

# 2 Relational Data Model and SQL

## 2.1 Summary

Relational Database Management Systems (RDBMS) have become the prevalent means of managing data. RDBMS comprises of software facilitating storage, entry and data retrieval. Relational databases are organised in entities, attributes, and tuples. A tuple (or a record) is a set of attributes. An attribute contains a single piece of information, and an entity is a collection of tuples. Relations in a database are represented using entities (or tables), with rows containing unique tuples. A cell must hold one atomic value (e.g. a value that wouldn't normally be divided into any smaller parts). Values can be Text (e.g. letters or Alphanumeric characters), Numbers (so that associated mathematical operations can be performed) or other types such as Dates, Times or Currency.

Standard Query Language (SQL) is the most widely-accepted database language, supported to some extent by every database product on the market today. Data retrieval in a database is performed using queries written in a query language. A Query can be classified as a question that we require the database to provide an answer to. The `Select` statement is used in SQL to pull out and display information from a table. Its basic structure has this form:

```
SELECT select-list
FROM table;
```

In addition to data retrieval, SQL supports other operations for managing data. These include:

Select	Used to retrieve data from the database, the most commonly used statement
Insert Delete Update	Used to enter ( <code>insert</code> ), remove ( <code>delete</code> ) or change ( <code>update</code> ) rows from a table. Together with <code>Select</code> , collectively known as the DML or Data Manipulation Language
Create Alter Drop	Used to set up ( <code>create</code> ), change ( <code>alter</code> ) or remove ( <code>drop</code> ) data structures such as tables, views or indexes. Collectively known as the DDL or Data Definition Language
Grant Revoke Validate	Used to give ( <code>grant</code> ) or remove ( <code>revoke</code> ) access rights to data and data structures within an SQL database

**Exercises in this chapter are based upon the following scenario:**

Dream Destinations Ltd is a company that provides a top quality service in bespoke, tailor-made holiday packages. They arrange everything from flights, hotel accommodation and trips to destinations within the Caribbean. At present they only record data from phone calls and e-mails on paper note pads and these are put inside filing cabinets. They have no methods for storing customer, hotel or flight information and have difficulty in keeping track of information. They only advertise by word of mouth, cold calling telesales and advertising through print media such as their own travel brochure which can be found in travel agents.

Dream Destinations Ltd have realised that should something happen to the paper files, e.g. an office fire, their data would be lost as they have no way of keeping data. They want to be able to access the required information quickly and efficiently. They also need a means of advertising themselves to increase their customer base. They have asked for us to create a means of storing their client, booking and property information.

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## 2.2 Solutions to Exercises

### 1. Display all the information in the table called `client`

SQL: `SELECT * FROM client;`

clientno	fname	lname	telno	preftype	maxrent
CR56	Aline	Stewart	0141-848-1825	Apartment	475
CR62	Mary	Tregear	01224-196720	Villa	550
CR74	Mike	Ritchie	01475-392178	Studio	525
CR76	John	Kay	0207-774-5632	Villa	500
*					

### 2. Display the `propertyno` and `country` for each property

SQL: `SELECT propertyno, country FROM property;`

propertyno	country
PA14	Barbados
PG16	Antigua
PG21	St Kitts
PG36	Barbados
PG4	Barbados
PL94	Barbados
*	

### 3. Display all the `distinct` types of property

SQL: `SELECT DISTINCT type FROM property;`

type
Apartment
Studio
Villa

### 4. Display a list of the monthly income of each rental property (calculated from yearly income / 12)

SQL: `SELECT propertyno,ownerno, yearincome/12, FROM property;`

propertyno	ownerno	Expr1002
PA14	CO46	1000
PG16	CO87	666.6666666666667
PG21	CO40	791.6666666666667
PG36	CO93	922.9166666666667
PG4	CO87	1170.8333333333333
PL94	CO93	1250
*		

### 5. Display a list of the distinct property locations

SQL: SELECT DISTINCT country FROM property;

country
Antigua
Barbados
St Kitts

### 6. Display the property number, and the new rent figure given a 12% rise in the rent figure. Name the new column **increase**

SQL: SELECT propertyno, (rent/100\*12)+rent AS increase FROM property;

propertyno	increase
PA14	560
PG16	448
PG21	504
PG36	532
PG4	588
PL94	616
*	

### 7. Display the first name and last name of each client as a single column separated by a hyphen (name the column **clientname**), along with new rent figure given a 5% increase in the maximum rent figure (name the new column **newmax**)

SQL: SELECT fname&"-"&lname AS clientname, (maxrent/100\*5)+maxrent AS newmax , FROM client;