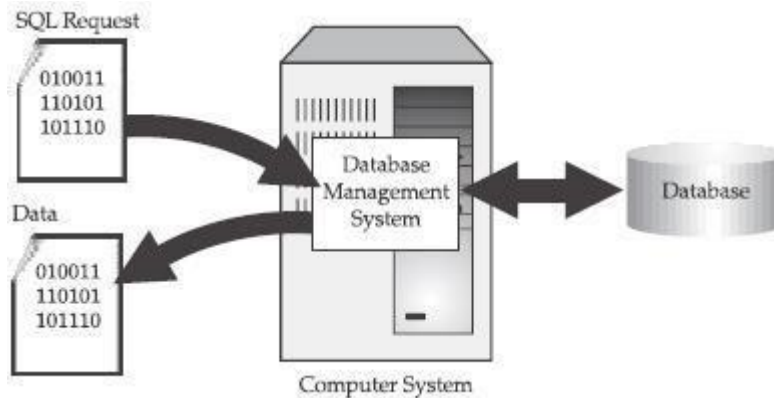


## Databases 3: Operations

### *The Database Management System (DBMS)*



A Database System

The **DBMS** is software that controls the organization, storage, retrieval, security and integrity of data in a database. It provides an interface between programs, users and the database.

DBMSs may work with traditional programming languages (COBOL, C, etc.) or they may include their own programming language for application development. One popular database language is **SQL** (Structured Query Language).

The major features of a DBMS are:

- **Data Security:** The DBMS can prevent unauthorized users from viewing or updating the database. This is done by using passwords.
- **Data Integrity:** The DBMS ensures that the data in the database is correct and is not corrupted. Backups help in this issue. Data integrity is also maintained through the use of various error-checking methods and validation procedures.
- **Interactive Query Language:** A DBMS provides a query language and report writer that lets users interactively interrogate the database.
- **Interactive Data Entry and Updating:** A DBMS typically provides a way to interactively enter and edit data.
- **Data Independence:** The data inside the database is independent of the programs that use them or the users that access them i.e.

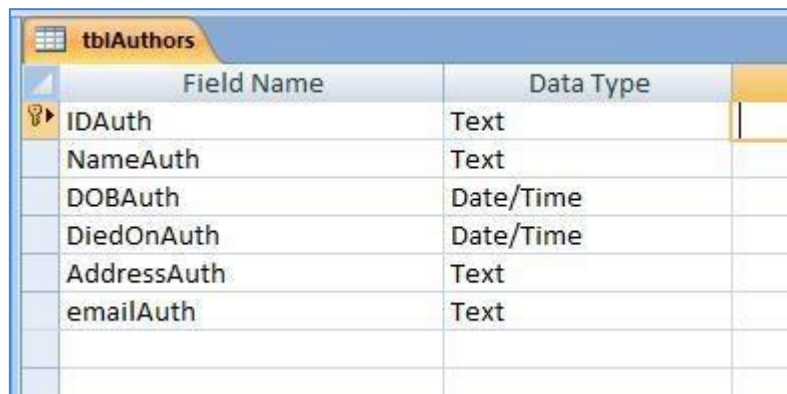
the database can be accessed by means of different languages and different query languages.

### Database Operations

Here are some of the operations one can do on a database. For the notes shown below I used Microsoft Access.

#### Create a Table

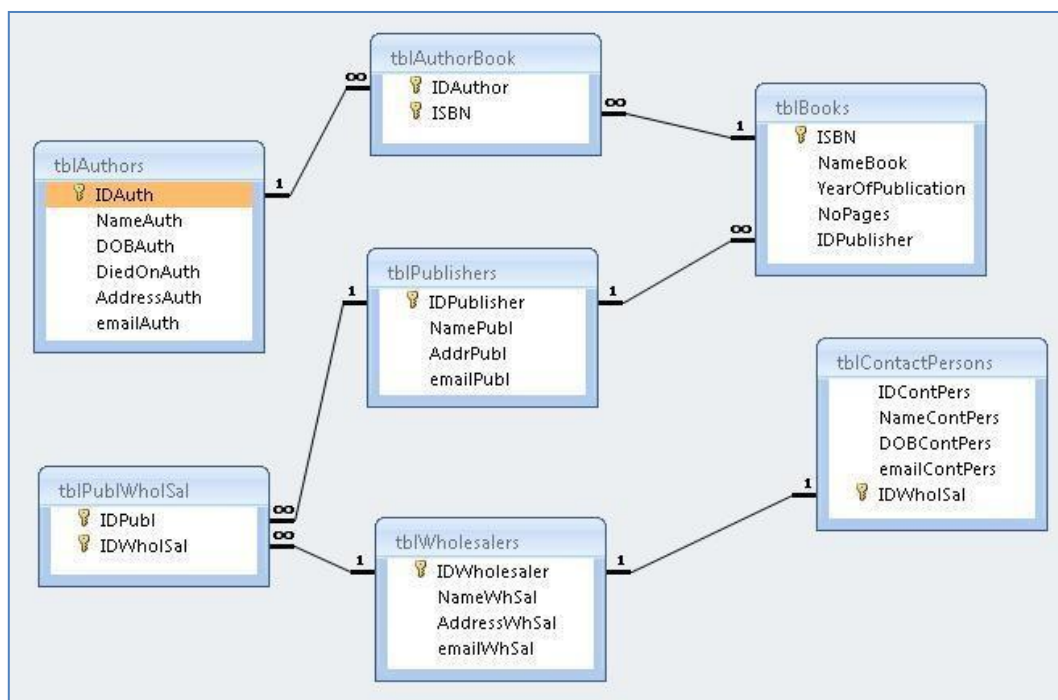
The fields and data types are defined. Note that IDAuth is declared as a primary field.



Field Name	Data Type
IDAuth	Text
NameAuth	Text
DOBAuth	Date/Time
DiedOnAuth	Date/Time
AddressAuth	Text
emailAuth	Text

Creation of a table

#### Create Relationships



A database where tables and relationships are shown

Note the relationships: 1-1 (one to one) and 1- oo (one to many). (One can also create a oo – oo (many to many) relationship but in this case one would have to create an extra table).

### Referential Integrity

If this feature is chosen, then the program would not let one enter a value in a foreign field if that value has not yet been created in the table being referred.

Student

ID No.	Name	Address	DOB	Course ID
5844	Borg Michael	5, St Peter Square	23/05/1997	NW01
4117	Galea Jackie	34, Valletta Road	04/07/1998	PRJ01
7502	Micallef Isabel	129, Dun Karm Valley	26/12/1997	NW01
9136	Pace Arthur	6, Car Hill	06/05/1998	PRJ02

Course

Course ID	Course Name
NW01	Networking
WD03	Web Design
PRJ01	Java Programming

**If Referential Integrity is enforced this value of Course ID will not be allowed since PRJ02 is not yet defined in the Course table.**

### Referential integrity

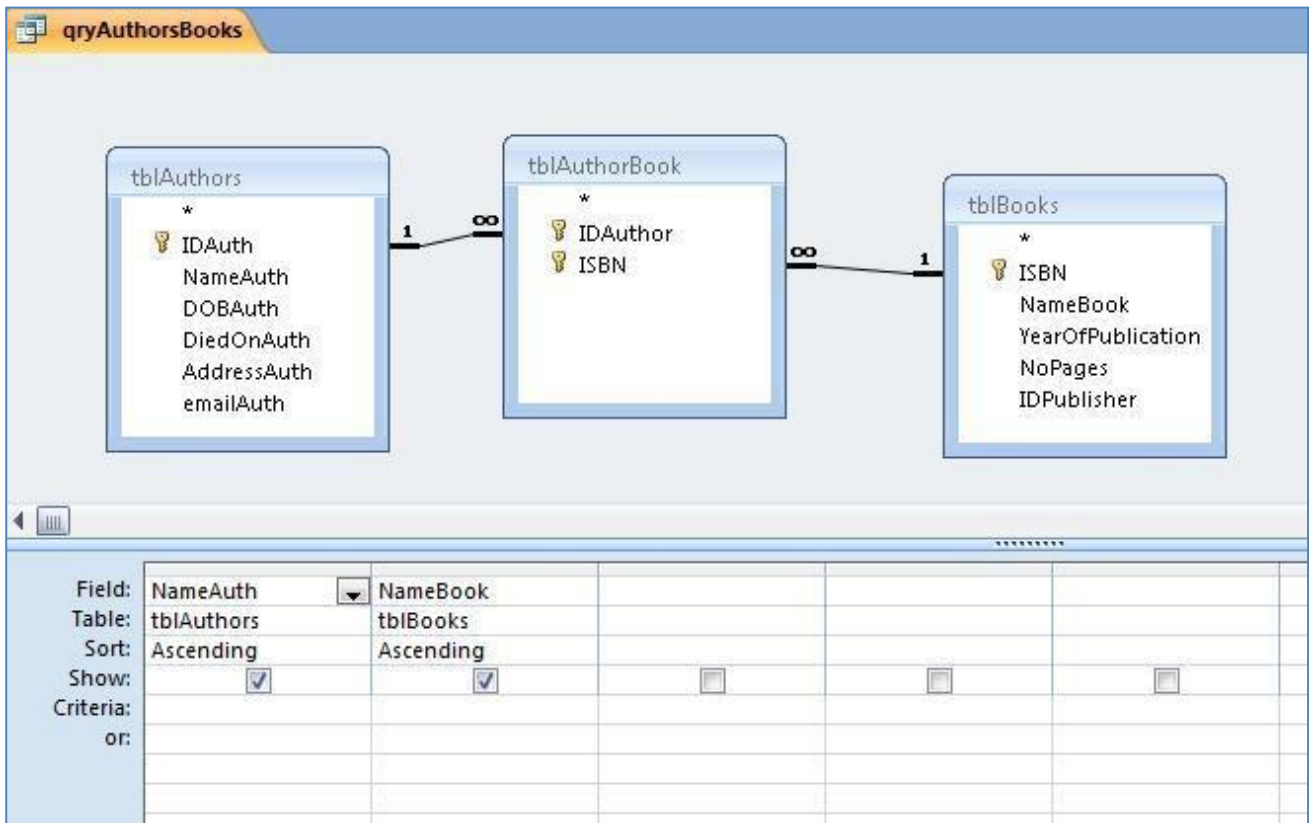
### Validation

The creator of the table can impose limits on a field e.g. the value has to be a number from 0 to 100. If a user enters a number that is not in that range, then the entry is refused.

### Queries

Two ways to write a query in Access are:

- Query by Example (in the example it is asking for a table of two fields (i) name of author and (ii) name of book).
- Query in SQL (the SQL query is asking for the same table).



### Query by example

```

SELECT tblAuthors.NameAuth, tblBooks.NameBook
FROM tblBooks INNER JOIN (tblAuthors INNER JOIN tblAuthorBook ON tblAuthors.IDAuth =
tblAuthorBook.IDAuthor) ON tblBooks.ISBN = tblAuthorBook.ISBN
ORDER BY tblAuthors.NameAuth, tblBooks.NameBook;

```

### SQL query

### Forms

A Form is a graphical arrangement that makes it easier to enter or view records especially related records which are seen in a subform.

A Form

### Reports

A report lists the results of a query or the contents of a table for the purpose of printing. One can add headers, footers, subtotals etc.

NameAuth	NameBook
Baldacchino Paul	Countryside Paths
Zammit Peter	Mdina
Farrugia Anne	The Sea
Sammut Chiara	The Sea
Sammut Chiara	Melbourne
Attard Victoria	Ix-Xorti
Sammut Chiara	Il-Qattusa
Zammit Peter	Il-Fosos
Tonna James	Diamonds

A Report

### *Some other tools*

Other basic operations on tables are search, delete, modify and sort.