

5. Data Manipulation Language

5.1 OBJECTIVES

This chapter involves SQL Data Manipulation Language Commands.

At the end of this chapter, students should:

- Be familiar with the syntax of SQL DML commands
- Easily manipulate the data in database table structures

5.2 Data Manipulation Language Commands (DML)

Data Manipulation Language Commands are used to manipulate the data in the database.

This is done either by retrieving information from existing rows, entering new rows, changing existing rows or removing unwanted rows from tables in the database.

Data Manipulation Language Commands are: SELECT, INSERT, UPDATE and DELETE.

5.2.1 Select

Selecting a row from a table

The SELECT statement is used to retrieve information from the database.

Syntax

```
SELECT column_name1, column_name2,.....  
FROM table_name  
[WHERE condition]
```

table_name is the name of the table from which the information is retrieved

column_nameN identifies the columns in the table from which information is retrieved.

[WHERE condition] restricts the number of rows retrieved from the table

The rows returned are those that meet the specified condition

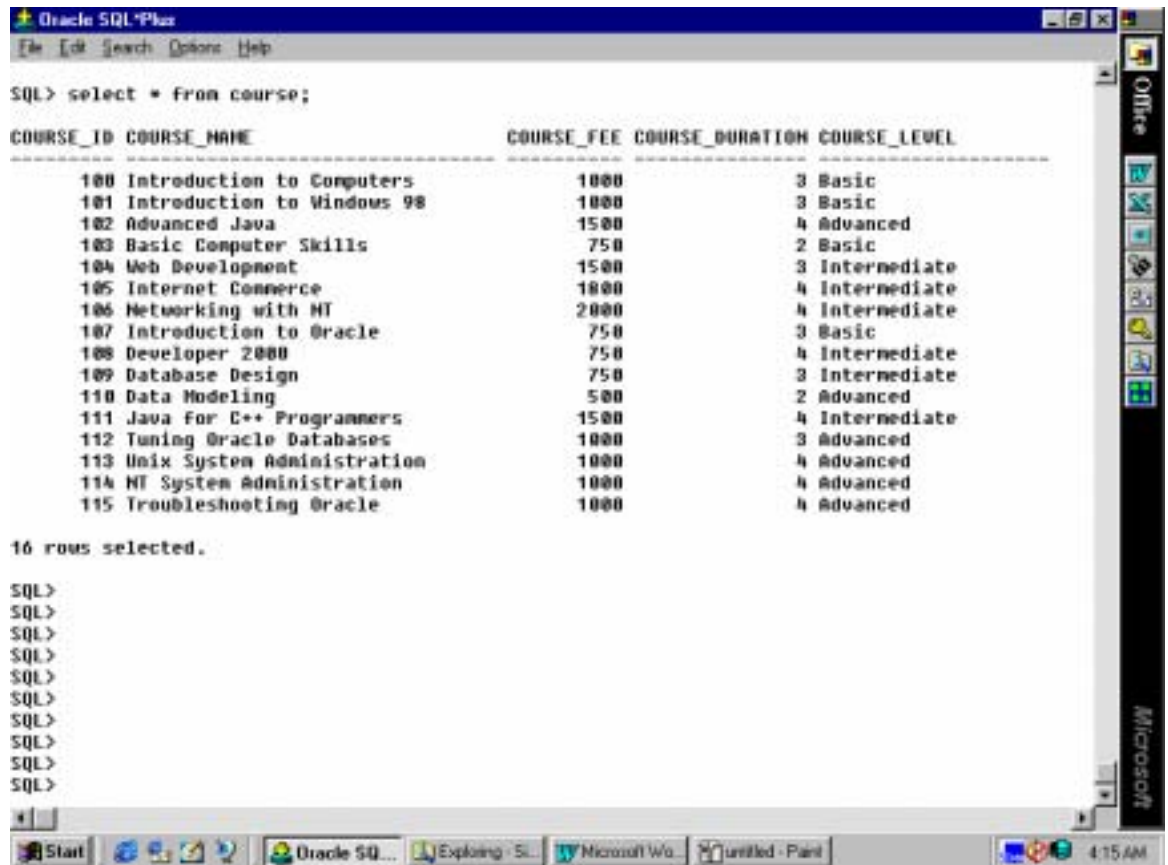
The SELECT command is one of the most important commands of SQL. Although this lesson only provides a simple overview of its syntax, more in-depth coverage will appear in subsequent chapters.

Examples

To select all the rows from the COURSE table, the corresponding command would be:

```
SELECT *  
FROM course;
```

The screen output follows:

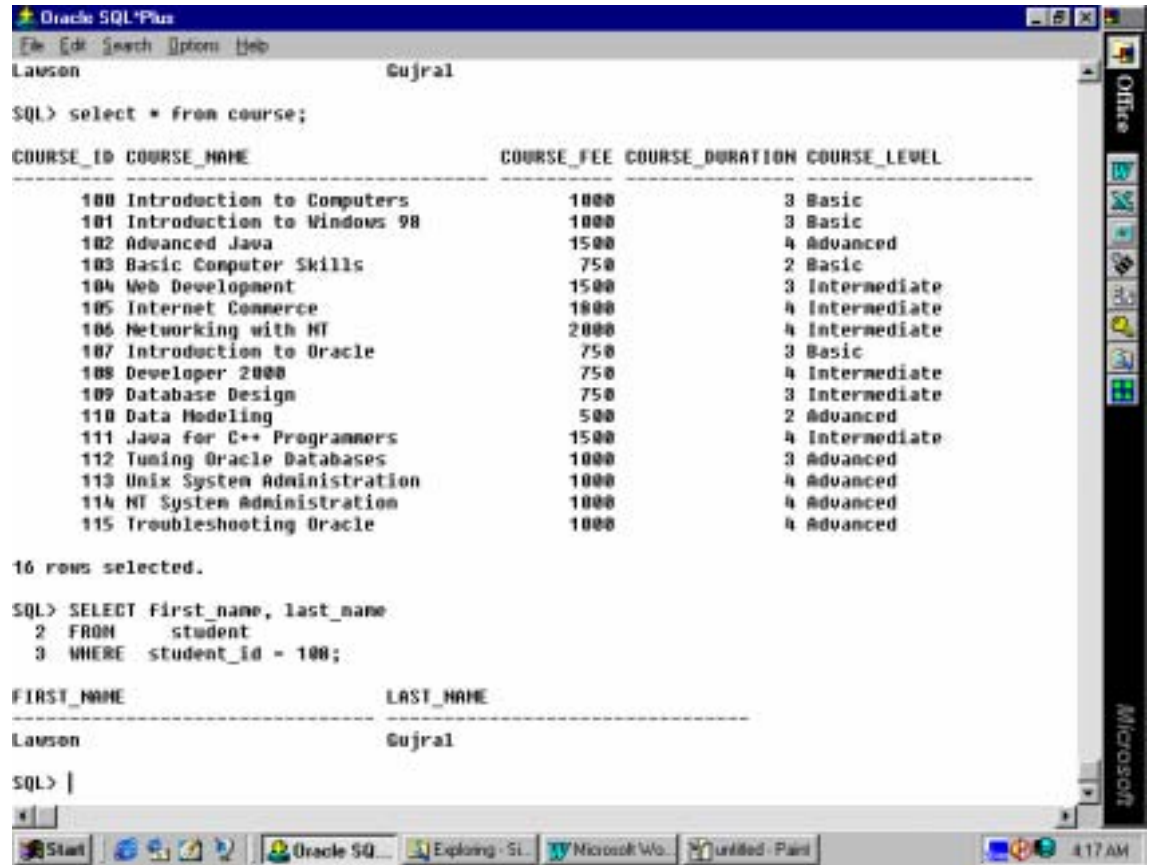


```
Oracle SQL*Plus  
File Edit Search Options Help  
SQL> select * from course;  
  
COURSE_ID  COURSE_NAME                                COURSE_FEE  COURSE_DURATION  COURSE_LEVEL  
-----  
100 Introduction to Computers                1000         3 Basic  
101 Introduction to Windows 98              1000         3 Basic  
102 Advanced Java                          1500         4 Advanced  
103 Basic Computer Skills                   750          2 Basic  
104 Web Development                         1500         3 Intermediate  
105 Internet Commerce                      1800         4 Intermediate  
106 Networking with NT                     2000         4 Intermediate  
107 Introduction to Oracle                  750          3 Basic  
108 Developer 2000                          750          4 Intermediate  
109 Database Design                        750          3 Intermediate  
110 Data Modeling                           500          2 Advanced  
111 Java For C++ Programmers                1500         4 Intermediate  
112 Tuning Oracle Databases                 1000         3 Advanced  
113 Unix System Administration              1000         4 Advanced  
114 NT System Administration                1000         4 Advanced  
115 Troubleshooting Oracle                 1000         4 Advanced  
  
16 rows selected.  
  
SQL>  
SQL>  
SQL>  
SQL>  
SQL>  
SQL>  
SQL>  
SQL>  
SQL>  
SQL>  
SQL>
```

(NOTE: The WHERE clause in a SELECT statement enables the user to specify a condition that will restrict the number of rows retrieved from the table.)

To display the first and last name of the student whose student_id is '108', the statement is:

```
SELECT first_name, last_name
FROM student
WHERE student_id = 108;
```



The screenshot shows the Oracle SQL*Plus interface. The first query executed is 'select * from course;', which returns a list of 16 courses with their IDs, names, fees, durations, and levels. The second query is 'SELECT First_name, last_name FROM student WHERE student_id = 108;', which returns the first and last names of the student with ID 108, 'Lawson' and 'Gujral'.

```
Oracle SQL*Plus
File Edit Search Options Help
Lawson          Gujral

SQL> select * from course;

COURSE_ID  COURSE_NAME                                COURSE_FEE  COURSE_DURATION  COURSE_LEVEL
-----
100 Introduction to Computers                1000        3 Basic
101 Introduction to Windows 98              1000        3 Basic
102 Advanced Java                          1500        4 Advanced
103 Basic Computer Skills                   750         2 Basic
104 Web Development                         1500        3 Intermediate
105 Internet Commerce                      1000        4 Intermediate
106 Networking with NT                     2000        4 Intermediate
107 Introduction to Oracle                  750         3 Basic
108 Developer 2000                          750         4 Intermediate
109 Database Design                        750         3 Intermediate
110 Data Modeling                          500         2 Advanced
111 Java for C++ Programmers                1500        4 Intermediate
112 Tuning Oracle Databases                 1000        3 Advanced
113 Unix System Administration              1000        4 Advanced
114 NT System Administration                1000        4 Advanced
115 Troubleshooting Oracle                 1000        4 Advanced

16 rows selected.

SQL> SELECT First_name, last_name
2 FROM student
3 WHERE student_id = 108;

FIRST_NAME                                LAST_NAME
-----
Lawson                                     Gujral

SQL> |
```

5.2.2 Insert

Inserting a row into a Table

A new row can be added to a table by means of the INSERT command.

Syntax

INSERT INTO tablename (column1, column2, ...)

VALUES (value1, value2, ...)

table_name	is the name of the table in which a row is inserted
column_nameN	is the name of the Nth column in which data is inserted
valueN	is the Nth data value in the values list and is inserted in the Nth column in the column list

Example

To insert a row into the course table, the corresponding statement is:

```
INSERT INTO course (course_id, course_name, course_fee,  
                    course_duration, course_level)  
VALUES (116, 'Oracle Fundamentals', 1200, 2, 'Basic');
```

The screen output is:

```
Oracle SQL*Plus
File Edit Search Options Help
FIRST_NAME          LAST_NAME
-----
Lawson              Gujral

SQL> INSERT INTO course (course_id, course_name, course_fee, course_duration, course_level)
  2 VALUES (116, 'Oracle Fundamentals', 1200, 2, 'Basic');

1 row created.

SQL> select * from course;

COURSE_ID  COURSE_NAME          COURSE_FEE  COURSE_DURATION  COURSE_LEVEL
-----
100 Introduction to Computers          1000           3 Basic
101 Introduction to Windows 98         1000           3 Basic
102 Advanced Java                     1500           4 Advanced
103 Basic Computer Skills              750            2 Basic
104 Web Development                    1500           3 Intermediate
105 Internet Commerce                 1800           4 Intermediate
106 Networking with NT                 2000           4 Intermediate
107 Introduction to Oracle              750            3 Basic
108 Developer 2000                     750            4 Intermediate
109 Database Design                    750            3 Intermediate
110 Data Modeling                       500            2 Advanced
111 Java For C++ Programmers            1500           4 Intermediate
112 Tuning Oracle Databases             1000           3 Advanced
113 Unix System Administration          1000           4 Advanced
114 NT System Administration            1000           4 Advanced
115 Troubleshooting Oracle             1000           4 Advanced
116 Oracle Fundamentals                 1200           2 Basic

17 rows selected.

SQL> |
```

NOTE:

When inserting a row of data in a table, there must be a value for every NOT NULL constrained column.

All character strings and dates must appear in quotes in the list of values of the INSERT statement

The column list may be omitted if all columns in a table will be populated. The values must however be listed in the columns' default order.

The statement to insert a complete row of values in the course table could also be:

INSERT INTO course

VALUES (116,'Oracle Fundamentals' ,1200, 2, 'Basic',109);

- Inserting multiple rows of data with a single insert statement cannot be accomplished unless a **SELECT** statement is used to replace the **VALUES** clause.

5.2.2.1 Embedding a Select within an Insert

Copying a row or rows of data from another table

The SELECT statement may be used to retrieve data from existing tables that will serve as input data for other tables.

Substitute a SELECT statement for the VALUES clause in the INSERT command.

Syntax

```
INSERT INTO table_name1 {column_list1}  
SELECT {column_list2}  
FROM table_name2  
[WHERE condition]
```

table_name1	is the table in which the row of data will be inserted
table_name2	is the table from which the data to be inserted is being retrieved

(NOTE: The number of columns in both column lists should match)

Example

The statement that will retrieve several rows of data from the instructor table and insert those rows into the my_instructor table is:

```
INSERT INTO my_instructor(
    my_instructor_id, last_name, first_name, address, city,
    state, zip, phone, gender)
SELECT instructor_id, last_name, first_name, address, city,
    state, zip, phone, gender
FROM instructor
WHERE instructor_id > 107;
```

The screenshot shows the Oracle SQL*Plus interface. The command prompt displays the following SQL statement and its execution results:

```
SQL> INSERT INTO My_instructor (my_instructor_id, last_name, first_name, address, city, state,
  phone, gender)
  2 SELECT instructor_id, last_name, first_name, address, city, state, zip, phone, gender
  3 FROM instructor
  4 WHERE instructor_id > 107;
```

6 rows created.

```
SQL> select * from my_instructor;
```

MY_INSTRUCTOR_ID	LAST_NAME	FIRST_NAME	ADDRESS	CITY	ST	ZIP	PHONE	G	MIDDLE_NAME
108	Ziagee	Ahmed	24953 Shannon Dr Freemont	Freemont	CA	10284	910-949-9853	H	
109	Zhen	Paul	9494 Townsend Street Ashburn	Ashburn	VA	22043	703-840-9842	H	
110	Thin	Patrick	99333 Caryn Dr McLean	McLean	VA	22394	703-393-9485	H	
112	Tanchak	Ted	39495 Cedar Pond Dr Richmond	Richmond	CA	10343	510-939-4494	H	
113	Isaac	Robert							

The screenshot also shows the Windows taskbar at the bottom with the Start button and several open applications: Oracle SQL*Plus, Exploring - Si..., Microsoft Wo..., and Untitled - Paint. The system clock shows 4:22 AM.

5.2.3 Update

Updating a row or rows in a table:

Existing rows in a table can be modified using the UPDATE command.

Syntax

```
UPDATE  table_name
SET     column_name1 = value1,
        column_name2=value2,
        .....
[WHERE  condition]
```

Example:

To change the course name for course number 116 from 'Oracle Fundamentals' to 'Introduction to Oracle', the statement is:

```
UPDATE course
SET   course_name = 'Introduction to Oracle'
WHERE course_id = 116;
```

(NOTE:

If several column names and values are indicated in the SET clause, one UPDATE statement may be used to affect multiple columns of a table

If the WHERE clause is omitted, all of the rows in the table are updated)

Example

To change the first name of all students to 'Smith', the statement is

```
UPDATE student
SET   first_name = 'Smith';
```

5.2.4 Delete

Deleting Rows from a Table:

The **DELETE command** is used to remove existing rows from a table

Syntax

```
DELETE [FROM] table_name  
[WHERE condition];
```

Example

To delete the row with course number = 116 from the course table, the statement is:

```
DELETE FROM course  
WHERE course_id = 116;
```

If the WHERE clause is omitted, all of the rows in the table are deleted. The table still exists in the database but it no longer holds any information.

```
DELETE FROM my_instructor;
```

5.3 SUMMARY

- Data Manipulation Language Commands allow manipulation of data in the database tables
- The **SELECT command** is used to retrieve information from the database tables
- The SELECT command is one of the most important commands in the SQL language
- A new row can be added to a table by means of the **INSERT command**
- Multiple rows of data cannot be added with a single INSERT statement unless a SELECT statement replaces the VALUES clause
- Existing rows in a table can be modified using the **UPDATE command**
- The **DELETE command** is used to remove existing rows from a table

5.4 LESSON 5 - EXERCISE

1. Insert the following record to the customer table:

customer_id :	1001
company_name:	Anteon
contact_name:	John Smith
address:	2112 B Gallows Rd
city:	Vienna
state:	VA
zip:	22182
phone:	123-456-7890

2. Insert the following record to the sales_person table:

sales_person_id:	4000
last_name:	Doe
first_name:	Marc
phone:	345-987-0987
gender:	M
manager_id:	7987
salary:	3000
commission:	500

3. Insert the following record to the product table:

product_id:	101
product_name:	Oracle Book
supplier_name:	Anteon
unit_price:	100

4. Insert the following record to the orders table:

order_id:	201
customer_id:	1001
sales_person_id:	4000
order_date	04-JUL-98
shipment_date	07-JUL-98
shipping_type	UPS

5. Insert the following record to the order_items table:

order_id	201
product_id	101
number_of_units	5

6. Examine the script file that was used to create and populate the exercise tables: CLASS_TAB.SQL. Note your observations.

7. Write an update statement to change the shipment type in the orders table to FEDEX for order_id 2303.

8. Write a select statement to display all the rows in the customer table.

9. Write a select statement to display the salesperson whose sales_person_id is 800.

10. Write an update statement that will update the zip code to 22180 for the customer in the customer table whose customer_id is 306.
