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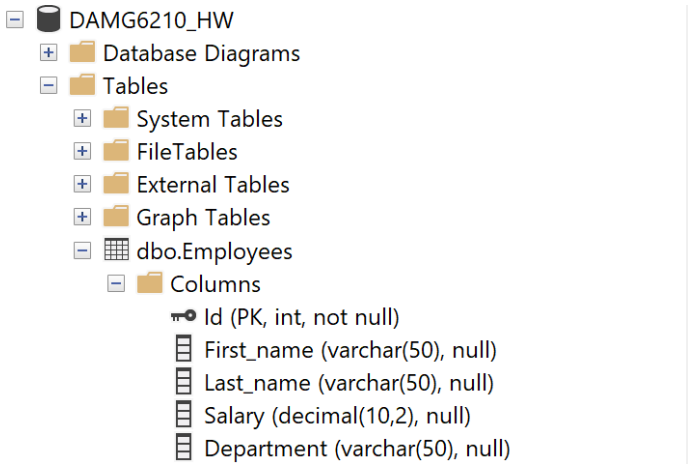
DATA MANAGEMENT AND DATABASE DESIGN
HOMEWORK: WEEK- 8

Answer the following questions on the provided schema for the table and sample record

INSERT statements:
Table definition:

```
CREATE TABLE Employees (
   Id INT PRIMARY KEY,
   First_name VARCHAR (50),
   Last_name VARCHAR (50),
   Salary DECIMAL (10, 2),
   Department VARCHAR (50)
);
```

Sol:



SQLQuery1.sql - L...LKUMAR\laksh (71))*

```sql
CREATE DATABASE DAMG6210_HW;
GO
USE DAMG6210_HW
GO
CREATE TABLE Employees (

Id INT PRIMARY KEY,
First_name VARCHAR(50),
Last_name VARCHAR(50),
Salary DECIMAL(10, 2),
Department VARCHAR(50)
);
```

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Sample records:
INSERT INTO employees (Id, First_name, Last_name, Salary, Department)
VALUES
(1, 'John', 'Doe', 50000, 'HR'),
(2, 'Jane', 'Smith', 60000, 'Finance'),
(3, 'Alice', 'Johnson', 70000, 'IT'),
(4, 'Bob', 'Williams', 80000, 'IT'),
(5, 'Charlie', 'Brown', 40000, 'HR');

Sol:

SQLQuery1.sql - L...LKUMAR\laksh (71))*

```sql
INSERT INTO Employees (ID, First_name, Last_name, Salary, Department)
VALUES (1, 'John', 'Doe', 50000, 'HR'), (2, 'Jane', 'Smith', 60000, 'Finance'), (3, 'Alice', 'Johnson', 70000, 'IT'),
(4, 'Bob', 'Williams', 80000, 'IT'),(5, 'Charlie', 'Brown', 40000, 'HR');

SELECT * FROM Employees;
```

110 %

Results | Messages

	Id	First_name	Last_name	Salary	Department
1	1	John	Doe	50000.00	HR
2	2	Jane	Smith	60000.00	Finance
3	3	Alice	Johnson	70000.00	IT
4	4	Bob	Williams	80000.00	IT
5	5	Charlie	Brown	40000.00	HR

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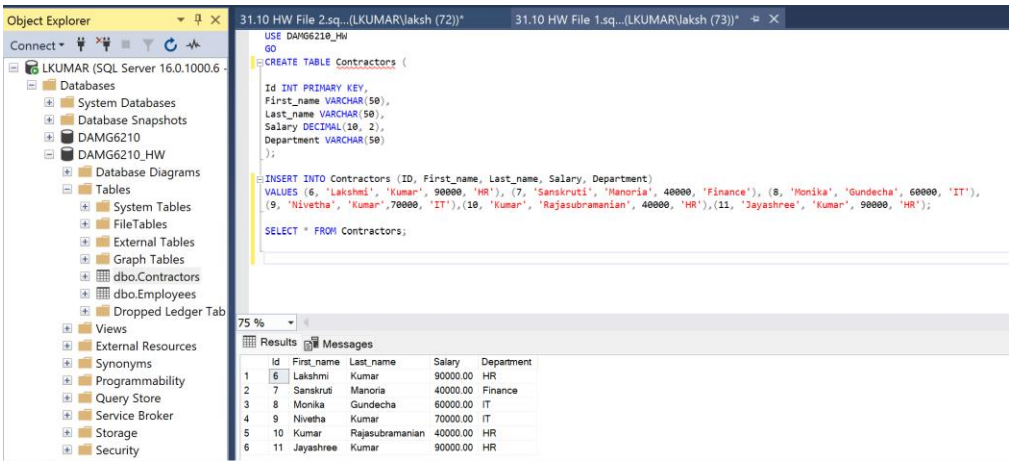
QUESTIONS:

1.

Sol:

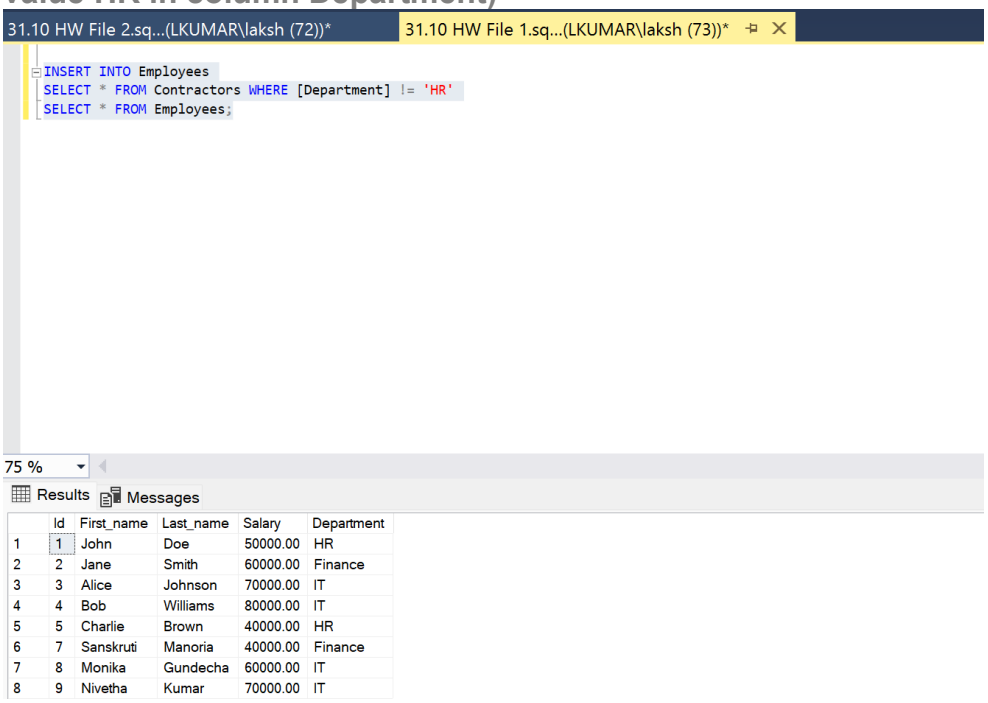
➔ Create a new table “Contractors” and add values into it.



➔ Query to insert data into the `Employees` table from another table `Contractors` with the same structure, excluding those in the 'HR' department.

```
INSERT INTO Employees
SELECT * FROM Contractors WHERE [Department]! = 'HR'
SELECT * FROM Employees;
```

(Only records with Id 7, 8, 9 have been inserted from Contractors to Employees. Records with Id 6, 10, 11 have not been inserted since those records have the value HR in column Department)



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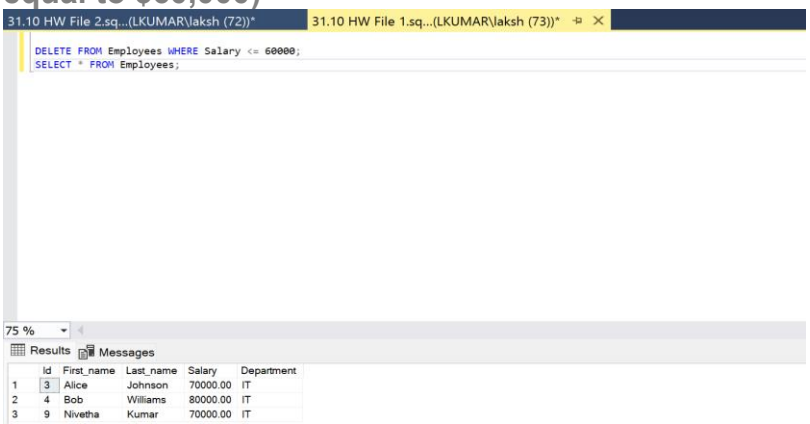
2.
Sol:

➔ Query to delete employees from the `Employees` table which have a salary less or equal to $ 60000.

```
DELETE FROM Employees WHERE Salary <= 60000;
SELECT * FROM Employees;
```

(Only records with Id 3, 4, 9 will be displayed from Employees. Records with Id 1,2,5,6,7 have not been displayed since those records have salary less than or equal to $60,000)

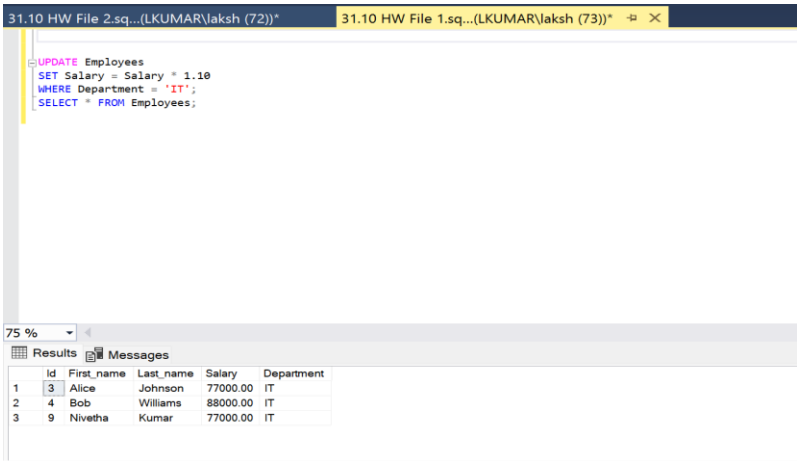


	Id	First_name	Last_name	Salary	Department
1	3	Alice	Johnson	70000.00	IT
2	4	Bob	Williams	80000.00	IT
3	9	Nivetha	Kumar	70000.00	IT

3.
Sol:

➔ Query to update the salary of employees in the 'IT' department by increasing it by 10%

```
UPDATE Employees
SET Salary = Salary * 1.10
WHERE Department = 'IT';
SELECT * FROM Employees;
```



	Id	First_name	Last_name	Salary	Department
1	3	Alice	Johnson	77000.00	IT
2	4	Bob	Williams	88000.00	IT
3	9	Nivetha	Kumar	77000.00	IT

Adding more values for Querying purpose:

31.10 HW File 2.sq...(LKUMAR\laksh (72))* | 31.10 HW File 1.sq...(LKUMAR\laksh (73))*

```sql
INSERT INTO Employees (ID, First_name, Last_name, Salary, Department)
VALUES (6, 'Lakshmi', 'Kumar', 90000, 'HR'), (7, 'Sanskruti', 'Manoria', 40000, 'Finance'), (8, 'Monika', 'Gundecha', 60000, 'IT'),
(10, 'Kumar', 'Rajasubramanian', 40000, 'HR'),(11, 'Jayashree', 'Kumar', 90000, 'HR'), (5, 'Johnson', 'Mathew', 20000, 'HR');
SELECT * FROM Employees;
```

75 %

Results | Messages

	Id	First_name	Last_name	Salary	Department
1	3	Alice	Johnson	77000.00	IT
2	4	Bob	Williams	88000.00	IT
3	5	Johnson	Mathew	20000.00	HR
4	6	Lakshmi	Kumar	90000.00	HR
5	7	Sanskruti	Manoria	40000.00	Finance
6	8	Monika	Gundecha	60000.00	IT
7	9	Nivetha	Kumar	77000.00	IT
8	10	Kumar	Rajasubramanian	40000.00	HR
9	11	Jayashree	Kumar	90000.00	HR

4.

Sol:

➔ Query to display all columns with the top 3 highest salaries from the `Employees` table

```sql
SELECT TOP 3 Salary
FROM Employees
ORDER BY Salary DESC;
```

31.10 HW File 2.sq...(LKUMAR\laksh (72))* | 31.10 HW File 1.sq...(LKUMAR\laksh (73))*

```sql
SELECT TOP 3 Salary
FROM Employees
ORDER BY Salary DESC;
```

75 %

Results | Messages

	Salary
1	90000.00
2	90000.00
3	88000.00

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➔ Query to display all columns with the top 3 highest salaries from the `Employees` table

```
SELECT TOP 3 *
FROM Employees
ORDER BY Salary DESC;
```

31.10 HW File 2.sq...(LKUMAR\laksh (72))* | 31.10 HW File 1.sq...(LKUMAR\laksh (73))*

```
SELECT TOP 3 *
FROM Employees
ORDER BY Salary DESC;
```

75 %

Results | Messages

	Id	First_name	Last_name	Salary	Department
1	6	Lakshmi	Kumar	90000.00	HR
2	11	Jayashree	Kumar	90000.00	HR
3	4	Bob	Williams	88000.00	IT

5.
Sol:
Query to select employees whose first name starts with 'J' and ends with 'n'

```
SELECT * FROM Employees
WHERE First_name LIKE 'J%n'
```

31.10 HW File 2.sq...(LKUMAR\laksh (72))* | 31.10 HW File 1.sq...(LKUMAR\laksh (73))*

```
SELECT * FROM Employees
WHERE First_name LIKE 'J%n';
```

75 %

Results | Messages

	Id	First_name	Last_name	Salary	Department
1	5	Johnson	Mathew	20000.00	HR

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6.
Sol:
Query to select employees who are either in the 'HR' department or have a salary greater than 60000, but not both.

```
SELECT * FROM Employees
WHERE (Salary>60000 OR Department='HR') AND NOT (Department = 'HR' AND Salary > 60000);
```

31.10 HW File 1.sq...(LKUMAR\laksh (73))* | 31.10 HW File 2.sq...(LKUMAR\laksh (72))*

```
SELECT * FROM Employees
WHERE (Salary>60000 OR Department='HR') AND NOT (Department = 'HR' AND Salary > 60000);
```

83 %

Results | Messages

	Id	First_name	Last_name	Salary	Department
1	3	Alice	Johnson	77000.00	IT
2	4	Bob	Williams	88000.00	IT
3	5	Johnson	Mathew	20000.00	HR
4	9	Nivetha	Kumar	77000.00	IT
5	10	Kumar	Rajasubramanian	40000.00	HR

7.
Sol:
Query to you get the total salary for each department using the `Employees` table?

```
SELECT Department, SUM(Salary) AS TotalSalary
FROM Employees
GROUP BY Department;
```

31.10 HW File 1.sq...(LKUMAR\laksh (73))* | 31.10 HW File 2.sq...(LKUMAR\laksh (72))*

```
SELECT Department, SUM(Salary) AS TotalSalary
FROM Employees
GROUP BY Department;
```

83 %

Results | Messages

	Department	TotalSalary
1	Finance	40000.00
2	HR	240000.00
3	IT	302000.00

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8.
Sol:
Query to select employees from the `Employees` table, sorted by department in ascending order, and then by salary in descending order within each department.

```
SELECT * FROM Employees
ORDER BY Department ASC, Salary DESC;
```

31.10 HW File 1.sq...(LKUMAR\laksh (73))* | 31.10 HW File 2.sq...(LKUMAR\laksh (72))*

```
SELECT * FROM Employees
ORDER BY Department ASC, Salary DESC;
```

83 %

Results | Messages

	Id	First_name	Last_name	Salary	Department
1	7	Sanskruti	Manoria	40000.00	Finance
2	6	Lakshmi	Kumar	90000.00	HR
3	11	Jayashree	Kumar	90000.00	HR
4	10	Kumar	Rajasubramanian	40000.00	HR
5	5	Johnson	Mathew	20000.00	HR
6	4	Bob	Williams	88000.00	IT
7	3	Alice	Johnson	77000.00	IT
8	9	Nivetha	Kumar	77000.00	IT
9	8	Monika	Gundecha	60000.00	IT

9.
Sol:
Query to create a view that shows the average salary for each department from the employees` table?

```
CREATE VIEW DepartmentAverageSalaryViewAS
SELECT Department, AVG(Salary) AS AverageSalary
FROM Employees
GROUP BY Department;
SELECT * FROM DepartmentAverageSalaryView;
```

31.10 HW File 1.sq...(LKUMAR\laksh (73))* | 31.10 HW File 2.sq...(LKUMAR\laksh (72))*

```
CREATE VIEW DepartmentAverageSalaryView AS
SELECT Department, AVG(Salary) AS AverageSalary
FROM Employees
GROUP BY Department;
SELECT * FROM DepartmentAverageSalaryView;
```

83 %

Results | Messages

	Department	AverageSalary
1	Finance	40000.000000
2	HR	60000.000000
3	IT	75500.000000

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10. What is a strategy to optimize a query that frequently retrieves department and average salary columns data from the `employees` table?

Sol:

Strategies to optimize a query that frequently retrieves department and average salary columns data from the Employees table.

- ➔ Maintenance: Ensure indexes are maintained regularly, indexes are not fragmented and also that queries run in a systematic manner.
- ➔ Caching: Implement a cache to store the department and average salary columns data in order to reduce load on the database.
- ➔ Usage of appropriate hardware: Make sure database server has the right type of hardware (i.e.) CPU, Memory, Storage etc.
- ➔ Denormalizing the data: Incase the data wouldn't have to be changed frequently, denormalize the data and store average salary in a separate table directly. In this way, frequent calculations can be eliminated.
- ➔ Indexing: Look out if the table has been indexed properly. Make sure to put an index on the column "Department" in order to speed up grouping and retrieval of data.
- ➔ Partitioning: If the table is extremely large, partition the table. This helps deal with poor performance in case of frequent querying or retrieval.