Database Management System

- Data is simply a collection of characters (that is letters, numbers and symbols) which on their own have no particular meaning. When data about a particular topic is stored it is said to be a database.
- A *database* is a collection of records and files that are organized for a particular purpose
- A database allows data to be processed into information, something that can be communicated and understood.
- A *relational database* is a database divided into logical units called *tables*, where tables are related to one another within the database. By dissecting a large database into smaller, logical, more manageable units, the relational database allows for easier maintenance and increased performance over the standard (flat-file) database.

Types of Databases

There are two different types of databases:

- CLOSED DATABASES already contain data and just allow you to obtain information from them. You are not able to make any changes to the data.
- OPEN DATABASES allow you to enter and change the data and process it.

Examples of CLOSED DATABASES include telephone directories.

Examples of OPEN DATABASES include Point of Sale Systems such as the counter system used at Club Nova, or TCF Tonga. Other OPEN databases include Reservation systems used by Airline agents such as Air Pacific, Air New Zealand.

Examples of Open Database development systems include:

- Microsoft Access, Microsoft FoxPro, IBM Lotus Approach, Corel Paradox

Microsoft Access Database

The term Database is used by some people to refer to just the files containing the “data.” A Microsoft Access database includes all the major ‘objects’ related to the stored data, including objects you define to automate the use of your data. Microsoft Access calls anything that can have a name an *object*.

Within an Access database, the main objects are tables, queries, forms, reports, macros, and modules.

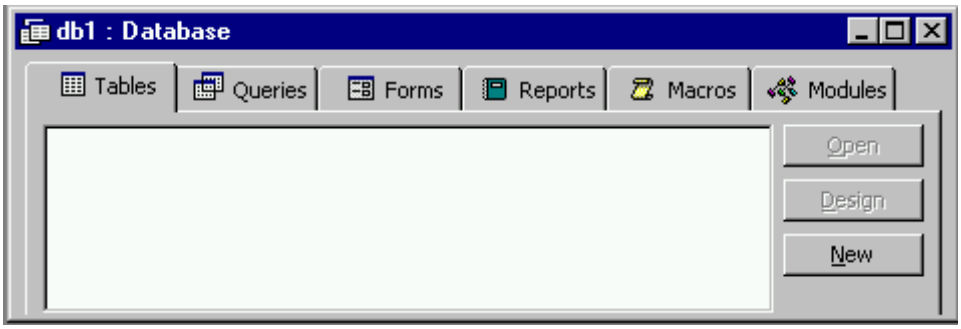

Figure: An Access Database “db1” with the Object Categories.

Table. Tables are used in Microsoft Access for storing data about a specific subject. A database can have many different tables.

- *Fields.* Subjects are usually divided into smaller categories or sections called *fields.* For example, the subject: [Person], can be divided into smaller categories of: [Name], [Address], [Age]. Visually, *fields* are similar to *columns* in a spreadsheet.
- *Records.* A Records is a particular instance of the data subject. Visually, *records* are similar to *rows* in a spreadsheet.

Subject: Person

	Field1	*Field2*	*Field3*
	Name	Address	Age
Record 1	Sione	Kolofo'ou	32
Record 2	Pilimi	Fatumu	25
Record 3	Kalisi	Vaini	21

Query. Queries allow us to ask questions to the database. Queries allow data to be combined from different tables, permanently find or sort data, do calculations or produce interactive dialogue boxes to allow a user to enter search data. Queries create *custom views* of the data.

- Microsoft Access allows the use its graphical query by example (QBE) facility or you can write SQL statements to create your queries.
- Queries can be used to select, update, insert, or delete data.
- You can also define queries that create new tables from data in one or more existing tables

Form. Forms allow us to present the data from tables and queries in non-table format. The Form view can be designed to look more professional than just printing, or viewing a table.

- Forms are a good means of customising the presentation of the data.
- Forms can display data from queries or directly from tables.
- Forms can be designed to execute database events.

Report. Similar to forms, Reports allow for a more professional 'look' to printing out tables of data. Tables can also be used for making calculations such as the total number of items sold.

- Reports allow formatting, calculating, and summarizing selected data.

Macro. Macros allow you to record regularly used steps and replay these steps as required. For example, a macro may open a second form (with additional information) in response to the selection of an item on a main form. A macro may validate the contents of a field whenever the value in the field changes.

- Macros can include simple conditions to specify when one or more actions in the macro should be performed or skipped.
- Macros can open and execute queries, to open tables, or to print or view reports.
- Macros can run other macros or VBA procedures from within a macro.

Module. Modules are containers for programming code, custom procedures using the programming language Visual Basic for Applications (VBA.)

- Modules allow thorough control of actions and trapping potential user errors.
- Modules can be stand-alone objects containing functions that can be called from anywhere in the database, or they can be directly associated with a form or a report to respond to events on the associated form or report

Other Definitions

- *Flat-file database.* A flat-file database is a file that has one table of rows (records) and columns (fields)

Field Type and Size

Each Field is defined to store a specific Data Type. The selection of the Data Type helps define for Microsoft Access the range of actions that can be performed on the field.

Each field has varying size depended on the size of the data to be stored within the field. For example, the field [Name] will have a different field size than the field [Initial]. The importance in selecting an appropriate "field size" is to allow for the biggest entry into the field, and to minimise unnecessary allocation of storage space.

Different field types and sizes.

- Text fields can contain alphanumeric, all characters and have a size between 1 and 255 charac-

Table – Microsoft Access Data Types

Data Type	Usage	Size
Text	Alphanumeric data	Up to 255 bytes
Number	Numeric data	1, 2, 4, or 8 bytes (16 bytes for ReplicationID)
Date/Time	Dates and times	8 bytes
Currency	Monetary data, stored with 4 decimal places of	8 bytes
AutoNumber	Unique value generated by Access for each	4 bytes (16 bytes for ReplicationID)
Yes/No	Boolean (true/false) data	1 bit

ters.
- Number fields can contain numbers and have the following Field Sizes:-
  Byte, Integer, Long Integer, Single, Double, Replication ID
- Date/Time contains date information and can be "formatted" for display and input in the following formats:
  General Date, Long Date, Medium Date, Short Date, Long Time, Medium Time, Short Time

Table – Numeric Field Sizes

Data Type *(byte size)*	Minimum Value	Maximum Value
Integer *(2 bytes)*	-32,768	32,767
Long Integer *(4 bytes)*	-2,147,483,648	2,147,483,647
Single-precision *(4 bytes)*		
Positive	$2.802597*10^{-45}$	$3.402823*10^{38}$
Negative	$-3.402823*10^{38}$	$-2.802597*10^{-45}$
Double-precision *(8 bytes)*		
Positive	4.940656458412465D-324	1.79769313486231D+308
Negative	-1.79769313486231D+308	-4.940656458412465D-324

Different Views of an Object

Microsoft Access allows us to look at Objects in different manners, or views. The key views for our Objects are: Design, Datasheet, Form, SQL View, and Print Preview.

Table – Date/Time Field Formatting

General	6/19/94 5:34:23 PM
Long Date	Sunday, June 19, 1994
Medium Date	19-Jun-94
Short Date	6/19/94
Long Time	5:34:23 PM
Medium Time	5:34 PM
Short Time	17:34

Design View is used by all objects for specifying details about the object. For example, Design View is used by the Table object for specifying the Field Names and Data Types of the Table subject. Design View is used by the Query object for specifying the query using QBE (Query by Example) and Design View is used by the Forms object for layout of the Form.

Datasheet View is used by all objects to quickly display a table of the data. This table can be printed and edited.

Form View is used by the Form object to view the Form in its data-entry mode (no design tools are available.)

SQL View is used by the Query object to allow direct entry of SQL queries. This view can also be used to review the query generated by QBE.

Print Preview is used by the Report object for reviewing the printed output for a Report.

Sources and References:

Bowden, Greg Guided Database Activities Using Microsoft Access (Cambridge University Press, Cambridge, 1998)
Running Microsoft Access 97 (Microsoft Press, Seattle,)
Stephens, Ryan K. and Donald R. Plew Sam's teach yourself SQL in 24 hours. (Sam's Publishing, Indianapolis, 1998)

These notes are augmented by the QBasic notes which describes in more detail the comparison functions AND, OR.

http://www.tongatapu.net.to/compstud/ - Computer Studies Course Notes
http://www.tongatapu.net.to - **Tonga** on the **'NET**

Tonga on the **'NET** is available on all networked computers at Queen Salote College and participating schools.