

## Lab 5

CLO-1

### Topic: Aggregate functions, Alias, and Having Clause

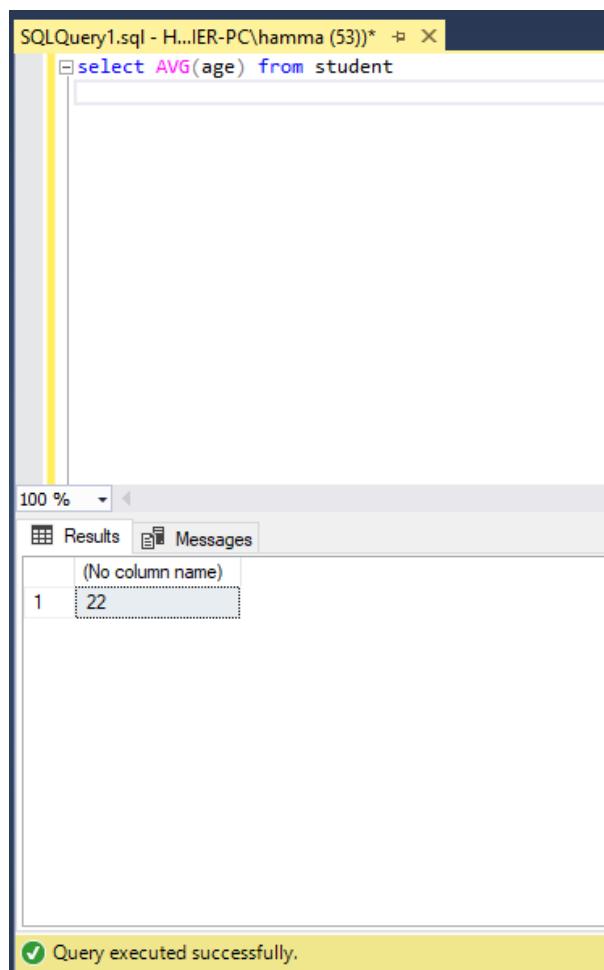
*Objectives:* Develop understanding of aggregation functions, Alias and Having clause.

#### Aggregation:

Aggregate functions allow you to perform a calculation on a set of values to return a single scalar value. The most common aggregatefunctions will be performed today.

#### AVG function:

AVG function is used to get average of the values in a column.

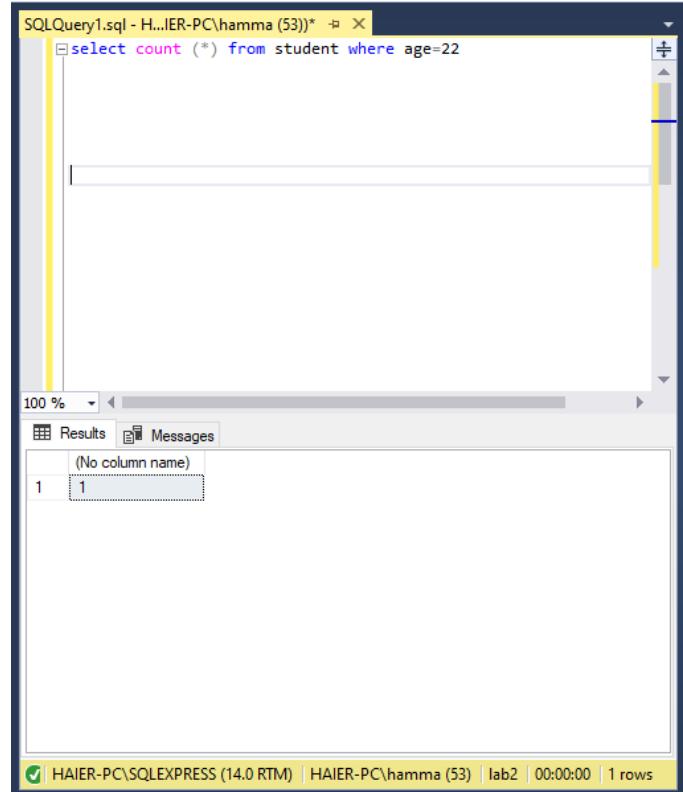


The screenshot shows a SQL query window titled "SQLQuery1.sql - H...IER-PC\hamma (53)\*". The query is "select AVG(age) from student". The results pane shows a single row with the value 22. A message at the bottom says "Query executed successfully."

	(No column name)
1	22

#### Count function:

Count function is used to count the number of rows.



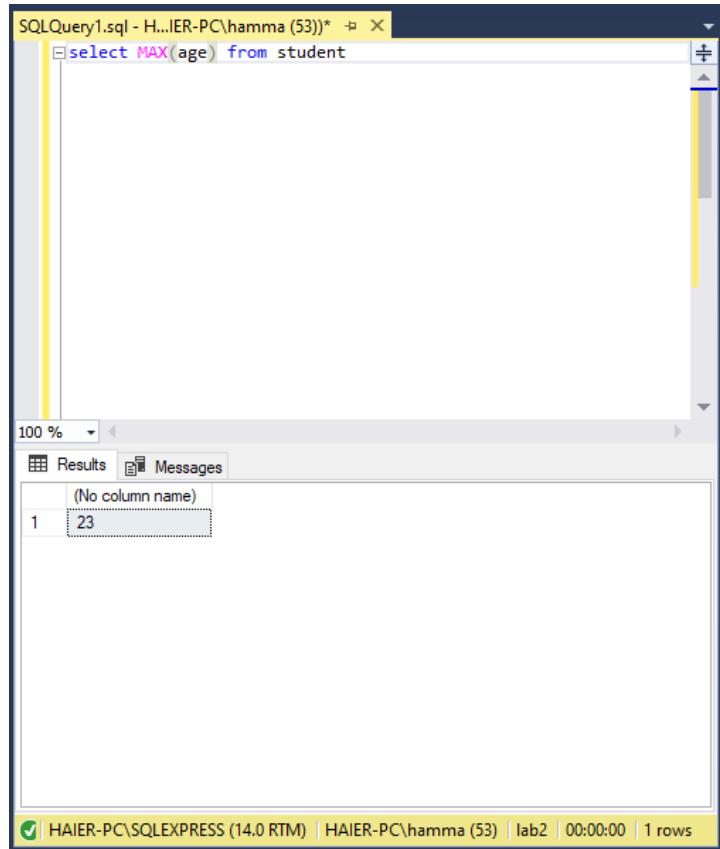
The screenshot shows a SQL query window titled "SQLQuery1.sql - H...IER-PC\hamma (53)\*". The query is:

```
select count (*) from student where age=22
```

The results pane shows one row with the value 1 under the column "(No column name)". The status bar at the bottom indicates the session is running on "HAIER-PC\SQLEXPRESS (14.0 RTM)" with "HAIER-PC\hamma (53)" as the user, "lab2" as the database, and "00:00:00" as the duration, with "1 rows" returned.

### Max function:

Max function is used to get maximum value from a column.



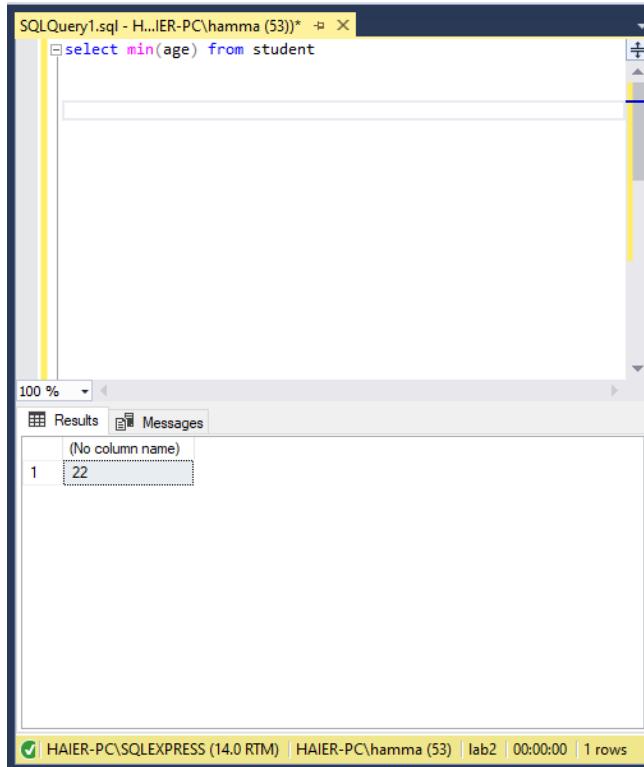
The screenshot shows a SQL query window titled "SQLQuery1.sql - H...IER-PC\hamma (53)\*". The query is:

```
select MAX(age) from student
```

The results pane shows one row with the value 23 under the column "(No column name)". The status bar at the bottom indicates the session is running on "HAIER-PC\SQLEXPRESS (14.0 RTM)" with "HAIER-PC\hamma (53)" as the user, "lab2" as the database, and "00:00:00" as the duration, with "1 rows" returned.

### Min function:

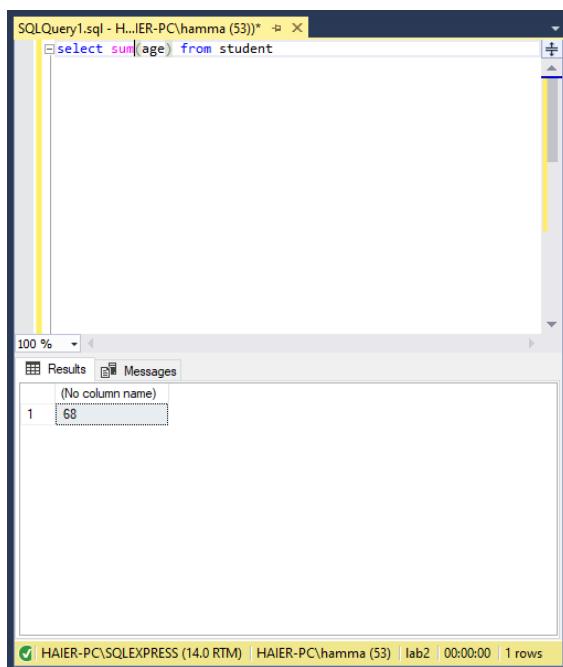
Min function is used to get minimum value from a column.



The screenshot shows a SQL query window titled "SQLQuery1.sql - H...IER-PC\hamma (53)\*". The query is "select min(age) from student". The results pane shows one row with the value 22 under the column "(No column name)". The status bar at the bottom indicates the session is connected to "HAIER-PC\SQLEXPRESS (14.0 RTM)" with "HAIER-PC\hamma (53)" as the user, and the task has completed in "00:00:00" with "1 rows" affected.

### Sum function:

Sum function is used to get sum of values from a column.



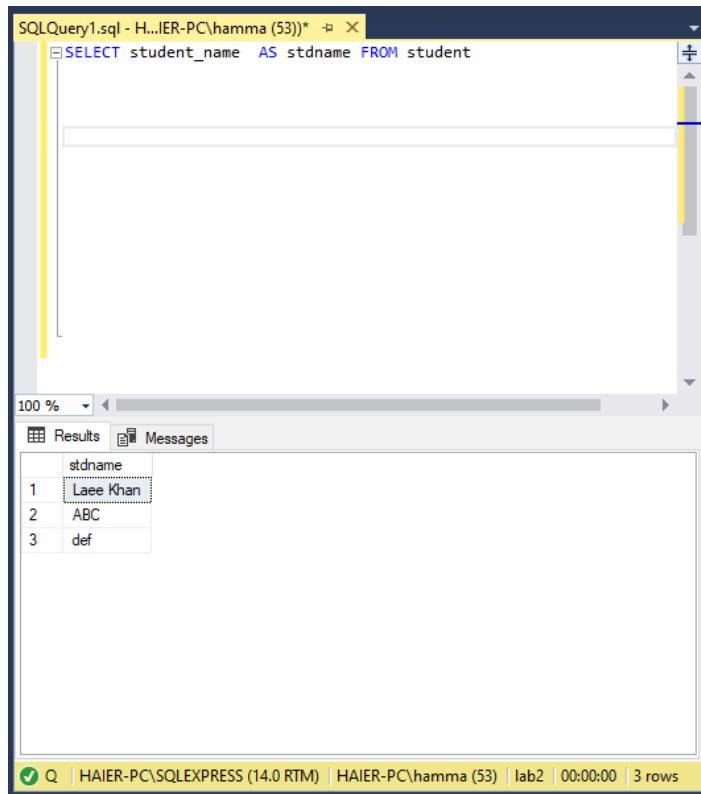
The screenshot shows a SQL query window titled "SQLQuery1.sql - H...IER-PC\hamma (53)\*". The query is "select sum(age) from student". The results pane shows one row with the value 68 under the column "(No column name)". The status bar at the bottom indicates the session is connected to "HAIER-PC\SQLEXPRESS (14.0 RTM)" with "HAIER-PC\hamma (53)" as the user, and the task has completed in "00:00:00" with "1 rows" affected.

### ALIASING TABLES AND COLUMNS:

Aliases provide database administrators, as well as other database users, with the ability to reduce the amount of code required for a query, and to make queries simpler to understand. In addition, aliasing can be used as an obfuscation technique to protect the real names of database fields.

#### ALIASING COLUMNS

```
SELECT column_name AS alias_name FROM table_name
```



The screenshot shows the SSMS interface with a query window titled "SQLQuery1.sql - H...IER-PC\hamma (53)\*". The query is:

```
SELECT student_name AS stdname FROM student
```

The results grid displays the following data:

	stdname
1	Laeen Khan
2	ABC
3	def

At the bottom of the interface, the status bar shows: "Q | HAIER-PC\SQLEXPRESS (14.0 RTM) | HAIER-PC\hamma (53) | lab2 | 00:00:00 | 3 rows".

#### ALIASING TABLES

```
SELECT column_name(s) FROM table_name AS alias_name;
```

The screenshot shows a SQL query window titled "SQLQuery1.sql - H...IER-PC\hamma (53)\*". The query is:

```
SELECT student_address FROM student AS alias_name;
```

The results pane shows a table with one column "student\_address" containing three rows, all of which are "Mianwali".

student_address
1 Mianwali
2 Mianwali
3 Mianwali

At the bottom of the window, it says "Q | HAIER-PC\SQLEXPRESS (14.0 RTM) | HAIER-PC\hamma (53) | lab2 | 00:00:00 | 3 rows".

#### Group By Clause:

The SQL GROUP BY clause is used in collaboration with the SELECT statement to arrange identical data into groups. This GROUP BY clause follows the WHERE clause in a SELECT statement and precedes the ORDER BY clause.

```
select count(*) from student group by (age)
```

The screenshot shows a SQL query window titled "SQLQuery1.sql - H...IER-PC\hamma (53)\*". The query is:

```
select count(*) from student group by (age)
```

The results pane shows a table with one column "(No column name)" containing two rows, "1" and "2".

(No column name)
1
2

At the bottom of the window, it says "Q | HAIER-PC\SQLEXPRESS (14.0 RTM) | HAIER-PC\hamma (53) | lab2 | 00:00:00 | 2 rows".

### Order By Clause:

The ORDER BY is used to sort the result-set in ascending or descending order.

The ORDER BY sorts the records in ascending order by default. To sort the records in descending order, use the DESC keyword.

The screenshot shows the SSMS interface with a query window titled "SQLQuery1.sql - HAIER-PC\hamma (53)\*". The query is "select \* from student order by age". The results pane displays a table with four columns: student\_roll, student\_name, student\_address, and age. The data is as follows:

	student_roll	student_name	student_address	age
1	3	def	Mianwali	22
2	12	Laee Khan	Mianwali	23
3	2	ABC	Mianwali	23

The status bar at the bottom indicates the query was successful ("Q"), the session is on "HAIER-PC\SQLEXPRESS (14.0 RTM)", the database is "HAIER-PC\hamma (53)", the current task is "lab2", and the duration is "00:00:00 | 3 rows".

### Having Clause:

The WHERE clause is a row filter, the HAVING clause is a group filter. Only groups for which the HAVING predicate evaluates to TRUE are returned by the HAVING phase to the next logical query processing phase. Groups for which the predicate evaluates to FALSE or UNKNOWN are discarded. Because the HAVING clause is processed after the rows have been grouped, you can refer to aggregate functions in the logical expression.

```
select age from student group by (age) having count (age) >1
```

The screenshot shows the SSMS interface. In the top window, a SQL query is written:

```
select age from student group by (age) having count (age) >1
```

In the bottom results pane, there is one row of data:

age
23

At the bottom of the screen, the status bar displays: Q HAIER-PC\SQLEXPRESS (14.0 RTM) | HAIER-PC\hamma (53) | lab2 | 00:00:00 | 1 rows.

## SQL Query Tasks

### (1) Calculate Average Salary:

Task: Write a SQL query to calculate the average salary of all employees.

### (2) Find Maximum Salary:

Task: Write a SQL query to find the maximum salary among all employees

### (3) Count Employees in Each Department:

Task: Write a SQL query to count the number of employees in each department.

### (4) Calculate Total Salary:

Task: calculate the total salary earned by each employee based on their job title.

### (5) Identify Department with Highest Average Salary:

Task: Write a SQL query to identify the department with the highest average salary among its employees.

### (6) Determine Number of Dependents per Employee:

Task: Write a SQL query to count the number of dependents each employee has.

### (7) Find Minimum and Maximum Years of Service:

Task: Write a SQL query to find the minimum and maximum years of service among all employees.

### (8) Calculate Total Salary Expense per Department:

Task: Write a SQL query to calculate the total salary expense for each department.

### (9) Identify Employees Earning Above Average Salary:

Task: Write a SQL query to identify employees who earn above the average salary.

(10) **Calculate Total Salary Expense by Job Title:**

Task: Write a SQL query to calculate the total salary expense for each job title.