MICROSOFT™ OFFICE® 2007

DATABASE NOTES

Compiled by:

W. Robert

INTRODUCTION

- In our day to day activities, we are often faced with the need to keep, search for or give a report. i.e. use of tools such as diaries. Traditionally human beings used to manage data and information manually by using simple devices. However these methods have a number of weaknesses which include:-

1. Unnecessary duplication of data.
2. Boredom and time wastage especially when searching for a particular item.
3. Misleading reports due to poor data entry and organization.
4. Poor update of records.

- However, in the current world electronic database have changed the way data and information is created, managed and stored in order to address such weaknesses.

DATABASE CONCEPTS

- A database is a collection of structured and related data items organized so as to provide a consistent and controlled access to the items.

  OR

- A database is an organized collection of related data.

Database management

Is the process by which information is organized and stored on a computer in such a way that there is efficient retrieval, updating and manipulation of the data.

MANUAL FILE SYSTEM

- This is where a file is set up in such a way that it holds information relating to a customer, project or even a product and also employees' information in an organization. For example in the hospital a doctor can create a file and assign a unique number for each patient.

Major problems that arise with respect to Manual databases are:

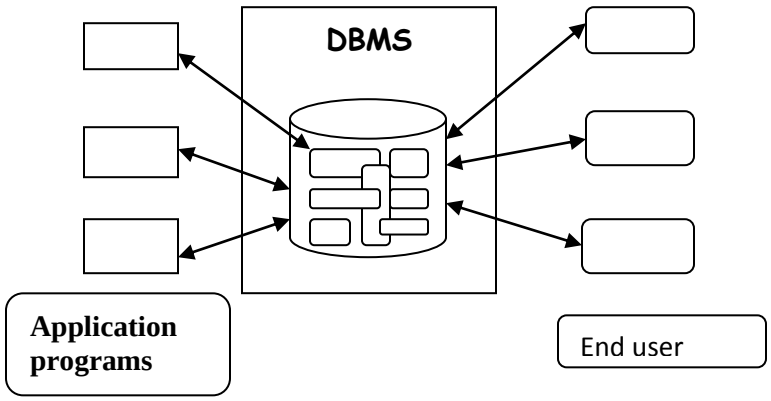
a. **Alteration** – the records can be altered and falsified. Crucial documents such as financial records can be wrongly changed by dishonest employees. Even though this can happen in any database system, it is minimal due to the required log-in password, which requires only authorized personnel that can make changes.
b. **Data redundancy** – it arises in the old filing system as a result of data duplication. New temporary files are usually created whenever the original one is not available for some transactions which is a waste of valuable space and other resources.
c. **Data security** – prevention of unauthorized access of sensitive information is never guaranteed in the manual system.
d. **Absent backup mechanism** – backing up or records is not an easy process in the old filing system. Natural disasters such as floods, earthquakes can destroy vital information.

Others include – *destruction of vital information by employees, stealing, carelessness, data isolation and data inconsistency.*

- To create and manage database, they use Database Management System (DBMS) software. The software facilitates the creation, organization and maintenance of databases. The DBMS lies between the physical database itself and the users of the system. Examples of database management software include Microsoft Access (Ms Access), Microsoft SQL Server, Oracle, FoxPro, DbaseIV, Lotus Approach and MySQL.

Database system

A database system consists of four major components:- data, hardware, software and users.



Data:-

- They are the values physically recorded in the database.

Hardware:-

- It consists of the secondary storage devices like disks, tapes which the database resides, together with the associated devices, control units and channels.

Users:-

- There are basically three broad categories of users:-

a. Application programmers
b. End users
c. Database Administrator

i. **Application programmers**

- They are responsible for writing application programs that use the database by using development tools available with the DBMS such as Visual Basic, which comes with Microsoft Access.
- The application programs operate on the data in all the usual ways: retrieving information, creating new information, modifying or deleting existing information. All the functions are performed by issuing the appropriate request to the DBMS.

ii. **End users**

- They interact with the database from a terminal. One may employ a query language provided as an integral part of the system, or invoke a user-written application program that accepts commands from the terminal and in turn issues requests to the DBMS on the end-user's behalf. The user performs functions such as retrieval, creation, modification and deletion.

iii. **Database administrator**

- The database administrator (DBA) is the person who is the overall in charge of the system. He is responsible for determining the information content of the database, defining authorization checks and validation procedures, monitoring performance and responding to changes in user requirements and defining a strategy for backup and recovery.

Database Management software performs the following duties:-

a. Allow the user to add or delete records.
b. Update or modify existing records.
c. Organize data for easy access, retrieval and manipulation of records.
d. Act as an interface between a database and other application programs.
e. Ensure security for the data in the database by safeguarding it against unauthorized access and corruption (damage).
f. Keep statistics of data items in a database.
g. Ensures **data integrity** – this is done to make sure that the data complies with the set up standards in order to ensure its validity and consistency, which is usually done through the use of integrity constraints. Data integrity is the correctness and internal consistency of data. For example a field may be defined to accept only numbers less than 10. If one enters 13 instead, will not accept unless it is less than 10 which is valid.
h. Allows multiple users to access the same data – in relational database, many users can read and manipulate the same data at the same time in the same database. For example, one user could be updating the bill paid by a particular customer while the other will be updating the address of the employees. This saves a lot of time as one does not need to wait for one to finish first.

Advantages of a computerized database

a) Information can be accessed quickly and easily with little probability of it being lost.
b) Related files can be linked together – once one is updated and the related file(s) will also automatically be updated.
c) Information need not be duplicated: it can be stored only once and accessed in several different ways.
d) It is easy to update or change records and their structure in computerized databases.
e) Data entered can be easily validated, thereby preventing mistakes on entry.
f) It is easy to store backup copies of the database 'offsite'.

Disadvantages

i. Database operators require training, which may take some time.
ii. It is easy to copy or steal files unless the files are stored and protected carefully.
iii. Computer breakdown can cause files to become inaccessible or corrupted.

Traditional filing methods

- It is an old way of organizing files in which data is stored within a single file or table; unlike the present relational database systems in which data is split into separate tables each containing different data items but all are related in some way.
- The traditional file system is almost obsolete but it is still used by many organizations because of:-

a. It is less expensive – does not need experts to maintain.
b. It is easy to manage – there are no programs written that are used in the retrieval of data such as application programs.
c. Modern database are expensive – for small organizations, it is expensive to purchase and maintain the new database system as they need experts and qualified database administrators to install and manage these

complex systems. Also Database Management System Software (DBMS) is very expensive for small organizations.

ENTITY RELATIONSHIP MODELLING

It is a technique used to identify the objects within an organization and how they are related to each other.

Definition of terms

Entity:-

- It is a thing or object of significance, whether real or imagined, about which information needs to be known or held. It can be an object with a physical existence such as person, car, house etc or it may be an object with a conceptual existence such as a company, a job, a house

Example:-

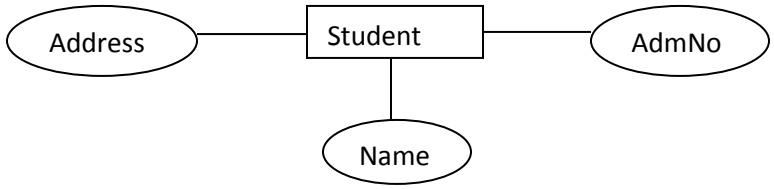
- A supplier has to maintain a list of all items that he/she supplies. The list may include:- description, price, category, product number etc. The entity here is the ***item*** about which information needs to be stored.
- Every entity has particular properties or attributes which describes it

Name	Product code	Price	Description
Lotion	2342	120	Body care
Bread	2300	31	Edible
Pen	1200	12	Stationery
Sugar	2390	200	Edible

Attributes

An attribute is any detail that serves to qualify, identify, classify, quantify or express the state of an entity or any description of a thing of significance.

An attribute could be text, numbers, a picture, a feel, a smell, sound etc as required.



- The ellipses in the above figure represent the attributes. Student's address, admission number, name etc are called attributes.
- Any attribute or set of attributes can be used to uniquely identify a row in a table. Such attributes acts as a candidate for a Primary key and is referred to as the Candidate Key.
- A candidate key can be chosen as a primary key depending on factors like uniqueness, usage etc. Thus a primary key is a field or set of fields in a table that uniquely identifies every record.

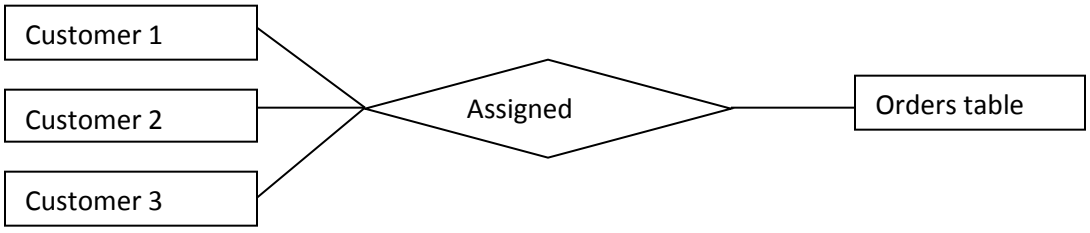
TYPES OF TABLE RELATIONSHIPS

A relationship is an association among entities. It may associate an entity with itself.

There are three types of table relationships.

A one-to-many relationship

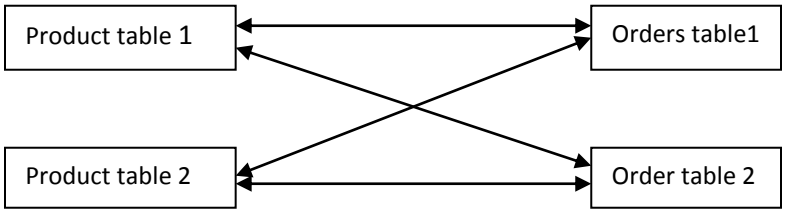
- Consider an order tracking database that includes a Customers table and an Orders table. A customer can place any number of orders. It follows that for any customer represented in the Customers table, there can be many orders represented in the Orders table. The relationship between the Customers table and the Orders table is, therefore, a one-to-many relationship.



- To represent a one-to-many relationship in your database design, take the primary key on the "one" side of the relationship and add it as an additional field or fields to the table on the "many" side of the relationship. In this case, for example, you add a new field — the ID field from the Customers table — to the Orders table and name it Customer ID. Access can then use the Customer ID number in the Orders table to locate the correct customer for each order.

A Many-to-Many relationship

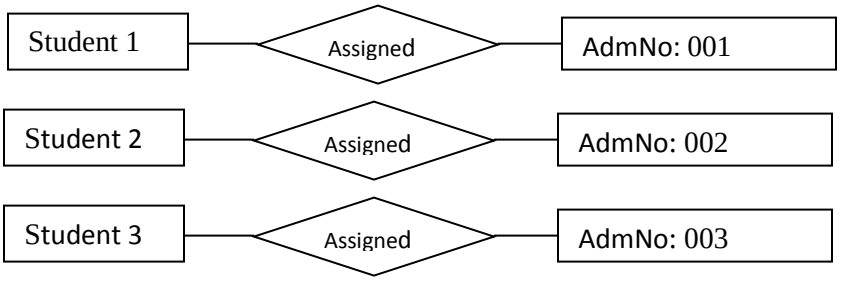
- Consider the relationship between a Products table and an Orders table. A single order can include more than one product. On the other hand, a single product can appear on many orders. Therefore, for each record in the Orders table, there can be many records in the Products table. In addition, for each record in the Products table, there can be many records in the Orders table. This type of relationship is called a many-to-many relationship because, for any product, there can be many orders and, for any order, there can be many products. Note that to detect existing many-to-many relationships between your tables, it is important that you consider both sides of the relationship.



- To represent a many-to-many relationship, you must create a third table, often called a junction table, that breaks down the many-to-many relationship into two one-to-many relationships. You insert the primary key from each of the two tables into the third table. As a result, the third table records each occurrence, or instance, of the relationship. For example, the Orders table and the Products table have a many-to-many relationship that is defined by creating two one-to-many relationships to the Order Details table. One order can have many products, and each product can appear on many orders.

A one-to-one relationship

- In a one-to-one relationship, each record in the first table can have only one matching record in the second table, and each record in the second table can have only one matching record in the first table. This type of relationship is not common because, most often, the information related in this way is stored in the same table. You might use a one-to-one relationship to divide a table with many fields, to isolate part of a table for security reasons, or to store information that applies only to a subset of the main table. When you do identify such a relationship, both tables must share a common field.



DATABASE MODEL

It is a specific method for describing the structure and processing within a database. The main database models include:-

i. Flat file
ii. Hierarchical
iii. Network
iv. Relational

NB:

The current database model trend is towards new models namely ***object relational*** and ***object oriented*** models.

FLAT FILES

The database holds only one set of data and is not any different from the manual files. For example, the teacher's assessment report may consist of performance cards for every student in a class. Another example is the cards used in a library books catalogue. The cards are arranged sequentially for easy access e.g. alphabetically using book's title or by authors' names. It is very hard to establish relationship between the items other than the sequence in which they are stored.

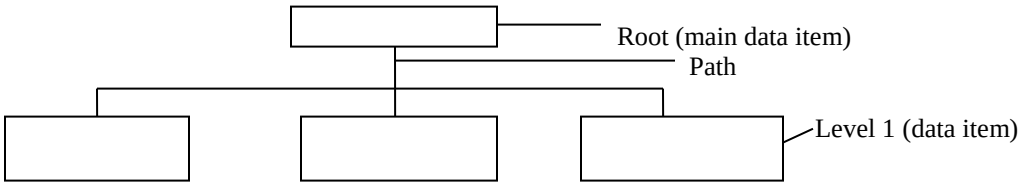
Name	Performance
Admission number	7680
Total marks	560
Number of subjects	8
Average	70
Position	2

Limitations

- Locating a record is very tedious – if one has to locate a particular data item, the search starts at the beginning and the subsequent items are checked until the required item is found.
- If data has to be inserted, the whole file has to be read and rewritten.
- Any changes in the database has to be updated which is also tedious.

HIERARCHICAL MODEL

- The data items are arranged in a hierarchical (tree) form as shown in the diagram below. To access level two data items, one has to access level 1 data items.
- A level 1 item is called the root component. A specific single path leads to each item at lower levels. The model represents a one-to-many relationship.

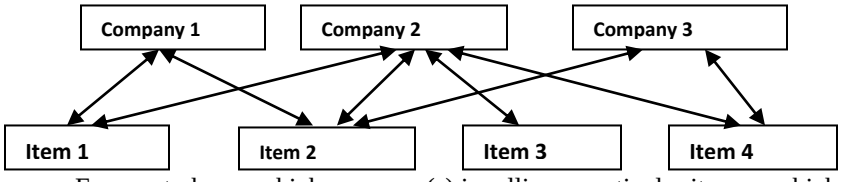


Limitation

- It is not possible to insert a new level in the table without altering the structure. This makes it impossible not to support many-to-many relationship.

NETWORK MODEL

- These types of organization, links are used to express the relationship between different data items, forming a network of data items. Access to one item can be through multiple paths and from any item. This type of model brings about many-to-many relationship.



- For one to know which company(s) is selling a particular item or which particular item the vendor sells, it is completely dependent on the pointer to map out the relationship.

Limitation

- Incase of large volumes of data, it is very difficult to locate the item because it will increase the complexity of the search, as it uses pointers.

RELATIONAL DATABASE MODEL

- It is the most common type of model used on minicomputers and microcomputers. In this type of organization, related data items are stored together in structures called relations or tables. Relationship can be created between tables such that a record(s) from one table relates to another or other records in another table.
- The tables below shows customers and orders table that are related by two fields; the customer number and customer ID. In this case, the orders table shows that one customer with number 450 has made several orders.

Customer No	Name	Tel. No.
2130	Mercy Koech	02389898
7890	Peter Karimi	08899489
8789	Bat Korir	09565656
7899	Mary Ngure	89984888

CustomerID	Order No.	Date	Amount (Ksh)
2130	5654	7/3/2009	89000
8789	56	8/4/2009	78800
8789	67	6/8/2009	67000
8789	874	5/8/2009	77880

OBJECT ORIENTED MODELS

- The next generation of database model will look at records as objects that are independent and how they relate with the other objects in a database. Such databases are still at developmental stages. However many databases today combine object and relational concepts to come up with object relation models.

DATA INTEGRITY

- It is meant to ensure correctness and completeness of the data in the database. When the contents of the database are modified, the integrity of the database is lost. To maintain consistency of data, integrity constraints are imposed. They restrict and validate the data values that are added or updated in the database.

Some of the constraints include:-

a. Validity integrity
b. Entity integrity
c. Referential integrity

Validity integrity

- It checks if the data entered in the database matches the column data type. For example if a column NAME is defined to be of character type and one tries to enter numeric value, then it will display an error message.
- A DBMS checks this rule each time an add or update attempt is made on the column.

Entity integrity

- An entity refers to any data recorded in the database. The primary key is used as an identifier of the row.
- This does not allow duplication of data as no component of the primary key is allowed to accept a NULL (blank or empty) value. For example, consider a table having student admission number and name, where AdmNo is the primary key. Numbers cannot be duplicated.

AdmNo	Name
7890	Ann
7870	Grace
7909	Jane
8790	Beatrice

Referential integrity

- It establishes a parent-child relationship between tables. A foreign key is defined on a column to declare this constraint.

Example:-

STUDENT TABLE

Adm.No	Name
001	Jane
002	Loise
003	Agnes
004	Beatrice

SCHOOL DETAILS TABLE

Adm.No	Class	Hostel
001	One Venus	Chania
002	One Pluto	Kareri
003	One Jupiter	Pangani
004	One Mars	Jogoo

- The admission number (AdmNo) of the parent table is the primary key and the AdmNo of the child table is the foreign key.
- When a new row is inserted into the child table, its foreign key value must match with one of the primary key values of the parent table. The same rule is applied for updating and deleting rows.

NB:-

- Any changes in the parent table should reflect in the child table.

FEATURES OF A DATABASE MANAGEMENT SOFTWARE

Most database software contains a collection of features that provides the user with a means to manipulate data in a database. The features include:-

a. Tables
b. Queries
c. Form interface
d. Report generators
e. Macros
f. Modules
g. Pages

Tables / file structure.

- It is a database structure that is used to hold related data records. Tables are organized in rows and columns with each row representing a record while each column represents common fields in each record.
- The table below represents three records and each record is made up of four fields.

FIRST NAME	SECOND NAME	LAST NAME	CLASS
Jane	Njeri	Njuguna	Form one Pluto
Grace	Wanjiru	Mburu	Form one Mars
Nancy	Wangeci	Mungiria	Form two Pluto

Queries

- A query is a statement used to extract, change, analyze or request for specific data from one or more tables. A query can select and define a group of records that fulfill a certain condition. You can use queries before printing a report so that only the desired data is printed. You can also use a query with forms so that only certain records that meet the desired criteria appear onscreen. You can also use queries within procedures to change, add, or delete database records.
- For example, the school bursar may wish to display all students who have a fees balance of more than Ksh.5000. he can use a query to extract the required records.
- The query statements are written using a special language called Structured Query Language (SQL). The user creates a query by writing structure query language statements such as:-

```
Select AdmNo, Name, Fees balance
From
        FeesTable
Where
        FeesBalance = ">5000"
```

Forms / Input screen

- A form is a graphical interface that resembles an ordinary paper form. Data-entry forms help users get information into a database table quickly, easily, and accurately.
- Data-entry and display forms provide a more structured view of the data than what a datasheet provides. From this structured view, database records can be viewed, added, changed, or deleted. Entering data through the data-entry forms is the most common way to get the data into the database table.
- You can use data-entry forms to restrict access to certain fields within the table. You can also use these forms to check the validity of your data before you accept it into the database table.
- Most users prefer to enter information into data-entry forms rather than datasheet tables; data-entry forms can be made to resemble familiar paper documents. Forms make data entry self-explanatory by guiding the user through the fields of the table being updated.
- Display-only screens and forms are solely for inquiry purposes. These forms allow for the selective display of certain fields within a given table. Displaying some fields and not others means that you can limit a user's access to sensitive data while allowing inquiry into other fields.

Reports

- Reports present your data in printed format. You can create several different types of reports within a database management system. For example, your report can list all records in a given table, such as a student table. You can also create a report that lists only students who have KCPE marks which is greater than 360 marks (meets a given criterion). You do this by incorporating a query into your report design.

NB:-

When you design your database tables, keep in mind all the types of information that you want to print. Doing so ensures that the information you require in your various reports is available from within your database tables.

Macros

- It automates frequently performed procedures or tasks. For example if you frequently use a particular form when you start a database program, one needs to create a macro that automates the opening of the form.

Programming module

- When a database becomes more and more complex, one needs a more powerful tool than the macros to automate the database operations further.
- Most database software come with their own computer languages associated with them. For example Microsoft Access comes with a language called Visual Basic included as a Module in the software. Using this feature, you can create a program that will print a query result over and over again until a certain condition is true.

Example:-

Print Student Report until Number of Students = ***40***

Pages

- Lets you publish live forms to a corporate intranet

DATA ORGANIZATION IN A DATABASE

One of the functions of a database is to organize data for easy access, retrieval and manipulation. Data is organized from the simplest form called a value to a very complex structure called a database.
This include:-

Value

- At the intersection of a row (record) and a column (field) is a *value*— the actual data element. For example, John, the First Name in the first record, represents one data value.

Fields

- A field is a character or a logical combination of characters that represent a data item. For example, in a class list, the student name is a field.

Records

- A record is a collection of related fields that represent a single entity. For example students' performance worksheet that may contain student's name, class, admission number, subjects he/she doing, total marks, average grade etc.

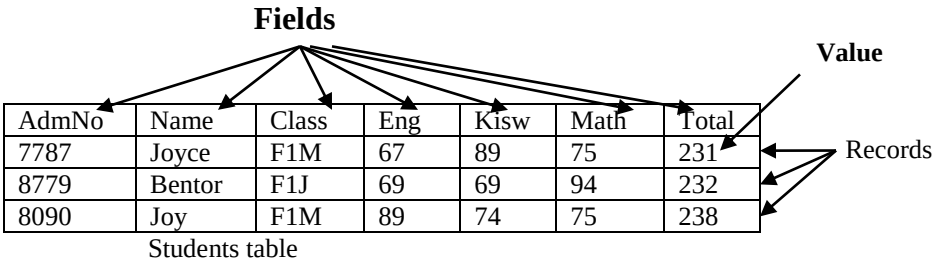
Tables

- It is a collection of related records. For example, the students' file in a school database contains the details of all the students in the school.

Database

- This is the highest in data organization hierarchy that holds all related files or tables. For example, a school database may contain students and staff tables/files.

Summary:-



AdmNo	Name	Class	Eng	Kisw	Math	Total
7787	Joyce	F1M	67	89	75	231
8779	Bentor	F1J	69	69	94	232
8090	Joy	F1M	89	74	75	238

Students table

CREATING A DATABASE USING MICROSOFT ACCESS

- Microsoft Access is a package in Microsoft Office Suite used for creating and manipulating databases. Currently the available versions of Access are Access 97/2000, Access XP, 2002, 2003 and 2007.
- Versions higher than 2000 always use Access 2000 as the default compatibility mode.
- We shall use Access 2007 to create databases supported by Access 2000.

Starting Microsoft Access

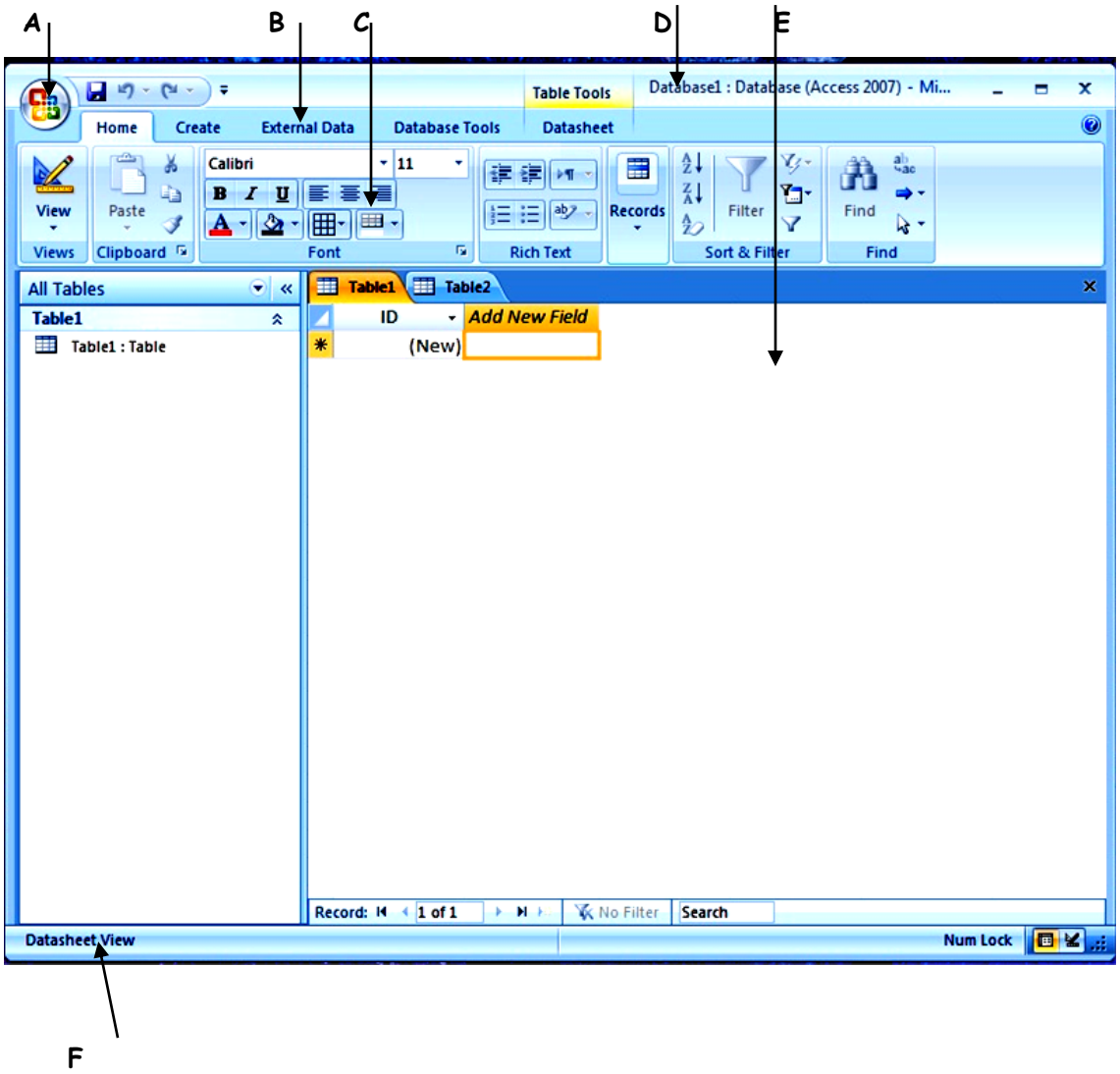
To create a new database:

i. Click *Start*, point to *Programs, Microsoft Office and then Access 2007.*
ii. From the resulting window displayed – Getting started with Microsoft Access
iii. Click on *New Blank Database*
iv. Select the location where the database will be created, type the *database name* then click *Create*.
v. Microsoft Access database objects window is displayed, from which you can choose the type of object you wish to create such as *tables, forms, macros, module, queries, reports* etc.

MICROSOFT ACCESS 2007 SCREEN LAYOUT

Like any other application packages discussed earlier, Access application Window has a title bar, menu bar, toolbars and status bar. However instead of having a work area like that of Ms Word or Excel, it provides the user with an object window from which you chose the data type of an object to work with such as tables, queries, forms, reports etc.

Microsoft Access application window



A – Office button
B – Menu bar
C – Standard toolbar
D – Title bar
E – Object window
F – Status bar.

Form the application window, in the menu bar it has different features used for different purpose.

Under HOME on the menu bar, a list of menus will be displayed which includes:-

- View, Clipboard, Font, Rich text, Records, Sort and Filter, Find etc.

Under CREATE:-

- Tables in design view, Forms, Reports and others which include Macros, Modules, Query design and Query wizard.

Under EXTERNAL DATA – this allows one either import some data from other application packages like Excel, Word etc. This includes:- Import, Export, Collect data and Share points.

Under DATABASE TOOLS

This includes:-

- Macros – Visual basic, Show or Hide – Relationships, Message bar, object dependencies etc. Analyze, Move data – SQL server, Access Database, Database tools – Switchboard manager, Set database password, Encode/Decode database, Administer – Users and permission, Replication options.

Under DATASHEET

They include:-

- Views – (design view or datasheet view), Fields and Columns, Data type and formatting, Relationships.

Office button

- When one clicks the office button, a drop down list will be displayed containing the following commands:- New, Open, Convert, Save/As, Print, Manage, E-mail, Publish and Close database.

EXITING FROM ACCESS

- Like any other application discussed earlier, one can exit from Microsoft Access by pressing Alt + F4 or on Office button select close database.

GUIDELINE ON DESIGNING GOOD DATABASES

A good database design mean a better storage, security and little maintenance effort. To design a good database:-

i. Carefully study the requirements of the user in order to define all the data inputs, outputs and relationship requirements.
ii. Design a draft database on the paper to determine the number of files or tables required.
iii. Divide the information into separate fields, records and tables to allow flexibility in manipulating the database. The process of dividing information into independent tables to avoid repetition of data entries items is referred to as normalizing a database.
iv. Define a field for each table that will be used to identify each record uniquely. This field is referred to as a primary key.
v. Give the most important fields the first priority when constructing a table. Important fields are those that are used in sorting and querying the database.
vi. Design data entry forms needed for the database.

Creating a table structure

To define a table structure:-

a. On the menu bar, click on **CREATE**; from the resulting list under tables click **Table design**; by default Microsoft Access starts Table1.
b. Using the grid displayed, enter a unique name for each field in the table. A field name must start with a letter and can be up to a maximum of 64 characters including letters, numbers, spaces and punctuation.
c. Choose appropriate data type before adding the next field. By default Microsoft Access inserts Text as a data type. The data types include: - Text, Memo, Number, Date/Time, Currency, Auto number, Yes/No, OLE object, Hyperlink and Lookup wizard.
d. To save the table, click on office button the select Save/As from the pull down menu. (Clicking save icon which resembles a diskette on the title bar)
e. Access will ask you whether you want to create a Primary key, click Yes. You can also select an icon of primary key under Tools.

DESCRIPTION OF FIELD DATA TYPES

The type of data to be used in a database must be clearly defined for the purpose of manipulation and storage. For example if the field is to be used for calculation, it must be defined as a number. The data types in Access includes:-

Text

- It is any type of data that is simply characters. These characters comprise alphanumeric characters, meaning numbers (0 through 9) and characters (A to Z, a to z). Names, addresses, and descriptions are all text data, as are numeric data that are not used in a calculation (such as telephone numbers, Social Security numbers, and ZIP codes).
- Although you specify the size of each text field in the property area, you can enter no more than 255 characters of data in any text field.
- Access uses variable length fields to store its data. If you designate a field to be 25 characters wide and you use only 5 characters for each record, then that is all the space you will actually use in your database container. You will find that the .MDB database file can get large quickly but text fields are not the cause. However, rather than allow Access to create every text field with the default 50 characters or the maximum 255 characters, it is good practice to limit text field widths to the maximum you believe they will be used for. Names are tricky because some cultures have long names.
- However, it is a safe bet that a postal code might be less than 12 characters wide while a U.S. state abbreviation is always 2 characters wide. By limiting the size of the text width, you also limit the number of characters the user can type when the field is used in a form.

The Memo

- It is a data type that holds a variable amount of data from 0 to 65,536 characters for each record. Therefore, if one record uses 100 characters, another requires only 10, and yet another needs 3,000, you use only as much space as each record requires.

The Number

- It is a data type that enables you to enter *numeric* data; that is, numbers that will be used in mathematical calculations. (If you have data that will be used in monetary calculations, you should use the *Currency* data type, which enables you to specify many different currency types.)

The Date/Time

- It is a data type that can store dates, times, or both types of data at once. Thus, you can enter a date, a time, or a date/time combination. You can specify many types of formats in the property entry area and then display date and time data as you prefer.

The Currency

- It is a data type that enables you to enter *numeric* data; that is, numbers that will be used with only two decimal places and can be used for mathematical calculations. You can specify many different currency formats with this data type. (If you have data that will be used for non-Currency, numeric calculations, you should use the *Number* data type.) Used when dealing with fees balance, amount sold etc.

The AutoNumber

- It is a data type that stores an integer that Access increments (adds to) automatically as you add new records. You can use the AutoNumber data type as a unique record identification for tables having no other unique value. If, for example, you have no unique identifier for a list of names, you can use an AutoNumber field to identify one John Smith from another.

The Yes/No

- It is a data type that holds logical data that has one of two values and that can, therefore, be expressed as a binary state. Data is actually stored as –1 for yes and 0 for no. You can, however, adjust the format setting to display Yes/No, True/False, or **On/Off**.
- When you use a Yes/No data type, you can use many of the form controls that are especially designed for it.

The OLE Object

- It is a data type that provides access for data that can be linked to an OLE server. This type of data includes bitmaps (such as Windows Paint files), audio files (such as WAV files), business graphics (such as those found in Access and Excel), and even full-motion video files. Of course, you can play the video files only if you have the hardware and necessary OLE server software.

The Hyperlink

- It is a data type field holds combinations of text and numbers stored as text and used as a hyperlink address. It can have up to three parts: (1) the visual text that appears in a field (usually underlined); (2) the Internet address — the path to a file (UNC, or Universal Naming Convention, path) or page (URL or Uniform Resource Locator); and (3) any sub-address within the file or page. An example of a sub-address is the name of an Access 2000 form or report. Each part is separated by the pound symbol (#).

The Lookup Wizard

- It is a data type that creates a field that enables you to use a combo box to choose a value from another table or from a list of values. This is especially useful when you are storing key fields from another table in order to link to data from that table. Choosing this option in the Data Type list starts the Lookup Wizard, with which you define the data type and perform the link to another table. You learn more about this field type later.

FIELD PROPERTIES

- When you create more and more complex tables, one will be required to use field properties to specify finer details related to fields and table entries expected.
- The field properties depend on the type of field selected. For example, when click on a Text field, then the General tab, you will be able to see the field properties associated with it.

The field properties include:-

Field size

- It allows the user to set the number of characters in a field instead of the default value 255. For numeric fields one uses properties such as *Integer, Long integer, Byte, Single and Double.*

Integer and longer integer – Accepts numbers with no decimals.
Byte: - it accepts only numbers ranging between 0 and 255.
Single and double: - it accepts numbers with decimals. Single accommodates up to 38 decimal places while double, accommodates up to 308 decimal places.

Format

- It determines how information appears on the screen when printed. For example, one can format a number to scientific, currency, percentage or general format.

Decimal places

- For number and currency fields, one can specify the number of decimal places.

Input mask

- It automatically formats the field entry into a specified format. For example, one can enter a number such as 02000100409874 and the input mask is set as 00-(00000)-000000, it is automatically displayed as 020-(00100)-409874. This property is mostly used to format phone numbers and address entries.
- Others include – social security number, zip code, extension, password, long time and date, short time and date, medium time and date etc.
- **NB:** - *The input mask applies only to text and date/time data types*.

Caption

- This is a more descriptive name (label) for a field to be used in a table or a form display. For example, the caption for ***StudName*** could be ***Student Name***.

Default value

- It is a value that appears automatically in the datasheet or form if nothing is entered by the user to change it. For example, =Date ( ) automatically displays the current date in a date field.

Validation rule

- It is a logical expression that restricts the values to be entered in a field. For example, one can restrict marks entered in a field to be between zero and a hundred, enter >=0 And <=100.

Validation text

- It is a message that appears once the validation rule is violated. For example, you may create a validation text for the above validation rule to display "Please enter a number between 0 and 100" whenever the user enters a value outside this range.

Required

- It determines if an entry must be made in the field before you proceed to the next field or record. For example, if a primary key is required, one must enter it before you proceed.

Allow zero length

- It allows the user to proceed without making any entry in the field set as Zero length.

Indexed

- An index facilitates the organization of records for easy search. A primary key is an example of an index set to ***No duplicates.***

ENTERING A FIELD DESCRIPTION

- The *field description* is completely optional; you use it only to help you remember a field's uses or to let another user know its purpose. Often you don't use the description column at all, or you use it only for fields whose purpose is not readily recognizable.
- If you enter a field description, it appears in the status bar whenever you use that field in Access—in the datasheet or in a form. The field description can help clarify a field whose purpose is ambiguous or give the user a fuller explanation of the values valid for the field during data entry.

PRIMARY KEY AND INDEXES

An index *is a key(s) used to speed up searching and sorting records in a table*, while **a primary key** is *an index that uniquely identifies each record stored in the table.*

Advantages of a primary key:

Besides being a common link field between tables, a primary key field in Access has these **advantages**:

a. It creates an index for the table that greatly speeds up queries, searches, and sort requests.
b. It prevents the user from making null - When you add new records, you must enter a value in primary key field(s). Access will not allow you to enter Null values, which guarantees that you'll have only valid records in your table.
c. Used to order records and control redundancy - When one adds a new record(s) to a table that has a primary key, Access checks for duplicate data and doesn't enable you to enter duplicates for the primary key field — thus it maintains its integrity.
d. By default, Access displays your data in the order of the primary key.
e. Enables a relationship between tables so that they can be joined.

An index is a special internal file that is created to put the records in a table in some specific order. For instance, the primary key field in the tblContacts table is an index that puts the records in order by idsContactID field. Using an indexed table, Access can display records in a specific manner and quickly find any record within the table using the index.

To set a primary key: -

The primary key can be created in any of four ways: -

✦ Select the field to be used as the primary key and choose Design ➪Primary Key icon displayed on the toolbar.

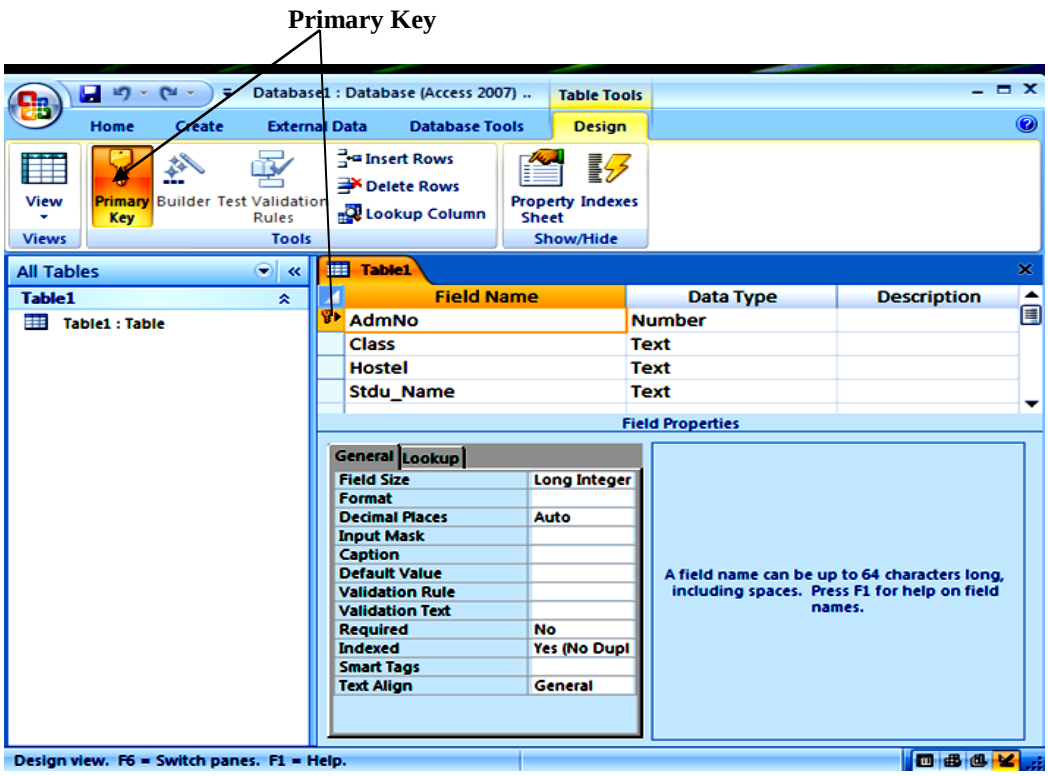
✦ Select the field to be used as the primary key and select the Primary Key button (the key icon) in the toolbar.

✦ Right-click the mouse to display the shortcut menu and select Primary Key.

✦ Save the table without creating a primary key, and Access automatically creates an AutoNumber field.

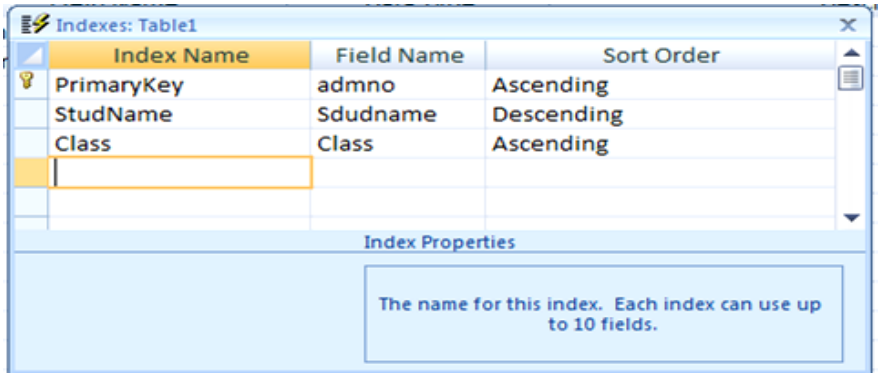
Alternatively

1. Open the table in design view.
2. Select the field you want to set as the primary key by clicking in the row header to the left of the Field Name.
3. Click Primary key button on the toolbar displayed under Design from the menu bar.



To set another field as an index other than the primary key:-

1. Open the table in design view.
2. Click Design from the menu bar. From the menu displayed under Show/Hide, click Indexes.
3. The index design grid is displayed on the screen as shown below.
4. In the Index Name column, type the name of the index.
5. In the Field Name column, select the corresponding fieldname.
6. In the Sort Order column, select Ascending or Descending and then close the window.



Index design window

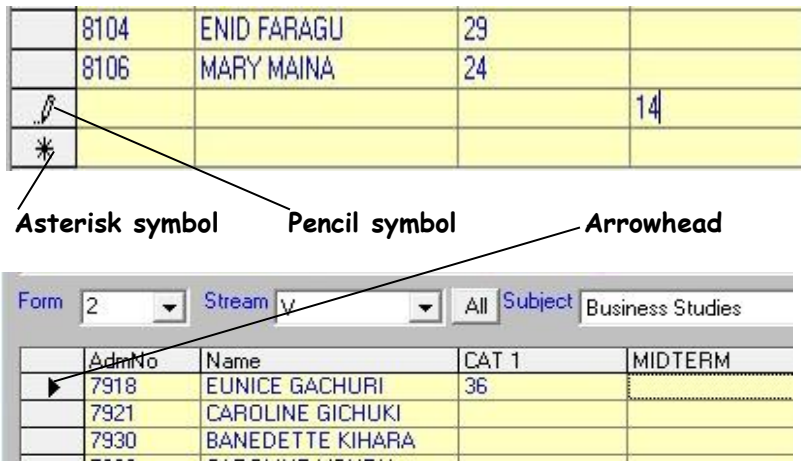
MANIPULATING DATA IN A TABLE / WORKING WITH DATABASE TABLES

Adding new records:-

- In Access, a record entry into a table is automatically saved once you move to a new row.

To enter records into a table:-

1. Double click the table icon. The table is displayed in datasheet view.
2. On the menu bar, click home; from the menu displayed under Records, select NEW record (or by clicking the New icon). The following symbols will appear at the row header: -
   - An arrowhead indicates that no new data entry or edit is pending;
   - Pencil symbol indicates that the current record entry is not yet saved;
   - Asterisk symbol marks a blank record below the current entry;
   - Record locked indicates that the current record is being edited by another user in a multi-user or networked environment.



New record entry

Deleting records

To delete a record:

1. Click the record you want to delete.
2. Click Home from the menu bar, under Records click Delete or Delete records. Alternatively right click at the top left corner of the table; from the menu displayed select Delete Record.
3. A message appears, click **Yes** to confirm deletion.

Editing fields

To edit a field:-

a. Double click the field you want to edit.
b. Replace the cell content.

Searching for records

To find and replace a field:

1. On the menu bar, click Home; from the menu displayed under Find click Find (Ctrl + F) or Replace.
2. In the "Find What" and "Replace With" boxes, type the field to search for and replace with respectively.

NB:-

- You can use wildcards e.g. asterisks (*) if one is not sure of the search phrase. For example, if you wish to search for all names that start with letter "J" in a Students table, type J*. All names that start with letter J such as John, Jane, Joy, Joyce and James will be displayed

COPYING AND MOVING RECORDS

1. Select the record(s) to be copied or removed.
2. Under Home menu click **Copy icon** under clipboard to create a copy or click **Cut icon** to move.
3. Open the target datasheet. Under clipboard click **Paste icon**.

Sorting records

a. In datasheet view, select the records to be sorted.
b. On the Home menu under Sort and Filter, click Filter. From the menu displayed select either (Sort Smallest to Largest / Sort Largest to Smallest).

Filtering records

- Use the same procedure like the one used in sorting records.
- Under sort and filter, select the type of filter; by selection or advanced.
- Under advanced; select the type of filter you want to use. Either Filter by Form; Apply Filter/Sort, Advanced Filter/Sort.

FILTERING RECORDS (USING ACCESS 2000 OR 2003)

a. In datasheet view, select the records to be filtered.
b. On the Records menu, point to filter.
c. Select the type of filter you want to apply.
d. In the datasheet, click a down Arrow of the field to set the filter option.
e. Click Apply filter button on the toolbar.
f. In the index name column, type in the name you want to give to the index.
g. In the Field Name column, click the cell to display a drop down list. From the drop down list, select the field to use as an index.
h. In the Sort Order column, select either ascending or descending.
i. In the lower portion, specify whether you want to make the field a primary key by selecting yes for *primary* and *unique*, and *Ignore Nulls* to ensure that data is entered into the field before proceeding.
j. Click the close dialog box.

MODIFYING A DATABASE

Modifying datasheet

To adjust the column size:

1. Point to the column border between the field's header, then drag to the required size.
2. Alternatively, under Records in Home menu, click on More; from the pull down menu select column width, a dialog box will be displayed from which you can enter width size. Default value is 11.75.

To adjust row height:

1. Point to the border between two rows in the row header and then drag.
2. Alternatively, under Records in Home menu, click on More; from the pull down menu select row height, a dialog box will be displayed from which you can enter height size. Default value is 14.25.

To reorder fields:

1. Select the column of the field you wish to move by pointing to the desired field name.
2. Drag the column right or left to the top of the field where you want your field to appear and then drop.

Modifying table structure

When one creates a table, he/she may need to add more fields, remove some fields, reorder the fields or change fields data types and properties. Before modifying the table, it is important to save a copy to avoid losing everything in case you make a mistake.

To make a copy of the table:-

1. On the Office button, select Save As from the pull down menu. From the menu displayed besides select Save Object As.
2. In the dialog box that appears, type the name of the table in the Save a copy as; e.g. *Student table* As *Student Details* and then click ***Ok***.

To modify the original table:

i. Open the table in design form by clicking the button that looks like a pencil and a set square under View in the Home menu.
ii. Select design view from the pull down menu.
iii. Select the field(s) to be modified and make the necessary changes.
iv. Click the save button to save the changes.

NOTE:

If a table contains data and you make changes to the field data types, Ms Access may refuse to implement the changes. To avoid this problem, exit without saving and delete all the records from the table then return to the design view.

Importing tables:-

One can import a table from another database or a spreadsheet into the database. To import a table or a worksheet:-

1. Select External Data from the menu bar; under Import, click Excel. From the resulting dialog box, select the source and destination of the data.
2. Click Browse. File open dialog box will be displayed; look in one of the Save in folders and then select the table(s) you wish to import and then click Open. Click Ok.
3. If the Spreadsheet contains more than one worksheet, select one of them then click next.
4. Specify the information about each of the fields you are importing. Click next.
5. Define the primary key of data in the worksheet. Choose my own primary key. Click next.
6. Click Finish.

FORM DESIGN

A form is an interface that enables the user to view and make data entries into an underlying table or query more easily.

Forms can be designed for different purposes:-

a. Displaying and Modifying data

- Forms can be used to add, modify or delete information in the database.

b. Accepting User Input

- They can be designed to limit the user by designing them to accept only certain data values, using data validation. Data values can also be provided to help automate data entry by using option groups, pop-up list, drop-down lists, etc.

c. Controlling Application flow

- They can be designed to work with Macros and Modules to automate a sequence of actions or to display specified information. Buttons can placed on forms to run a macro attached to it, or to perform a VBA procedure when clicked.

d. Displaying Messages

- They can be used to display messages including warning or error messages.

e. Printing Information

- Reports are the ones used for printing information but forms can also be used to print information.

CONTROLS

- In Microsoft Access, a form is designed using graphical objects called controls. ***A control is a visual object such as a text box, check box, command button or shapes that you place on a form design grid to display data or perform actions***.
- Forms contain tools that are designed to help users navigate and utilize the form. There are three categories which include:-

a. Bound
b. Unbound
c. Calculated

Bound

- These controls are fields of data that come from a table or a query. A form must have a bound control for each field that you display on the form. In Access one cannot create a calculation in a bound control.

Unbound

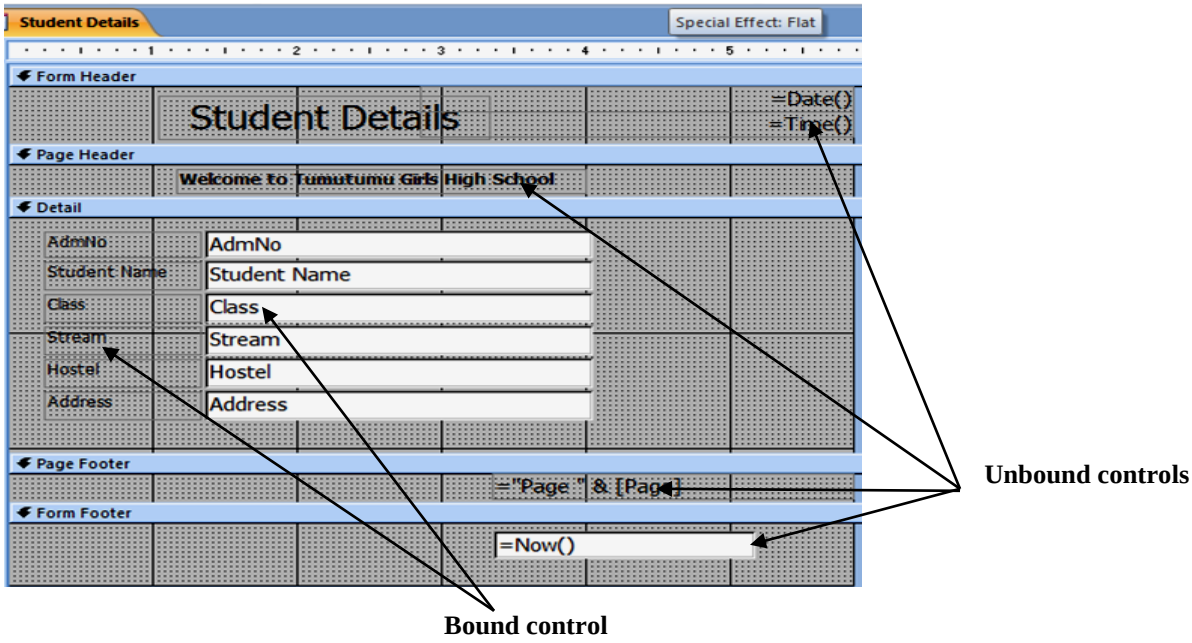
- It is a control that is not connected to any source. The control contains a label or a text box. One uses unbound controls to explain or identify other controls on the form. Calculations can be created from an unbound control.

Calculated

- These are any values calculated in the form, including totals, subtotals and average.

You can design or modify a form layout by dragging these controls to the required position.

The figure below shows a form designer for a table called STUDENT DETAILS



Form layout

- All forms must have a detail section. These include Detail, Page Header, Page Footer, Form Header and Form Footer sections.

Form Header:-

- It displays information that remains the same for every record such as a title for the form. It appears at the top of the screen in Form view and at the top of the first page when printed.

Page Header:-

- It displays information such as a title or column headings, at the top of every printed page. Page headers appear only on printed forms.

Page Footer:-

- It displays information, such as the date or page number at the bottom of every printed page. Page footers appear only on printed forms.

Detail

- This is the area where one places the controls that one wants to use both bound and unbound controls.

Form Footer

- It displays information that remains the same for every record such as command buttons or instructions for using the form. A form footer appears at the bottom of the screen in Form View or after the last detail section on the last page when printed.

Creating a form layout using a Wizard

To create a form layout, one can either use the form wizard or start from scratch. When using a ***form wizard***, you can create either a Columnar, a Tabular, a Datasheet or a Justified form layout

- ***Columnar form***: - The fields for each record are displayed down a column i.e. each value displayed on a separate line with field labels to the left.
- ***Tabular***: - Records are displayed from left to right across the page and labels appear at the top of column. Each row represents a new record.
- ***Datasheet***: - The form resembles a table datasheet view.
- ***Justified***: - One record occupies the whole form.

To create a form using the form wizard:-

a. Open the database for which the form is to be created e.g. “Patients table”.
b. Click **Create** on the **Menu bar**, from the resulting objects displayed(Tables, Forms, Reports and Others); under Forms, select ***More Forms*** by clicking on the arrow pointing down –(Form wizard, Datasheet, Modal Dialog and Pivotal Table) will be displayed from the pull down menu. Select Form wizard. Form wizard Dialog box will be displayed.
c. Select the name of table or query you want to create a form under Table/Query.
d. From the available fields in the Table/Query you have chosen, select the fields you want to add on your form by clicking > button or clicking >> to add all fields, then next.
e. The layout dialog box displayed select the layout you want to use e.g. Columnar, Tabular, Datasheet, and Justified. Click Next.

f. From the style dialog box, select the style you would like to use e.g. Access 2003, Access 2007, Vista, Apex, and Office etc. click Next.
g. In the form Title dialog box, type the name of the form then click Finish.

NB:-

From the option button displayed in the dialog box, one can open the form to view or modify the form design. Ms Access will automatically display the form on the screen.

Creating a form from scratch

a. Open a database.
b. Under Create select Form design icon displayed. A blank form in design view will be displayed.

To add controls onto a form;

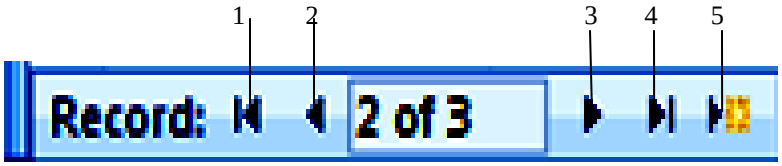
Forms can be made user-friendly by adding controls that are well defined and self-explanatory to the end user. Controls can also greatly improve the appearance of a form.

a. When in design view, display the form that you would like to edit.
b. Click Design from the menu bar. Under controls select one of the controls.
c. Drag and drop the various controls like check box, command button, option button, labels, logo, combo box, tab control, list box etc.
d. Save the form by clicking on the save button.

Data manipulation in a form

Adding and displaying records

- The form provides the user with navigation buttons located at the bottom that can be used to navigate the form as shown below:-



The functions of the buttons can be summarized as shown below

1. Displays the first record in the table.
2. Displays the previous record.
3. Displays the next record.
4. Displays the last record.
5. Used to add a new record.

Formatting controls

To format controls on a form:-

1. Open the form in design view.
2. To resize, click the controls then position the pointer on the outline of the control then drag to the required size.
3. To move, click control and position the pointer onto the place holder or inside control, then drag to the required location.
4. If you want to format the text by changing its color, bold, italic, font size and type; select the various formatting tools under **Font in Home menu.**

Removing controls

1. Open the form you wish to edit in design view.
2. Select the control you would like to remove and the Delete key.

NB: - *One must be careful when removing controls, since Access does not prompt you to verify the removal of some controls.*

Adding Graphics to Forms

Graphics and pictures can be used to add style to forms. Access provides the flexibility to add graphics files from a number of sources such as scanned pictures, Office clipart, and graphics created using graphics packages.

Steps:-

a. Open the form in Design View.
b. Under design, click the Image icon in Controls.
c. With the image pointer, click on hold while you drag a rectangle in the location the picture on the form.
d. From the Insert Picture dialog box, locate the folder that contains the graphics or image that you want to insert. Double click the file you want to insert.
e. Resize the image by dragging the handles.

CREATING SUBFORMS

- Sub-forms are used to display data from several tables that have a one-to-many relationship. The main form displays data from the parent table, and the sub-form from the child table. For example, to display all the items on one order, a sub-form would be used.

Steps for creating a sub-form

- Open the form in design view.
- Under design in controls, select sub-form/sub-report icon displayed.
- Follow the steps on the screen that will take you through sub-form wizard.
- Select the table/query from which you want to draw the data for the sub-form.

QUERYING A DATABASE

- Queries are the fastest way to search for information in a database.
- A query is a database feature that enables the user to display specific records as well as perform calculations on fields from one or more tables.

One can analyze a table(s) by using either a ***select query*** or an ***action query***. Select query is the one we shall discuss.

Select query

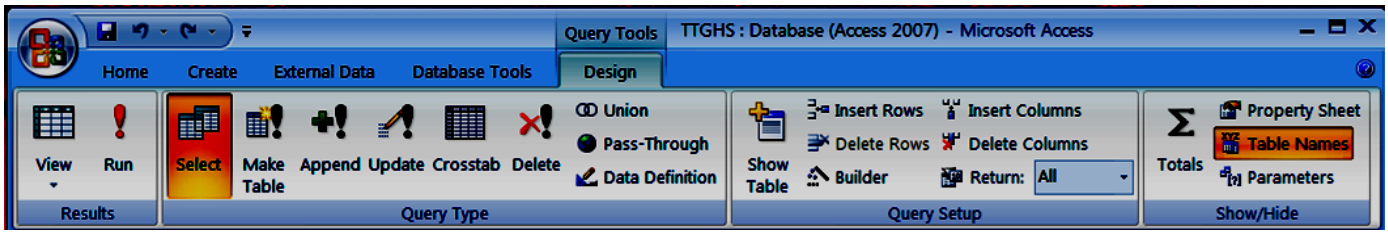
It is the most common type of query used for searching and analyzing data in one or more tables. Select query lets the user specify the search criteria and the records that meet those criteria are displayed in a dynaset or analyzed depending on the user requirements.

Action query

They are queries that are used to make changes to many records at once. They are mostly used to delete, update, add a group of records from one table to another, or create a new table from another table.

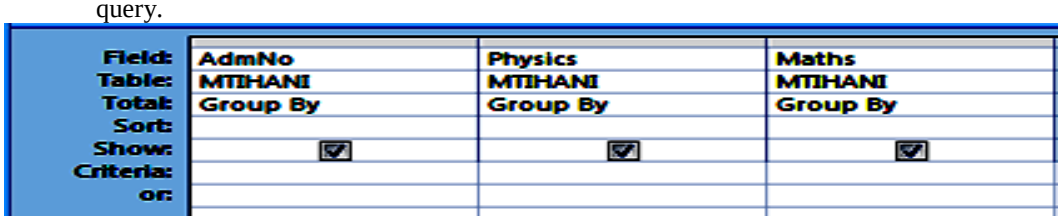
Types of action queries include:-

a. **Update query** – creates a query that will automatically make changes, to records that match users specifications.
b. **Append query** – adds data in a table from one or more tables.
c. **Delete query** – deletes specified records from one or more tables.
d. **Make table query** – creates a query that will make a new table with the data that fits users criteria.



Creating a select query

a. Ensure that the database you want to create a query for is open.
b. Click Query design under Create on the menu bar. One can also choose query wizard.
c. To design from scratch, click query design. Show table dialog box appears from which you can add a table(s) you wish to create a query from.
d. Click the table from the table/query list and then click Add.
e. Click close to close Show table dialog box.
f. The query design grid opens. In Ms Access it is called Query-by-Example. This allows the user to design a query.



Parts of the query grid

Field row – fields from a table(s) to be used are arranged in this row. Each field occupies its column.
Table row – indicates the table providing the fields.
Sort row – clicking the down arrow inn the sort cell, one can specify the sort order i.e. ascending, descending or no sort.

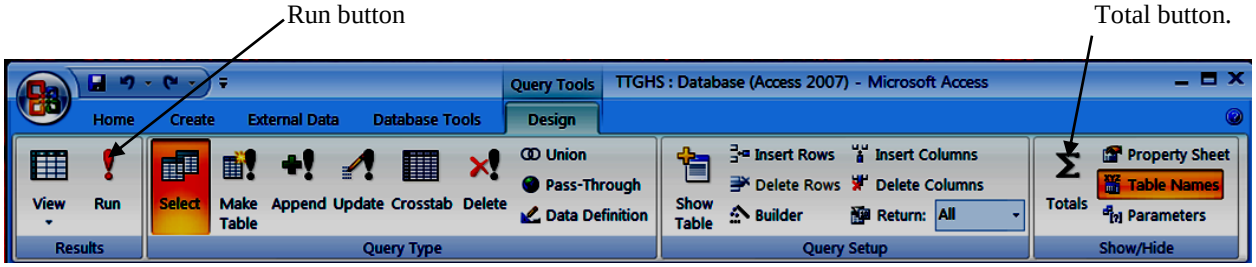
Show row – clicking the show box, one specifies whether to display the field in the query results. If the box is not checked, the field will not be displayed.
Criteria row – these is where one types conditional statements that will be used by the query to display specific records.
Or row – used to specify an alternative condition e.g. if you want to display records with a field called Schools, with items **Alliance or BG Ngandu**, type **Alliance** in **criteria cell** and **BG Ngandu** in the **Or** cell.
Total row – allows one to group data in the active query or perform summary calculations. Some of the calculations one can perform includes: - sum, count, average, minimum, maximum, standard deviation etc.
To add fields into the query grid:-
Open the query in design view.
From the field list of the underlying table, drag each field and place it in the field row.

Specifying the search criteria

- One must enter conditional statements in the criteria row when searching for a particular set of records. For example from the employees table; salary field – one can display all people who are earning more than 15,000 by typing >15,000 in the criteria row, salary column.
- When defining criteria, use either relational or logical operators. ***Relational operators*** include: - less than (<), greater than (>), greater than or equal to (<=), not equal to (< >) and equal to (=). Logical operators include: - AND, OR and NOT.
  AND – used when one wants to display values in a specific range. Example, to display records from the employees table with salaries above 30,000 but less than 60,000, type, >30,000 AND <60,000 on the criteria row in the salary column. All the employees meeting the condition will be displayed.
  OR – used when one wants to get either one of two values. Example, to display employees who are either in Nairobi OR Embu.
  Between – used when one wants to display data in a particular range. Example, instead of typing, >30,000 AND <60,000, type Between 30,000 And 60,000.
  NOT – used when one wants to list all records except those that one does not want to see. Example NOT 60,000 in the salary column of the employees table, all employees' records will be displayed except those with their salary as 60,000.
  LIKE – used to display records that one is not sure of the field name but at least he/she can remember a few characters. One can also use ***wildcards***.
  Wildcards are special symbols mostly an asterisk and a question mark used in place of other characters.
  Example –to display all names starting with "Sm" followed by other characters, type **Like Sm?**
  Like*/*/2008 lists records created in 2008 regardless of the day or month.

Saving and running the query

Click the save button on the standard toolbar or save command from the Office button drop down list.
In the name box that appears type in the name of the query then click Ok.
To run the query in design view, click the Run button on the toolbar as shown below.



Run Query

You can also view the results of your query any other time by selecting the query, then clicking the Open button from the database window.

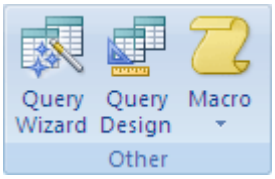
Sorting the dynaset

To sort a dynaset:

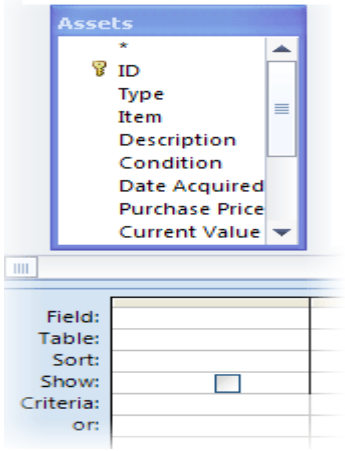
1. In the sort row, click the down arrow that appears to specify the sort order i.e. *ascending or descending* of the desired field.
2. Display the dynaset.

Creating a select query

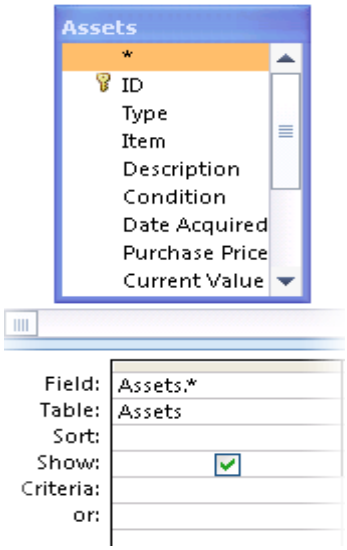
a. Open the database that contains the records you want to update.
b. On the Create tab, in the Other group, click Query Design.



c. The query designer opens, and the Show Table dialog box opens.
d. Select the table or tables that contain the records you want to update, click Add, and then click Close.
e. The table or tables appear as one or more windows in the query designer, and the windows list all the fields in each table. This figure shows the query designer with a typical table.



f. Double-click the fields that you want to update. The selected fields appear in the Field row in the query design grid.
g. You can add one table field per column in the query design grid.
h. To add all the fields in a table quickly, double-click the asterisk (*) at the top of the list of table fields. This figure shows the query design grid with all fields added.



Optionally, you can enter one or more criteria in the Criteria row of the query design grid. The following table shows some example criteria and explains the effect they have on the results of a query.

Note:-

Many of the examples in this table use wildcard characters to make the query more flexible or powerful.
For more information about using wildcards in your queries, see the article Access wildcard character reference.

Criteria	Effect
>234	Returns all numbers greater than 234. To find all numbers less than 234, use < 234.
>="Cajhen"	Returns all records from Cajhen through the end of the alphabet.
Between #2/2/2007# And #12/1/2007#	Returns dates from 2-Feb-07 through 1-Dec-07 (ANSI-89). If your database uses the ANSI-92 wildcard characters, use single quotation marks (') instead of pound signs (#). Example: Between '2/2/2007' And '12/1/2007' .

Not "Germany"	Finds all records where the exact contents of the field are not exactly equal to "Germany." The criterion will return records that contain characters in addition to "Germany," such as "Germany (euro)" or "Europe (Germany)".
Not "T*"	Finds all records except those beginning with T. If your database uses the ANSI-92 wildcard character set, use the percent sign (%) instead of the asterisk (*).
Not "*t"	Finds all records that do not end with t. If your database uses the ANSI-92 wildcard character set, use the percent sign (%) instead of the asterisk (*).
In(Canada,UK)	In a list, finds all records containing Canada or UK.
Like "[A-D]*"	In a text field, finds all records that start with the letters A through D. If your database uses the ANSI-92 wildcard character set, use the percent sign (%) instead of the asterisk (*).
Like "*ar*"	Finds all records that include the letter sequence "ar". If your database uses the ANSI-92 wildcard character set, use the percent sign (%) instead of the asterisk (*).
Like "Maison Dewe?"	Finds all records that begin with "Maison" and contain a 5-letter second string in which the first 4 letters are "Dewe" and the last letter is unknown. If your database uses the ANSI-92 wildcard character set, use the underscore (_) instead of the question mark (?).
#2/2/2007#	Finds all records for February 2, 2007. If your database uses the ANSI-92 wildcard character set, surround the date with single quotation marks (') instead of pound signs (#); for example, ('2/2/2007').
< Date() - 30	Uses the Date function to return all dates more than 30 days old.
Date()	Uses the Date function to return all records containing today's date.
Between Date() And DateAdd("M", 3, Date())	Uses the Date and DateAdd functions to return all records between today's date and three months from today's date.
Is Null	Returns all records that contain a null (blank or undefined) value.
Is Not Null	Returns all records that contain a value.
""	Returns all records that contain a zero-length string. You use zero-length strings when you need to add a value to a required field, but you don't yet know what that value is. For example, a field might require a fax number, but some of your customers might not have fax machines. In that case, you enter a pair of double quotation marks with no space between them ("") instead of a number.

On the Design tab, in the Results group, click Run.

Modifying and updating a query

To delete fields from the query grid:

i. Open the desired Query in design view
ii. Select the field column you wish to delete
iii. Choose delete columns under Query set up as shown on the diagram above.
iv. Click the Save button to save the changes.

To adjust the column size in a query

i. Open the desired query in design view.
ii. Position the mouse pointer at the boundary that separates columns, then drag it to the required size. Alternatively, double click the boundary to *autofit* cell content.
iii. Click the Save button to save the changes.

To modify a criteria statement, select query:

i. Open the desired query in design view.
ii. Modify the criteria statements as desired
iii. Click the save button to save the changes.
iv. To test whether the changes have been effected, click the Run button to display the results of the query.

Performing calculations in a query

Unlike tables, queries let the user perform mathematical calculations on numeric data. You can perform calculations in a query by using the Total functions or by creating basic formulas.

Creating basic formulae

To create a formula that calculates the total marks in an underlying table e.g. *Exams table*

1. Open the query in design view.
2. In an empty cell, type an expression that includes a field name such as
   Total: ([Physics]+[Maths]+[Chemistry]+[Computer studies]) shown in the diagram below.
3. You can then set the criteria, and other query options.
4. Save the query and run it. The results of the calculations will be displayed in the dynaset as shown in figure number two. However, this field is not added to the underlying table(s) because query results must always be based on the most current data in the database.

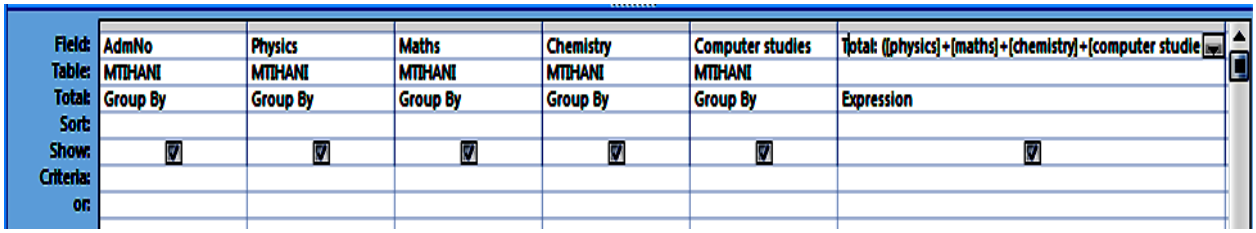


Fig. 1
Creating calculated field

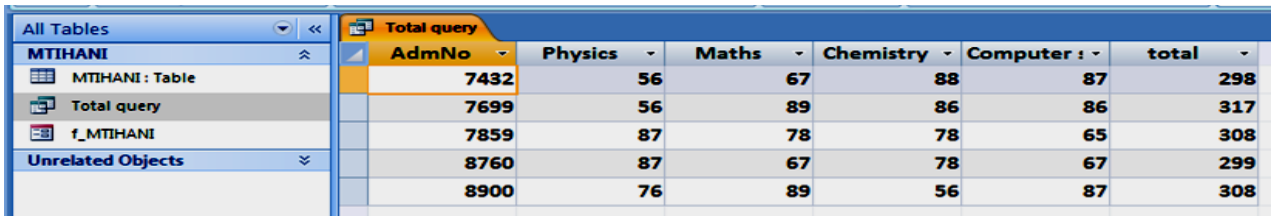


Fig. 2
Results of the calculated fields

Using Total functions

- With a query, one can analyze all record fields using the inbuilt functions such as Sum, Average, Minimum and Maximum etc.

To use the total functions:

1. Open the query in design view.
2. Click the Totals button on the query toolbar.
3. Select the field you want to analyze.
4. For each field to be analyzed, click its cell in the Total row, and then select any of the functions.
   Sum: - adds all the numerical data items.
   Avg: - calculates the mean of all numeric data items in the field column.
   Min: - returns the minimum value from the field column.
   Max: - returns the maximum value from the field column.
   Count: - returns the number of items field column.
5. Set criteria and other options, then click run to preview the results.
6. Save the query.

Printing a query

i. Open the database window of the database containing the query you want to print.
ii. Select the query you want to print and then open the query.
iii. On the Office button drop down list, click print. Set the printing options then click OK button.

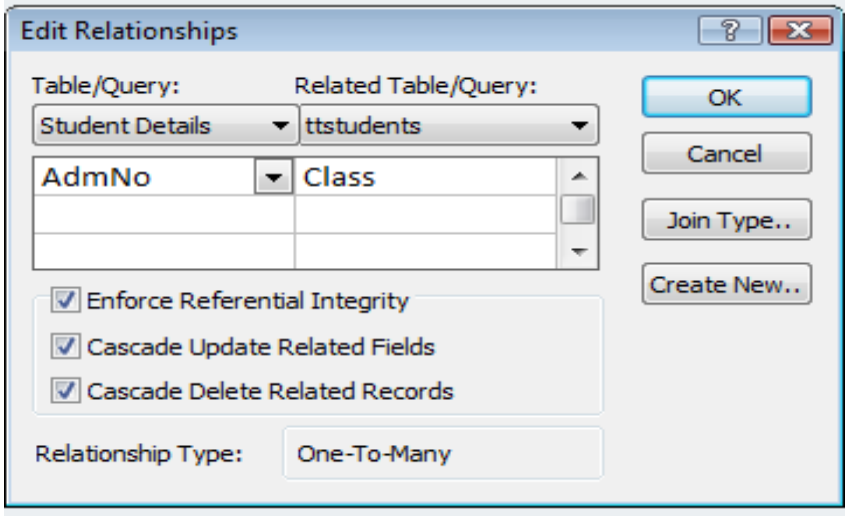
Creating queries based on multiple tables.

If the fields used come from more than one table in a query, there should be a common link between the tables. There are three types of relationships one-to-one, one-to-many, many-to-many.

a. ***One-to-one relationship***: - for a particular field in one table (the main table), there is only one matching record in the related table and vice versa.
b. ***In a one-to-many relationship***, for a particular field in one table, there are several matching records in another table. It is the most common type of relationship. Example, a person can make one order, or several orders. In this case, there is only one record with that person's details say in customers table, yet there are several records related to the same person in the Orders table.
c. In ***a many-to-many relationship***, for particular records in one table, there are several matching records in the other table and vice versa. This is not common.

Defining relationship between tables

a. Make sure the database is open.
b. Select Database tools on the menu bar. From the menu displayed select **Relationships**. The relationship dialog box will appear (show table).
c. Select the table to add, then click the Add button.
d. To create relationship, click on the common field and drag it to the second table. ***The fields used to create the relationship must be of the same type and properties***.
e. To Enforce Referential Integrity, under Design from the menu bar, Under Tools select edit relationship. Alternatively, right click the line joining the two tables, then click Edit. An Edit relationship dialog box will be displayed.
f. Make sure Enforce Referential Integrity is checked to ensure that all records entered in the related table exist in the primary table.
g. Click Ok to close the Edit relationship dialog box.



Edit relationship dialog box.

To create a query based on related tables:-

i. Start the database window and click the Query design.
ii. Select the design view and then click OK.
iii. From the show table dialog box, click the tables you want to base your query on and then click Add.
iv. Relationship between various tables will be displayed.
v. Save and Run the query.

Creating reports and labels

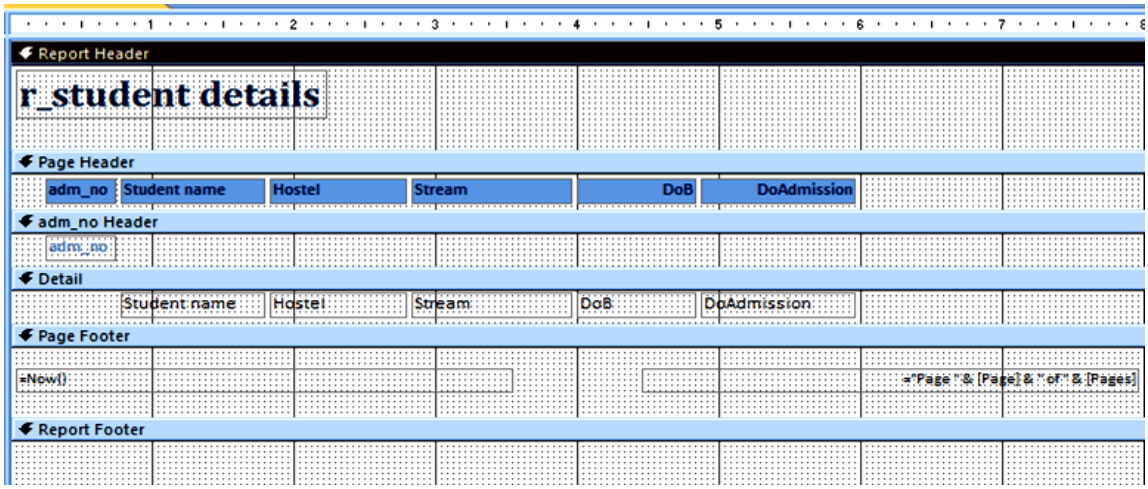
Reports are used to summarize and present information from a database while labels are used for identity purpose. A good database software should enable the user to generate reports and labels.

Creating reports

Like in forms, a report layout is also designed by placing controls on to the report designer as shown below.

Parts of a report

a. ***Report header*** – this contains unbound controls that display title of the report.
b. ***Page header*** – contains heading or labels data items to be displayed in every column.
c. ***Detail*** – holds bound controls that display data items for the table or query it was created from.
d. ***Page footer*** – holds a control that is to be displayed on every page such as the page number and date. For example ***=NOW ( )*** displays the current date and time as set in the system clock.
e. ***Report footer*** – used to display summary from a report such as the grand total for numerical data in a particular field column.



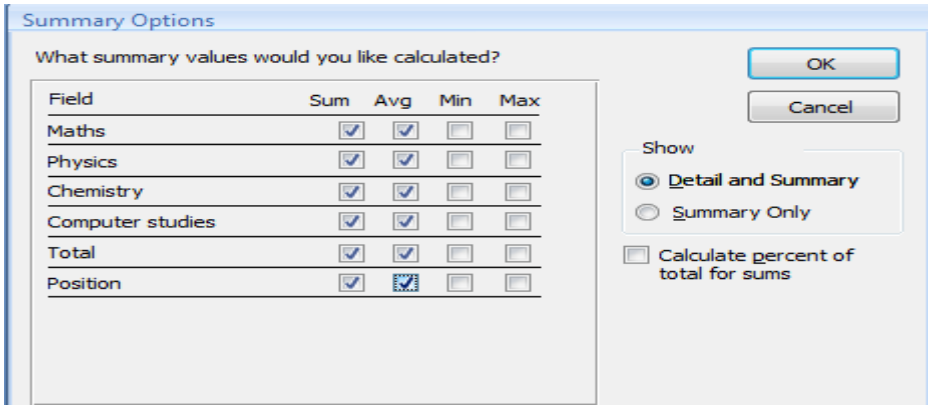
Report layout designer

Creating a Report using report wizard

Report wizard takes the user through a number of steps by answering a few questions and Ms Access automatically does the rest.

To create a report layout

1. Ensure the database is open.
2. Click the Report Wizard under Reports in the Create menu.
3. In the Report wizard dialog box displayed, select a table or query, then the fields to be added to the report then click Next.
4. The wizard asks you whether you wish to add grouping. Grouping is used to classify records using a particular field. For example, to categorize Student Admission number in a school database according to Admission number double click the field, then click next.
5. In the dialog box that appears, select the Sort option if you want to sort the records. Click the Summary options button in case you want Ms Access to perform calculations on numerical fields.
6. In summary options dialog box, select the Summary options you want to performed e.g. Sum, Average, Max and Min as shown in the diagram below.
7. Click OK to close the summary options dialog box, and then click Next.



8. In the layout dialog box, select the type of layout such as stepped and the click Next.
9. In the style dialog box, specify the report style by selecting Access 2007, Access 2003, Office, Metro, Module, Median, Foundary, Windows Vista etc
10. Finally enter the name of your report, and then click Finish. The report will be displayed on the screen in print preview mode.

Creating a report in design view

Just like forms, one can create a report in design view by placing controls on the design grid.

Steps for designing a report in design view.

- In the database window, click Blank Report under Reports.

- A blank report will be opened which will be displayed in Layout view. The available fields in other tables will be displayed.
- Drag each field from the field list to the layout grid and drop it where you want the data column to appear.
- Click Save button after placing the controls.
- In the Save As dialog box, enter the name of the report and click Ok.
- To view the report, click View under Home menu. Select Print Preview from the pull down menu.

Sorting and Grouping

- Sorting and grouping allows one to organize information in a neat and easy-to-read manner. If a report wizard is used, it will prompt the user to specify how the records should be grouped and/or sorted.
- By default, if one groups data in a field; data will be sorted by that field. One needs to group similar records in order to perform any calculations on the group.

Example:-

- A report for overall student performance, one can group the marks by subject and by class. This enables one to determine the overall performance of every class and the subject average.

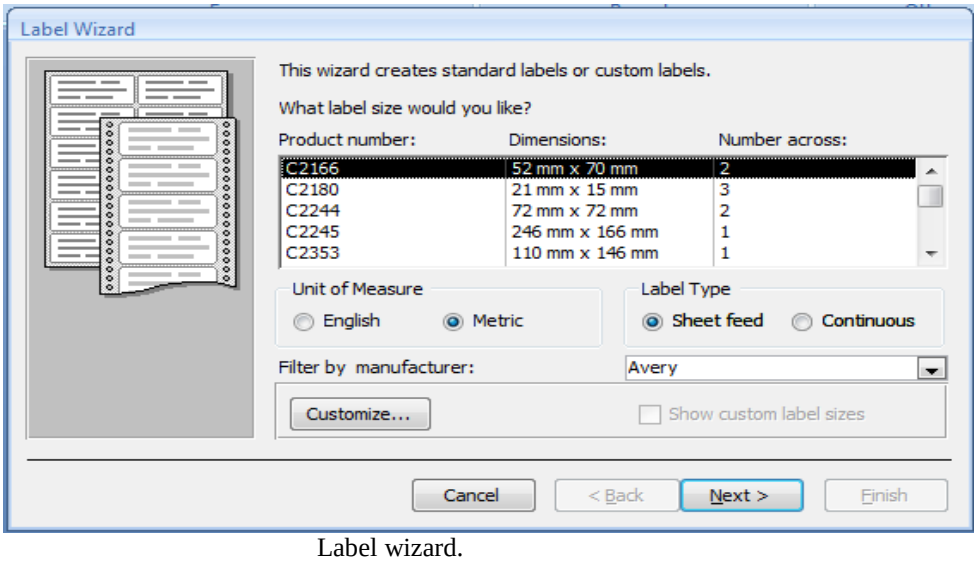
Using sorting and grouping feature:-

Creating labels

- A label is a sticker or piece of paper put on an item for the purpose of identification. Examples of stickers are mailing labels, label on the floppy disk where you write your name etc.
- Using the report label wizard, Ms Access lets you easily create labels of different sizes.

Steps

a. Open your database
b. On the database window, click Create on the Menu bar; under Reports select Labels.
c. In the resulting label wizard dialog box, specify the label size and then click Next.
d. From a series of dialog boxes displayed, specify the label size, font, text color, choose the fields to be included on your mailing label by clicking the arrow > to move to the Prototype label.
e. You can sort your labels by one or more fields in your database by clicking > or >> and then click Next.
f. Enter the name of the ***Label*** then click Finish.



Label wizard.

Modifying labels

The way you modify a report or form, one can also modify a label by manipulating the layout controls.

Steps:

a. On the database window under Reports in the Create menu, click Labels or Open existing label and then click Design View button under View.
b. The label design grid will be displayed. Edit the layout as desired, save and close the design grid.
c. To view the modified label, click the Preview button under the View button.

Printing the reports and labels

Before printing a report or a label, one must set the page options i.e. the margins, paper size and orientation.

a. Open the database that contains the report you want to print.
b. Select the Report you want to print, and then click the Preview button under View.
c. On the Office button, select print from the pull down menu.
d. Set the printer options i.e. the printer type, print range and number of copies.
e. Click Ok to print.

USING ADVANCED ACCESS FEATURES.

Creating Macros

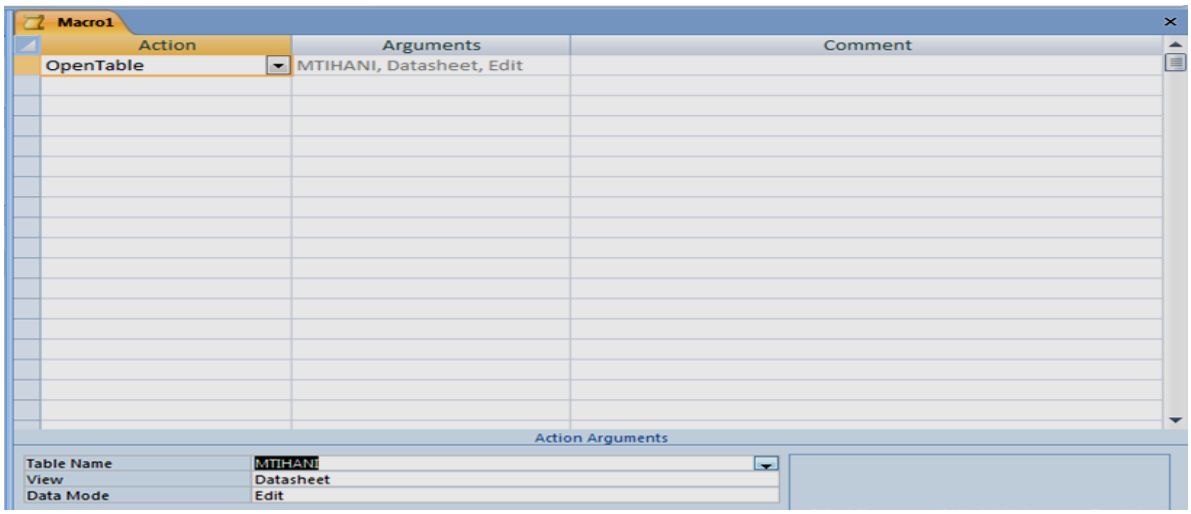
- A macro is a set of one or more actions used to automatically perform particular operations such as opening a form or printing a report. Macros are used to automate database application.

Advantages of using a macro:-

i. It saves time by automating tasks that are both routine and repetitive.
ii. It reduces errors and increases accuracy, ensuring that tasks are performed consistently.
iii. It makes the forms and reports user-friendly by adding command buttons (that represent macros) that will enable users to easily manoeuvre between several objects.
iv. Automating the exporting and importing of data to and from outside sources, such as Excel.

To create a macro:-

i. In the database window, click the Macros button. Macro design will be displayed as shown below.
ii. In action column, click to add an action e.g. OpenTable. In the lower part, specify arguments settings for the action in Action Argument box.
iii. Type an optional comment for the action.
iv. Add more actions to the macro. Actions are executed in the order you list them.
v. Save the macro and run.



Macro design

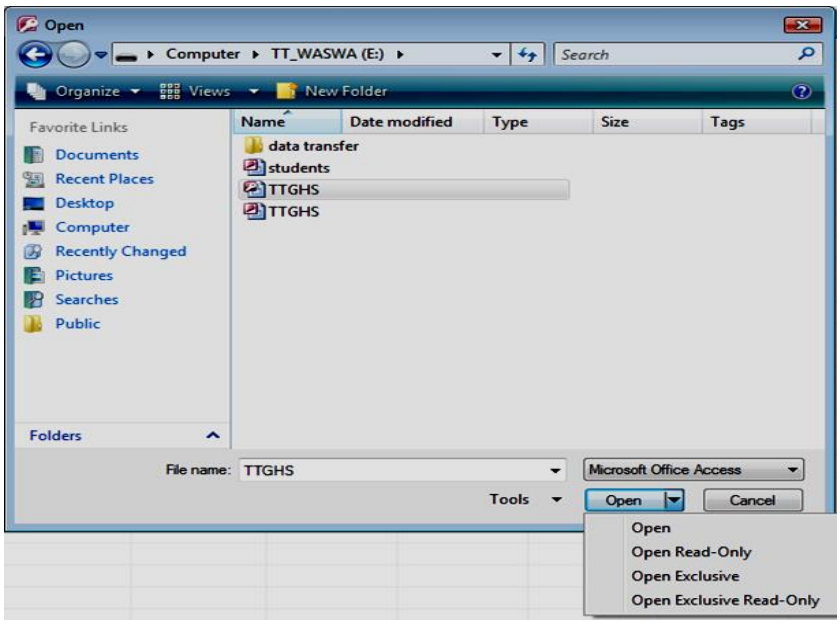
Enforcing database security

Ms Access provides the user with several data security tools such as encryption, password protection, hiding database objects and user level security.

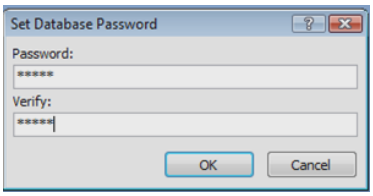
Password protection of a database

A password protected database displays a dialog box that requests the password for opening. To set up a password:

a. Open the database in exclusive mode as shown in the diagram below.
b. On the Database tools menu select Set Database Password.
c. In the Password box, type in a Password.
d. Re-enter the password in the verify box, and then click OK.



Open a database exclusively



Encrypting a database

Encryption compacts a database file and makes it indecipherable by a utility program or a word processor especially on a networked environment. Encrypting a database does not restrict access to objects by users. To encrypt a database:

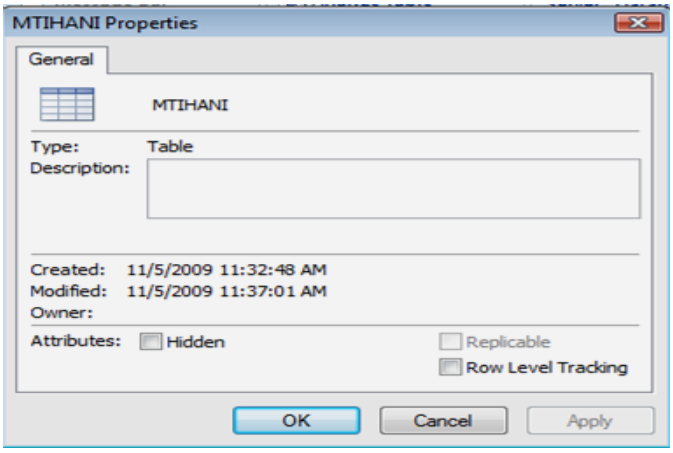
i. Start Ms Access without opening a database because you cannot encrypt or decrypt a database when it is open.
ii. On the Database tools menu, select Encode and Decode database.
iii. In the dialog box that appears, select the database you want to encode or decode and then click OK.
iv. In the Encrypt database dialog box that appears, specify the location and type the file name for the encrypted or decrypted database, and then click Save.

Hiding database objects

i. Hide tables, queries, forms and reports and macros from casual users. This method of protection is the least secure because it is possible to unhide the objects.

To hide objects:-

i. On the Show/Hide list under the Database Tools menu, select Property sheet.
ii. In the dialog box that appears, check Hidden.
iii. Click Apply, and then OK.



Hiding database objects

User level security

This is the most extensive security method especially on a multi-user environment. A database Administrator can grant specific users or groups' specific permissions and privileges to tables, queries, forms, reports and macros.
To assign user rights and privileges:

Open the database

- **a.** On the Database tools under Administer Select User and permissions; from the pull down menu select User Level Security wizard, security wizard dialog box will be displayed and then click Next.
- **b.** Enter the name and workgroup ID (WID) you want for your workgroup information file. One can enter the name and company (optional). You can make this default workgroup information file or create shortcut to open security-enhance database.
- **c.** Select objects you want to secure e.g. ***tables, queries, macros, forms, reports, other or all objects***, and then click Next.
- **d.** Select the groups you want to include in your workgroup information file e.g. Full permissions – the group has full permissions on all database objects but can't assign permission to other users. Click Next.
- **e.** If you want to grant the Users group some permission or not you select one of the option buttons. (Yes/No) and then click next.
- **f.** Click finish after going through the entire process.

Setting up startup options

To customize your database application workplace, there is need to specify how the database is to be loaded.
To set the startup options:-

i. On the tools menu, click startup
ii. In the startup dialog box, set startup options e.g. application title, startup object and other application window options and then click Ok.

END OF THE TOPIC