Multiple-Row Functions

Practical 7

Lesson Objectives

- Identify the available group functions
- Group data by using the GROUP BY clause
- Include or exclude grouped rows by using the HAVING clause

Using Scripts

- Run the following scripts before the practical.
  - **Northwoods.sql**
  - **HR.sql**

Group Functions

- Group Functions: Perform an operation on a group of queried rows and returns a single result.

Function	Description	Example Query	Result
AVG (*fieldname*)	Returns the average value of a numeric field's returned values	SELECT AVG(capacity) FROM location;	33.230769
COUNT(*)	Returns an integer representing a count of the number of returned rows	SELECT COUNT(*) FROM enrollment;	20
COUNT (*fieldname*)	Returns an integer representing a count of the number of returned rows for which the value of *fieldname* is not NULL	SELECT COUNT(grade) FROM enrollment;	12
MAX (*fieldname*)	Returns the maximum value of a numeric field's returned values	SELECT MAX(max_enrl) FROM course_section;	140
MIN (*fieldname*)	Returns the minimum value of a numeric field's returned values	SELECT MIN(max_enrl) FROM course_section;	30
SUM (*fieldname*)	Sums a numeric field's returned values	SELECT SUM(capacity) FROM location;	432

Group Functions – SUM(), AVG(),MAX(), MIN()

- AVG and SUM are used for numeric data
- MIN and MAX are used for numeric, character, and date data types.

```
SELECT AVG(salary), MAX(salary),
MIN(salary), SUM(salary)
FROM employees
WHERE job_id LIKE '%REP%';.

SELECT MIN(hire_date), MAX(hire_date)
FROM employees;
```

Group Functions – COUNT()

```
SELECT *
FROM enrollment
WHERE s_id = 5;
```

```
SELECT COUNT(*)
FROM enrollment
WHERE s_id = 5;
```

COUNT(*) returns the number of rows in a table

```
SELECT COUNT(grade)
FROM enrollment
WHERE s_id = 5;
```

COUNT(expr) returns the number of rows with non null values for the expr

Group By

- Use to group output by the field with duplicate values and apply group functions to the grouped data.

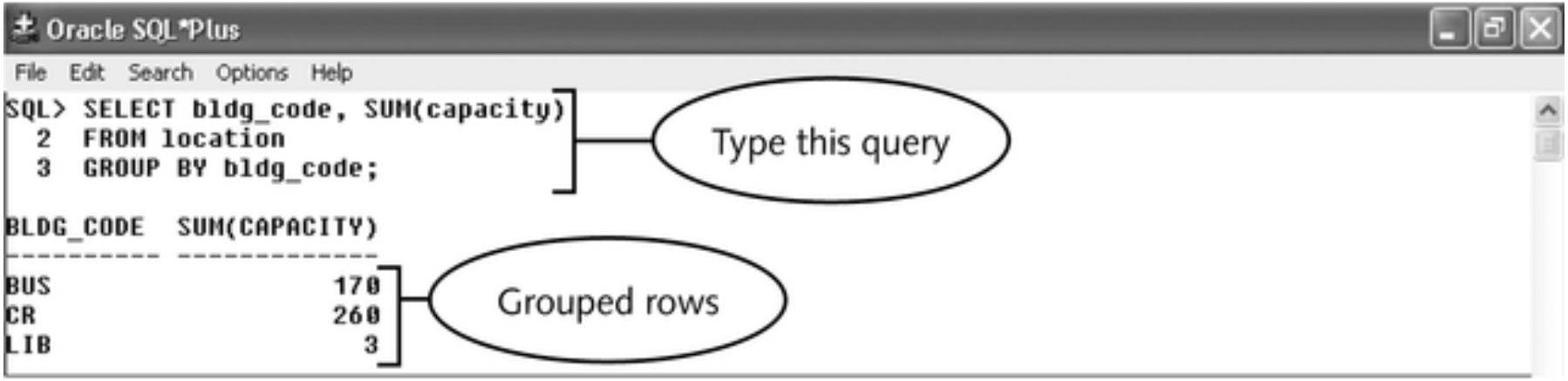

Figure 3-34 SQL query that uses the GROUP BY clause to group rows

Group By

- All columns in the SELECT list that are not in group functions must be in the GROUP BY clause.
- The GROUP BY column does not have to be in the SELECT list.

```
SELECT s_id, COUNT(*)
FROM enrollment;
```

whatever that is here (involving multi line function)

```
SELECT s_id, COUNT(*)
FROM enrollment
GROUP BY s_id;
```

has to be here

```
SELECT COUNT(*)
FROM enrollment
GROUP BY s_id;
```

Group By

```
SELECT bldg_code, capacity
FROM location;
```

```
SELECT bldg_code, SUM(capacity)
FROM location;
```

```
SELECT bldg_code, SUM(capacity)
FROM location
GROUP BY bldg_code;
```

Groups Within Groups

SELECT department_id dept_id, job_id,SUM(salary)
FROM employees
GROUP BY department_id, job_id
Order by dept_id;

```
if department id == 90

   if job_id == ad_pres
       does something
ig job_id = IT_Prog
      does something
else if department id == 100
   if job_id == ...
      does something
   if job_id ==
      does something
```

Having

- Use to place a search condition on results of group function calculations.
- Like “WHERE” for group functions.
- *HAVING SUM(capacity) >= 100*

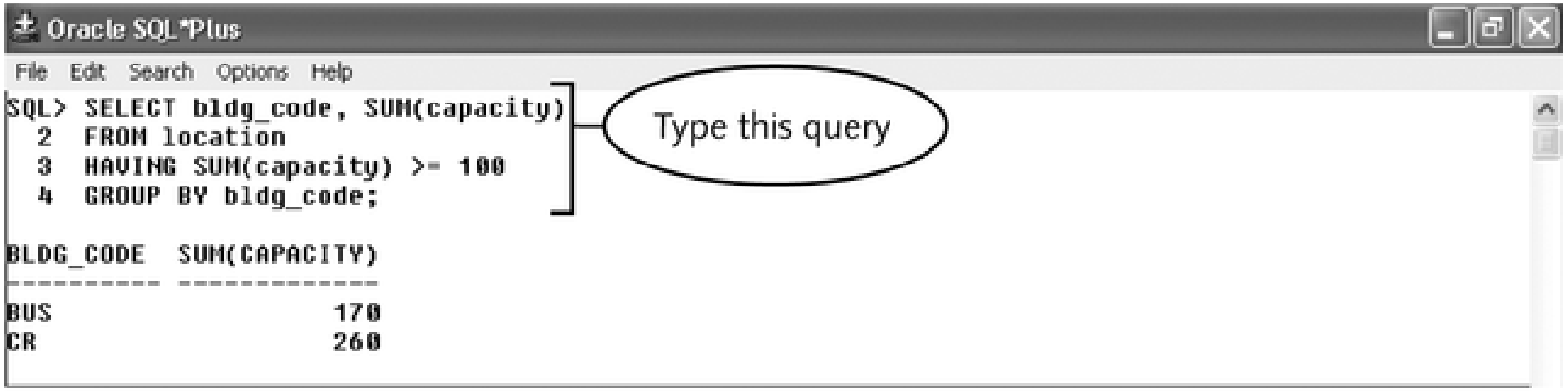

Figure 3-36 Using the HAVING clause with a group function

Having

```
SELECT bldg_code, SUM(capacity)
FROM location
GROUP BY bldg_code;
```

```
SELECT bldg_code, SUM(capacity)
FROM location
HAVING SUM(capacity) >= 100
GROUP BY bldg_code;
```

Practice 7.1

Exercise 1

```
SELECT bldg_code AS Building, SUM(capacity) AS seat
FROM location
GROUP BY bldg_code
ORDER BY seat;
```

Exercise 2

```
SELECT bldg_code AS Building, SUM(capacity) AS "Seat"
FROM location
GROUP BY bldg_code
ORDER BY seat;
```

change to "SEAT"

Practice 7.1

Exercise 3

```
SELECT bldg_code AS Building, SUM(capacity) AS Seat
FROM location
WHERE Building = 'BUS'
GROUP BY bldg_code;
```

Do it yourself

1. Calculate the number of courses that were conducted at location id 5. course_ection
2. Identify the total number of students who stay at Eau Claire city. student

- Try the exercise given.