface. The top navigation bar includes tabs for 'Administration' and 'Schemas'. The 'Schemas' tab is active, displaying the 'windb' schema with its tables: Department, Employee, Project, WorksOn, Views, Stored Procedures, and Functions. The 'Tables' section is expanded, showing the 'WorksOn' table. The main workspace displays a query editor with the following content:

```
Employee   Department   Project   WorksOn   SQL File 8*
File       Find       Refresh   Insert   SQL Editor  Help

1 •  SELECT * FROM windb.WorksOn;
```

The results grid shows the following data:

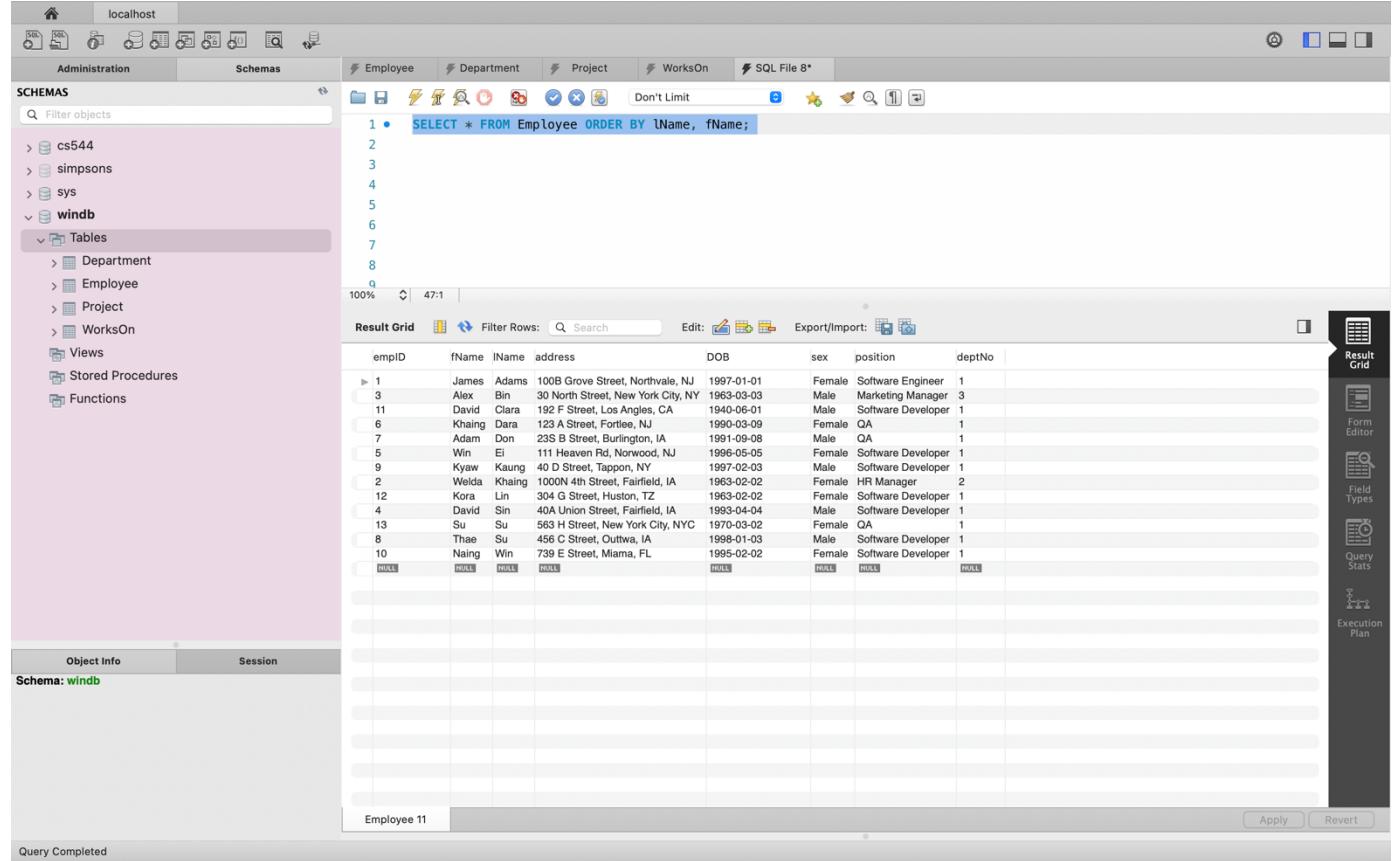
empID	projNo	hoursWorked
1	1	10
4	1	20
5	1	30
MULL	MULL	MULL

Below the results grid, there are tabs for 'Object Info' and 'Session'. The 'Object Info' tab shows the schema as 'windb'. The bottom status bar indicates 'Query Completed'.

## Exercises

1. List all employees in alphabetical order of surname and within surname, first name.

**ANS:**



The screenshot shows the Oracle SQL Developer interface. The left sidebar displays the schema structure under 'Administration' for the 'windb' schema, including tables like Department, Employee, Project, and WorksOn. The main workspace shows a query editor with the following SQL statement:

```
1 • SELECT * FROM Employee ORDER BY lName, fName;
```

The results grid displays 11 rows of employee data:

empID	fName	lName	address	DOB	sex	position	deptNo
1	James	Adams	100B Grove Street, Northvale, NJ	1997-01-01	Female	Software Engineer	1
3	Alex	Bin	30 North Street, New York City, NY	1963-03-03	Male	Marketing Manager	3
11	David	Clara	192 F Street, Los Angeles, CA	1940-06-01	Male	Software Developer	1
6	Khaing	Dara	123 A Street, Fortlee, NJ	1990-03-09	Female	QA	1
7	Adam	Don	235 B Street, Burlington, IA	1991-09-08	Male	QA	1
5	Win	Ei	111 Heaven Rd, Norwood, NJ	1996-05-05	Female	Software Developer	1
9	Kyaw	Kaung	40 D Street, Tappan, NY	1997-02-03	Male	Software Developer	1
2	Welda	Khaing	1000N 4th Street, Fairfield, IA	1963-02-02	Female	HR Manager	2
12	Kora	Lin	304 G Street, Huston, TZ	1963-02-02	Female	Software Developer	1
4	David	Sin	40A Union Street, Fairfield, IA	1993-04-04	Male	Software Developer	1
13	Su	Su	563 H Street, New York City, NYC	1970-03-02	Female	QA	1
8	Thae	Su	456 C Street, Ottowa, IA	1998-01-03	Male	Software Developer	1
10	Naing	Win	739 E Street, Miami, FL	1995-02-02	Female	Software Developer	1

The bottom status bar indicates "Employee 11" and "Query Completed".

2. List all the details of employees who are female.

**ANS:**

The screenshot shows the SQL Workbench interface. On the left, the schema tree for 'windb' is visible, showing tables like Department, Employee, Project, and WorksOn. The main area displays a query result grid for employees where sex is 'female'. The results are as follows:

empID	fName	lName	address	DOB	sex	position	deptNo
1	James	Adams	100B Grove Street, Northvale, NJ	1997-01-01	Female	Software Engineer	1
2	Welda	Khaing	100NN 4th Street, Fairfield, IA	1963-02-02	Female	HR Manager	2
5	Win	Ei	111 Heaven Rd, Norwood, NJ	1996-05-05	Female	Software Developer	1
6	Khaing	Dara	123 A Street, Fortlee, NJ	1990-03-09	Female	QA	1
10	Naing	Win	739 E Street, Miami, FL	1995-02-02	Female	Software Developer	1
12	Kora	Lin	304 G Street, Huston, TZ	1963-02-02	Female	Software Developer	1
13	Su	Su	563 H Street, New York City, NYC	1970-03-02	Female	QA	1
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Employee 12

Query Completed

3. List the names and addresses of all employees who are Managers.

ANS:

The screenshot shows the SQL Workbench interface. On the left, the schema tree for 'windb' is visible, showing tables like Department, Employee, Project, and WorksOn. The main area displays a query result grid for employees who are managers. The results are as follows:

fName	lName	address
James	Adams	100B Grove Street, Northvale, NJ
Welda	Khaing	100NN 4th Street, Fairfield, IA
Alex	Bin	30 North Street, New York City, NY

Employee 13

Query Completed

4. Produce a list of the names and addresses of all employees who work for the IT department.

**ANS:**

The screenshot shows the SQL Developer interface with a query editor and a result grid. The query is:

```
4 •  SELECT * FROM Employee e JOIN Department d ON e.deptNo=d.deptNo WHERE d.deptName LIKE 'IT';
```

The result grid displays 14 rows of employee data, including their ID, first name, last name, address, DOB, sex, position, and department details. The columns are:

empID	fName	lName	address	DOB	sex	position	deptNo	deptNo	deptName	mgrEmpID
1	James	Adams	100B Grove Street, Northvale, NJ	1997-01-01	Female	Software Engineer	1	1	IT	1
4	David	Sin	40A Union Street, Fairfield, IA	1993-04-04	Male	Software Developer	1	1	IT	1
5	Win	Ei	111 Heaven Rd, Norwood, NJ	1996-05-05	Female	Software Developer	1	1	IT	1
6	Khaing	Dara	123 A Street, Fortlee, NJ	1990-03-09	Female	QA	1	1	IT	1
7	Adam	Don	235 B Street, Burlington, IA	1991-09-08	Male	QA	1	1	IT	1
8	Thae	Su	456 C Street, Ottowa, IA	1998-01-03	Male	Software Developer	1	1	IT	1
9	Kyaw	Kaung	40 D Street, Tappon, NY	1997-02-03	Male	Software Developer	1	1	IT	1
10	Naing	Win	700 E Street, Miami, FL	1995-02-02	Female	Software Developer	1	1	IT	1
11	David	Clara	192 F Street, Los Angles, CA	1940-06-01	Male	Software Developer	1	1	IT	1
12	Kora	Lin	304 G Street, Huston, TZ	1963-02-02	Female	Software Developer	1	1	IT	1
13	Su	Su	563 H Street, New York City, NYC	1970-03-02	Female	QA	1	1	IT	1

Query Completed

5. Produce a complete list of all managers who are due to retire this year, in alphabetical order of surname.

**ANS:**

The screenshot shows the SSMS interface with the following details:

- Left pane (Object Explorer):** Shows the database structure for schema "windb". It includes tables (Department, Employee, Project, WorksOn), views, stored procedures, and functions.
- Top bar:** Shows the connection to "localhost" and various toolbar icons.
- Query Editor:** Displays a T-SQL query to select employees aged 60 or older who manage others. The results are shown in a grid below.
 

```

5 • SELECT *, DATE_FORMAT(FROM_DAYS(DATEDIFF(NOW(), DOB)), '%Y') AS age
6   FROM Employee e WHERE YEAR(NOW()) - YEAR(DOB) = 60
7   AND empID = ANY(SELECT mgrEmpID FROM Department d WHERE e.empID=d.mgrEmpID)
8   ORDER BY lName;
9
10
11
12
13
14
15
16
17
18
      
```

empID	fName	lName	address	DOB	sex	position	deptNo	age
3	Alex	Bin	30 North Street, New York City, NY	1963-03-03	Male	Marketing Manager	3	0060
2	Welda	Khaing	1000N 4th Street, Fairfield, IA	1963-02-02	Female	HR Manager	2	0060
- Result Grid:** Shows the results of the query with two rows of data.
- Right pane (Toolbars):** Includes buttons for Result Grid, Form Editor, Field Types, Query Stats, and Execution Plan.
- Status Bar:** Shows "Query Completed" and "Read Only".

6. Find out how many employees are managed by 'James Adams'.

**ANS:**

The screenshot shows the SSMS interface with the following details:

- Left pane (Object Explorer):** Shows the database structure for schema "windb". It includes tables (Department, Employee, Project, WorksOn), views, stored procedures, and functions.
- Top bar:** Shows the connection to "localhost" and various toolbar icons.
- Query Editor:** Displays a T-SQL query to count employees managed by James Adams. The results are shown in a grid below.
 

```

6 • SELECT COUNT(*)
7   FROM Employee WHERE
8   deptNo IN(SELECT deptNo FROM Department WHERE mgrEmpID IN (SELECT empID FROM Employee e WHERE e.fName LIKE 'James' AND e.lName LIKE
9   AND fName NOT LIKE 'James' AND lName NOT LIKE 'Adams');
10
11
12
13
14
      
```

COUNT(*)
10
- Result Grid:** Shows the results of the query with one row of data.
- Right pane (Toolbars):** Includes buttons for Result Grid, Form Editor, Field Types, Query Stats, and Execution Plan.
- Status Bar:** Shows "Query Completed" and "Read Only".

7. Produce a report of the total hours worked by each employee, arranged in order of department number and within department, alphabetically by employee surname.

**ANS:**

The screenshot shows a database management interface with the following details:

- Left Panel (Administration):** Shows the schema tree for the 'windb' database, which contains tables for Department, Employee, Project, and WorksOn.
- Top Bar:** Includes tabs for Employee, Department, Project, WorksOn, and SQL File 8\*, along with various toolbar icons.
- Query Editor:** Displays the following SQL code:

```

7 • SELECT e.*, SUM(w.hoursWorked)
8 FROM Employee e
9 JOIN WorksOn w WHERE w.empID=e.empID
10 GROUP BY(e.empID)
11 ORDER BY e.deptNo, e.lName;
12
13
14
15
    
```
- Result Grid:** Shows the output of the query in a tabular format:

empID	fName	lName	address	DOB	sex	position	deptNo	SUM(w.hoursWorked)
1	James	Adams	100B Grove Street, Northvale, NJ	1997-01-01	Female	Software Engineer	1	10
5	Win	Ei	111 Heaven Rd, Norwood, NJ	1996-05-05	Female	Software Developer	1	30
4	David	Sin	40A Union Street, Fairfield, IA	1993-04-04	Male	Software Developer	1	20
- Bottom Status Bar:** Shows "Query Completed" and "Read Only".

8. For each project on which more than two employees worked, list the project number, project name and the number of employees who work on that project.

**ANS:**

The screenshot shows a database management system interface with the following details:

- Top Bar:** localhost, Administration, Schemas, Employee, Department, Project, WorksOn, SQL File 8\*, Don't Limit.
- Schemas Panel:** Shows schemas cs544, simpsons, sys, and windb. The windb schema is selected, and its Tables folder is expanded, showing Department, Employee, Project, WorksOn, Views, Stored Procedures, and Functions.
- Query Editor:** Displays the following SQL query:
 

```

8 • SELECT p.projNo, p.projName, COUNT(empID)
9   FROM Project p
10  JOIN WorksOn w ON w.projNo = p.projNo
11  GROUP BY (p.projNo)
12  HAVING COUNT(empID) > 2;
      
```
- Result Grid:** Shows the results of the query in a table format:
 

projNo	projName	COUNT(empID)
1	Document Management System	3
- Object Info:** Schema: windb
- Session:** Read Only
- Message:** Query Completed

9. List the total number of employees in each department for those departments with more than 10 employees. Create an appropriate heading for the columns of the results table.

**ANS:**

localhost

Administration Schemas

Schemas

Filter objects

Employee Department Project WorksOn SQL File 8\*

Don't Limit

9 • SELECT d.deptNo AS 'Department Number', d.deptName AS 'Department Name', COUNT(e.empID) AS 'Employee Count'  
10 FROM Employee e JOIN Department d ON e.deptNo = d.deptNo  
11 GROUP BY (d.deptNo)  
12 HAVING COUNT(e.empID) > 10  
13  
14  
15  
16

100% 27:12 | Result Grid Filter Rows: Search Export:

Result Grid Department Number Department Name Employee Count

1	IT	11
Result 20		

Object Info Session Schema: windb

Query Completed

Result Grid Form Editor Field Types Query Stats Execution Plan

Read Only

The screenshot shows a database management system interface with a central query editor and a results grid. The query editor contains a SELECT statement that joins the Employee and Department tables to find departments with more than 10 employees. The results grid displays one row: Department Number IT, Department Name IT, and Employee Count 11. The interface includes a sidebar for administration, schema navigation, and various tools like form editor and field types.

MUM-DBMS