Session 6
The Data Manipulation Language (DML)

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Objectives

After completing this lesson, you should be able to do the following:

- **Describe each DML statement**
- **Insert rows into a table**
- **Update rows in a table**
- **Delete rows from a table**
- **Merge rows in a table**
- **Control transactions**

Data Manipulation Language

- **A DML statement is executed when you:**
  - **Add new rows to a table**
  - **Modify existing rows in a table**
  - **Remove existing rows from a table**
- **A *transaction* consists of a collection of DML statements that form a logical unit of work.**

Adding a New Row to a Table

70	Public Relations	100	1700

New row

DEPARTMENTS

DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
10	Administration	200	1700
20	Marketing	201	1800
50	Shipping	124	1500
60	IT	103	1400
80	Sales	149	2500
90	Executive	100	1700
110	Accounting	205	1700
190	Contracting		1700

…insert a new row into the DEPARMENTS table…

DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
10	Administration	200	1700
20	Marketing	201	1800
50	Shipping	124	1500
60	IT	103	1400
80	Sales	149	2500
90	Executive	100	1700
110	Accounting	205	1700
190	Contracting		1700
70	Public Relations	100	1700

The INSERT Statement Syntax

- **Add new rows to a table by using the INSERT statement.**

```
INSERT INTO   table [(column [, column...])]
VALUES        (value [, value...]);
```

- **Only one row is inserted at a time with this syntax.**

Inserting New Rows

- **Insert a new row containing values for each column.**
- **List values in the default order of the columns in the table.**
- **Optionally, list the columns in the `INSERT` clause.**

```
INSERT INTO departments
(department_id, department_name,
  manager_id, location_id)
VALUES       (70, 'Public Relations', 100, 1700);
1 row created.
```

- **Enclose character and date values within single quotation marks.**

Inserting Rows with Null Values

- **Implicit method: Omit the column from the column list.**

```
INSERT INTO departments (department_id,
                         department_name )
VALUES       (30, 'Purchasing');
1 row created.
```

- **Explicit method: Specify the NULL keyword in the VALUES clause.**

```
INSERT INTO   departments
VALUES        (100, 'Finance', NULL, NULL);
1 row created.
```

Inserting Special Values

The SYSDATE function records the current date and time.

```
INSERT INTO employees (employee_id,
                       first_name, last_name,
                       email, phone_number,
                       hire_date, job_id, salary,
                       commission_pct, manager_id,
                       department_id)
VALUES           (113,
                       'Louis', 'Popp',
                       'LPOPP', '515.124.4567',
                       SYSDATE, 'AC_ACCOUNT', 6900,
                       NULL, 205, 100);
1 row created.
```

Inserting Specific Date Values

- **Add a new employee.**

```
INSERT INTO employees
VALUES      (114,
             'Den', 'Raphealy',
             'DRAPHEAL', '515.127.4561',
             TO_DATE('FEB 3, 1999', 'MON DD, YYYY'),
             'AC_ACCOUNT', 11000, NULL, 100, 30);
1 row created.
```

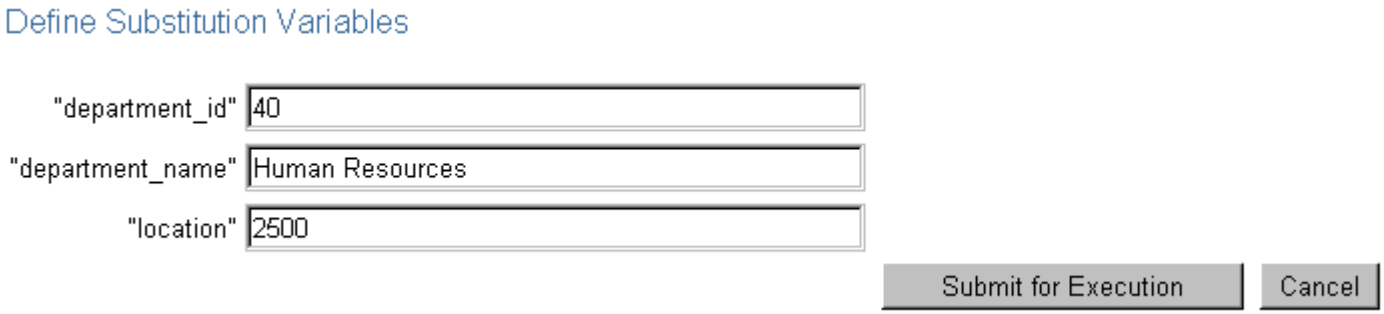
- **Verify your addition.**

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	PHONE_NUMBER	HIRE_DATE	JOB_ID	SALARY	COMMISSION_P
114	Den	Raphealy	DRAPHEAL	515.127.4561	03-FEB-99	AC_ACCOUNT	11000	

Creating a Script

- **Use & substitution in a SQL statement to prompt for values.**
- **& is a placeholder for the variable value.**

```
INSERT INTO departments
            (department_id, department_name, location_id)
VALUES      (&department_id, '&department_name',&location);
```




```
1 row created.
```

Copying Rows from Another Table

- **Write your `INSERT` statement with a subquery.**

```
INSERT INTO sales_reps(id, name, salary, commission_pct)
  SELECT employee_id, last_name, salary, commission_pct
  FROM   employees
  WHERE  job_id LIKE '%REP%';

4 rows created.
```

- **Do not use the `VALUES` clause.**
- **Match the number of columns in the `INSERT` clause to those in the subquery.**

Changing Data in a Table

EMPLOYEES

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	HIRE_DATE	JOB_ID	SALARY	DEPARTMENT_ID	COMMISSION_P
100	Steven	King	SKING	17-JUN-87	AD_PRES	24000	90	
101	Neena	Kochhar	NKOCHHAR	21-SEP-89	AD_VP	17000	90	
102	Lex	De Haan	LDEHAAN	13-JAN-93	AD_VP	17000	90	
103	Alexander	Hunold	AHUNOLD	03-JAN-90	IT_PROG	9000	60	
104	Bruce	Ernst	BERNST	21-MAY-91	IT_PROG	6000	60	
107	Diana	Lorentz	DLORENTZ	07-FEB-99	IT_PROG	4200	60	
124	Kevin	Mourgos	KMOURGOS	16-NOV-99	ST_MAN	5800	50	

Update rows in the EMPLOYEES table.

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	HIRE_DATE	JOB_ID	SALARY	DEPARTMENT_ID	COMMISSIO
100	Steven	King	SKING	17-JUN-87	AD_PRES	24000	90	
101	Neena	Kochhar	NKOCHHAR	21-SEP-89	AD_VP	17000	90	
102	Lex	De Haan	LDEHAAN	13-JAN-93	AD_VP	17000	90	
103	Alexander	Hunold	AHUNOLD	03-JAN-90	IT_PROG	9000	30	
104	Bruce	Ernst	BERNST	21-MAY-91	IT_PROG	6000	30	
107	Diana	Lorentz	DLORENTZ	07-FEB-99	IT_PROG	4200	30	
124	Kevin	Mourgos	KMOURGOS	16-NOV-99	ST_MAN	5800	50	

The UPDATE Statement Syntax

- **Modify existing rows with the UPDATE statement.**

```
UPDATE      table
SET         column = value [, column = value, ...]
[WHERE      condition];
```

- **Update more than one row at a time, if required.**

Updating Rows in a Table

- **Specific row or rows are modified if you specify the WHERE clause.**

```
UPDATE employees
SET    department_id = 70
WHERE  employee_id = 113;
1 row updated.
```

- **All rows in the table are modified if you omit the WHERE clause.**

```
UPDATE   copy_emp
SET      department_id = 110;
22 rows updated.
```

Updating Two Columns with a Subquery

Update employee 114's job and salary to match that of employee 205.

```
UPDATE    employees
SET       job_id   = (SELECT   job_id
                      FROM     employees
                      WHERE    employee_id = 205),
          salary   = (SELECT   salary
                      FROM     employees
                      WHERE    employee_id = 205)
WHERE     employee_id     =   114;
1 row updated.
```

Updating Rows Based on Another Table

Use subqueries in `UPDATE` statements to update rows in a table based on values from another table.

```
UPDATE   copy_emp
SET      department_id  =  (SELECT department_id
                           FROM employees
                           WHERE employee_id = 100)
WHERE    job_id         =  (SELECT job_id
                           FROM employees
                           WHERE employee_id = 200);
1 row updated.
```

Updating Rows: Integrity Constraint Error

```
UPDATE employees
SET    department_id = 55
WHERE  department_id = 110;
```

```
UPDATE employees
       *
ERROR at line 1:
ORA-02291: integrity constraint (HR.EMP_DEPT_FK)
violated - parent key not found
```

Department number 55 does not exist

Removing a Row from a Table

DEPARTMENTS

DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
10	Administration	200	1700
20	Marketing	201	1800
30	Purchasing		
100	Finance		
50	Shipping	124	1500
60	IT	103	1400

Delete a row from the DEPARTMENTS table.

DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
10	Administration	200	1700
20	Marketing	201	1800
30	Purchasing		
50	Shipping	124	1500
60	IT	103	1400

The DELETE Statement

You can remove existing rows from a table by using the DELETE statement.

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

Deleting Rows from a Table

- **Specific rows are deleted if you specify the `WHERE` clause.**

```
DELETE FROM departments
WHERE  department_name = 'Finance';
1 row deleted.
```

- **All rows in the table are deleted if you omit the `WHERE` clause.**

```
DELETE FROM  copy_emp;
22 rows deleted.
```

Deleting Rows Based on Another Table

Use subqueries in `DELETE` statements to remove rows from a table based on values from another table.

```
DELETE FROM employees
WHERE  department_id =
                       (SELECT department_id
                        FROM   departments
                        WHERE  department_name
                               LIKE '%Public%');

1 row deleted.
```

Deleting Rows: Integrity Constraint Error

```
DELETE FROM departments
WHERE       department_id = 60;
```

```
DELETE FROM departments
            *
ERROR at line 1:
ORA-02292: integrity constraint
(HR.EMP_DEPT_FK) violated - child record
found
```

You cannot delete a row that contains a primary key that is used as a foreign key in another table.

Using a Subquery in an INSERT Statement

```
INSERT INTO
        (SELECT employee_id, last_name,
                email, hire_date, job_id,
                salary, department_id
         FROM   employees
         WHERE  department_id = 50)
VALUES (99999, 'Taylor', 'DTAYLOR',
        TO_DATE('07-JUN-99', 'DD-MON-RR'),
        'ST_CLERK', 5000, 50);

1 row created.
```

Using a Subquery in an INSERT Statement

- **Verify the results**

```
SELECT employee_id, last_name, email,
       hire_date, job_id, salary,
       department_id
FROM   employees
WHERE  department_id = 50;
```

EMPLOYEE_ID	LAST_NAME	EMAIL	HIRE_DATE	JOB_ID	SALARY	DEPARTMENT_ID
124	Mourgos	KMOURGOS	16-NOV-99	ST_MAN	5800	50
141	Rajs	TRAJS	17-OCT-95	ST_CLERK	3500	50
142	Davies	CDAVIES	29-JAN-97	ST_CLERK	3100	50
143	Matos	RMATOS	15-MAR-98	ST_CLERK	2600	50
144	Vargas	PVARGAS	09-JUL-98	ST_CLERK	2500	50
99999	Taylor	DTAYLOR	07-JUN-99	ST_CLERK	5000	50

6 rows selected.

Using the WITH CHECK OPTION

- **A subquery is used to identify the table and columns of the DML statement.**
- **The WITH CHECK OPTION keyword prohibits you from changing rows that are not in the subquery.**

```
INSERT INTO  (SELECT employee_id, last_name, email,
                    hire_date, job_id, salary
              FROM   employees
              WHERE  department_id = 50 WITH CHECK
                                        OPTION)
VALUES (99998, 'Smith', 'JSMITH',
        TO_DATE('07-JUN-99', 'DD-MON-RR'),
        'ST_CLERK', 5000);
INSERT INTO
          *
ERROR at line 1:
ORA-01402: view WITH CHECK OPTION where-clause
violation
```

Overview of the Explicit Default Feature

- **With the explicit default feature, you can use the `DEFAULT` keyword as a column value where the column default is desired.**
- **The addition of this feature is for compliance with the SQL: 1999 Standard.**
- **This allows the user to control where and when the default value should be applied to data.**
- **Explicit defaults can be used in `INSERT` and `UPDATE` statements.**

Using Explicit Default Values

- **DEFAULT with INSERT:**

```
INSERT INTO departments
  (department_id, department_name, manager_id)
VALUES (300, 'Engineering', DEFAULT);
```

- **DEFAULT with UPDATE:**

```
UPDATE departments
SET manager_id = DEFAULT
WHERE department_id = 10;
```

The MERGE Statement

- **Provides the ability to conditionally update or insert data into a database table**
- **Performs an `UPDATE` if the row exists, and an `INSERT` if it is a new row:**
  - **Avoids separate updates**
  - **Increases performance and ease of use**
  - **Is useful in data warehousing applications**

The MERGE Statement Syntax

You can conditionally insert or update rows in a table by using the MERGE statement.

```
MERGE INTO table_name table_alias
  USING (table|view|sub_query) alias
  ON (join condition)
  WHEN MATCHED THEN
    UPDATE SET
    col1 = col_val1,
    col2 = col2_val
  WHEN NOT MATCHED THEN
    INSERT (column_list)
    VALUES (column_values);
```

Merging Rows

Insert or update rows in the COPY_EMP table to match the EMPLOYEES table.

```
MERGE INTO copy_emp  c
  USING employees e
  ON (c.employee_id = e.employee_id)
WHEN MATCHED THEN
  UPDATE SET
     c.first_name      = e.first_name,
     c.last_name       = e.last_name,
     ...
     c.department_id   = e.department_id
WHEN NOT MATCHED THEN
 INSERT VALUES(e.employee_id, e.first_name, e.last_name,
          e.email, e.phone_number, e.hire_date, e.job_id,
          e.salary, e.commission_pct, e.manager_id,
          e.department_id);
```

Summary

In this lesson, you should have learned how to use DML statements and control transactions.

Statement	Description
INSERT	Adds a new row to the table
UPDATE	Modifies existing rows in the table
DELETE	Removes existing rows from the table
MERGE	Conditionally inserts or updates data in a table


Thank You !