Database Manipulation Language

The database manipulation language (DML) is used to insert, update and delete data from the database once the database and associated objects have been created using the Database Definition Language (DDL).

DML statements can be run through a command-line interface, creating one item of data at a time, or data can be bulk loaded through data loading tools such as Oracle's SQL Loader. DML statements modify the database content, and in PostgreSQL changes are automatically saved by default.

Three key statements exist within this language:

Insert

This command allows new rows to be added to a table. For example, to add a new record to an EMPLOYEES table having the following structure:

- NI_Number
- Name
- Surname
- Department
- Grade
- Salary

Use the following statement:

```
INSERT INTO ucfscde.EMPLOYEES
(NI_Number, Name, Surname, Department, Grade, Salary)
VALUES
('B 29296875','David','Gower','IT','Consultant',15000);
```

Note the use of quotation marks around the string values. Also the number of attributes in the first list should match the number of values in the second list.

Update
Once a row has been added, it can be changed in two ways:
1. Delete the row and reinsert it from scratch
2. Use the update command to update some elements of the data

The first option obviously causes problems particularly if the row forms part of a primary key referenced in a child table. Attempting to delete the row may result in a referential integrity error - the database will not know whether to keep or delete the child record.

Updating the row is therefore safer in most cases, but it should be noted that some values may not be updatable – these include automatically generated primary keys or date and time stamps.

To give David Gower a salary increase of £10,000 the following statement can be issued:

```
UPDATE ucfscde.EMPLOYEES
SET SALARY = 25000
WHERE SURNAME = 'Gower';
```

Note the use of the WHERE clause to ensure that only David Gower got the increased salary.

Delete
This is the equivalent of the DROP statement in DML and should be used with great care. It allows deletion of one or more rows from a table. Again, where a row is a parent reference to another row in the child table, the row will not be able to be deleted as a referential integrity error will be generated. Particular care should be taken with the statement:

```
DELETE *
FROM ucfscde.EMPLOYEES;
```

As this will delete all records in the employees table.

Once again, the WHERE statement is used to identify the records to delete:

```
DELETE
FROM ucfscde.EMPLOYEES
WHERE SURNAME = 'Gower';
```

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