

An Introduction to Microsoft Access

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1. Introduction:

Microsoft Access, henceforth referred to as Access, is an RDBMS (Relational DataBase Management System) for the PC platform and is part of the *Microsoft Office* suite. The database applications for Access may range from personal applications, such as maintaining an inventory of your personal book collection, to small business applications, such as maintaining business-specific customer information.

Access provides a database engine called the *Microsoft Jet Engine* and a graphical user interface (GUI) for data definition and manipulation, with the power of SQL (Structured Query Language). It also provides a programming language called *Access Basic*. Users can quickly develop forms and reports for input/output operations against the database through the use of *Wizards*, which are interactive helper programs. The definition of the forms and reports is interactively accomplished when the user designs the layout and links the different fields on the form or report to the items in the database.

2. Architecture of Access:

The two important components of Access are:

- i The underlying database engine for managing the data
- i The user interface, which calls the engine for data services like storage

The engine stores all the application data (tables, indexes, forms, reports, macros, and modules) in a single Microsoft database file (.mdb file). The user interface provides *Wizards* and *Builders* to aid the user in designing a database application. *Builders* are interactive programs that help the user build syntactically correct expressions. The programming model used by Access is event driven. The user builds a sequence of simple operations, called *macros*, to be performed in response to actions that occur during the use of the database application. While some applications can be written in their entirety using macros, others may require the extended capabilities of Access Basic, the program language provided by Access.

3. Elements of an Access Database:

The elements in Access are referred to as *objects* and includes:

- F **Tables:** For data holding
- F **Queries:** For data manipulation and information retrieval
- F **Forms:** For data entry, data viewing and data editing
- F **Reports:** For customized data summary and printouts
- F **Macros:** For task automation
- F **Modules:** For database customization using Visual Basic for Applications (VBA)

4. Data Types in Access:

The various data types available in Access are:

- F **Text:** To hold up to 255 alphanumeric characters
- F **Number:** To hold numeric data. Has various sub types like byte (range is 0-255), integer (range is -32768 to 32767), long integer (range is -2,147,483,648 to 2,147,483,647), decimal, single and double (the last three for holding real numbers).
- F **Autonumber:** A unique sequential (incrementing by 1) or random number is automatically inserted when a record is added. Commonly used as a key field to uniquely identify records.
- F **Currency:** For monetary data
- F **Yes/No (Boolean):** For holding data with only two possible values – true/false or yes/no
- F **Date/Time:** For holding date and/or time related data
- F **Memo:** For holding notes of up to 64000 characters

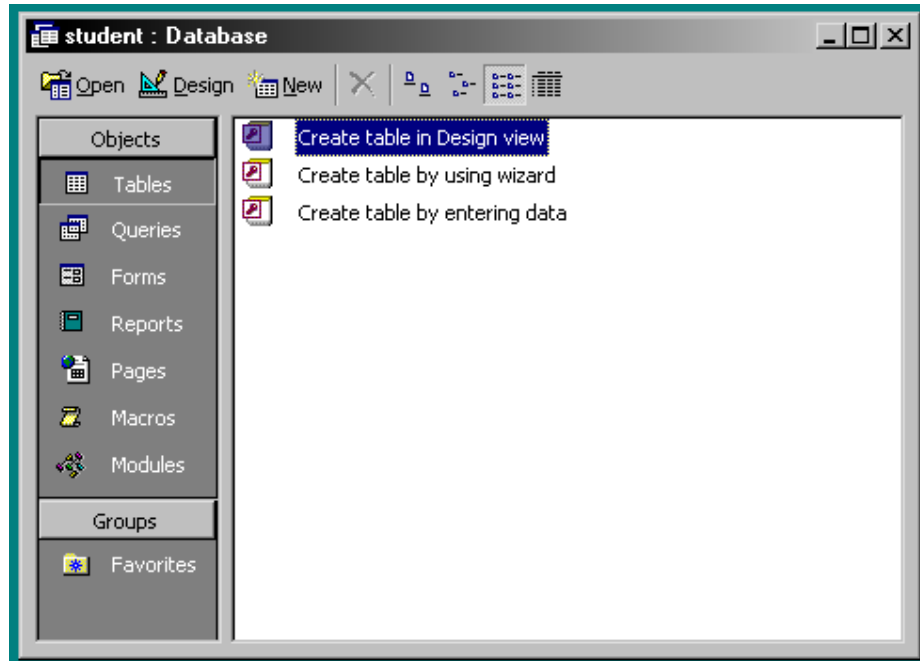
5. Working with Access:

This tutorial in spite of being general, is particularly based on Microsoft Access 2000, and explores its features. The first job is of course of creating the database, i.e., the underlying tables. For data entry, customized forms may be created. Queries and reports help in retrieving required information.

We start by creating a *Student Database* where we have two tables – the first table will be called *student_info*, containing personal details while the second table will be called *student_course_info*, containing information on the course he/she is pursuing. The fields in the *student_info* table will be *stuid* (number), *name* (text), *dob* (date) and *address* (text), *day_scholar* (boolean). The fields in the *student_course_info* will be *stuid*(number), *course_name* (text), *fees*(currency) and *remarks* (memo). The tables have been intentionally kept to the bare minimum, but will be sufficient for what is intended to. The parentheses specify the data type for each field name.

5.1 Creating the Database:

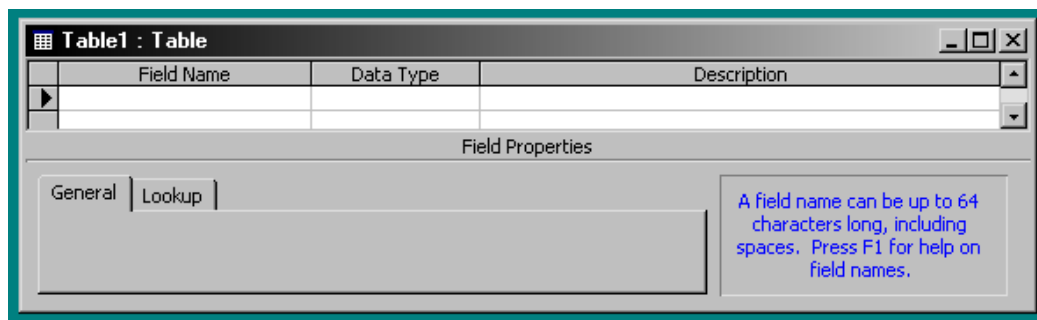
On first opening Access, you can either open an existing database or create a new one. We select the later. Name the database as *student* and click on the **create** button. You are shown with the *student* database as shown below:



5.1.1 Creating the Tables:

You have three options by which you can create the tables. *Create table by using wizard* is helpful for creating tables based on some pre-existing table structures already maintained by Access. *Create table by entering data* is similar to that of entering data in an Excel datasheet. *Create table in design view* is the most advanced form of creating tables with lot of flexibility and control for the creator. This is the one followed in this tutorial.

On selecting *create table in design view*, you are presented with the following screen.



Enter the field names, the corresponding data type and you can even enter some notes on that particular field in the description box. You can alter the various properties of the data types from the

General tab or stick to the default. All done, define *stuid* as the primary key and save the table as *student_info*. Similarly create table *student_course_info* without any primary key (Not assigning any primary key is against the principles of database design, but a default primary key can be shown to be already existing).

5.2 Setting the Relationships:

For multiple tables in a database, it is imperative that you define the relationships that exist between the various tables. In the case of the *student* database just created, there is a *one-to-many* relationship between the tables, *student_info* and *student_course_info*. This is because. A student may be opting for more than one course.

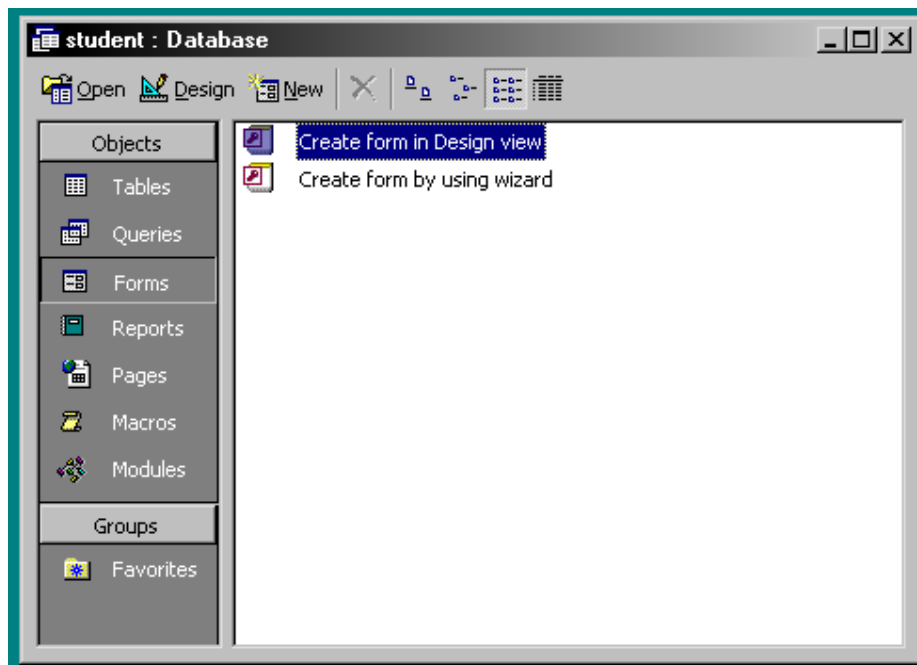
To define the relationship, you have to open the *Relationships* window. This can be done by any of the following:

1. Right-click anywhere in the *student* database window and select *Relationships*.
2. Press the *Relationships* button on the toolbar.
3. Select *Tools, Relationships* from the menu bar.

Once the *Relationships* window is open, you have to add the tables to the window. After this is done, select the *stuid* field from the *student_info* table and drag it to the *stuid* field in the *student_course_info* table. A *one-to-many* is automatically created, as we didn't define any primary key in the second table. Had *stuid* been declared as a primary key in the second table also, the relationship would have been automatically defined as *one-to-one*.

5.3 Entering Data into the tables:

Data may be entered directly into the tables just created or you can create customized forms to enter the data. To create the forms, click on the *Forms* object in the *student* database window. You are presented with the following screen:



Creating forms in design view, though being very flexible is a tough task to begin with. It is better to stick with the second option, which is sufficient for most common needs. The process is straightforward and you have to carefully follow the instructions presented by the Form Wizard. In our case, the only thing you have to keep in mind is that, whether you want to create two separate forms for the two tables or a single one. It is advisable to create a single form because in that case, you don't have to worry about entering the same data for the same fields appearing in the different tables like the *stuid* field which appears in both the tables *student_info* and *student_course_info*.

You are now ready to enter the data through the forms just created. Enter sufficient data so that you are comfortable while making the *queries* and printing the *reports*.

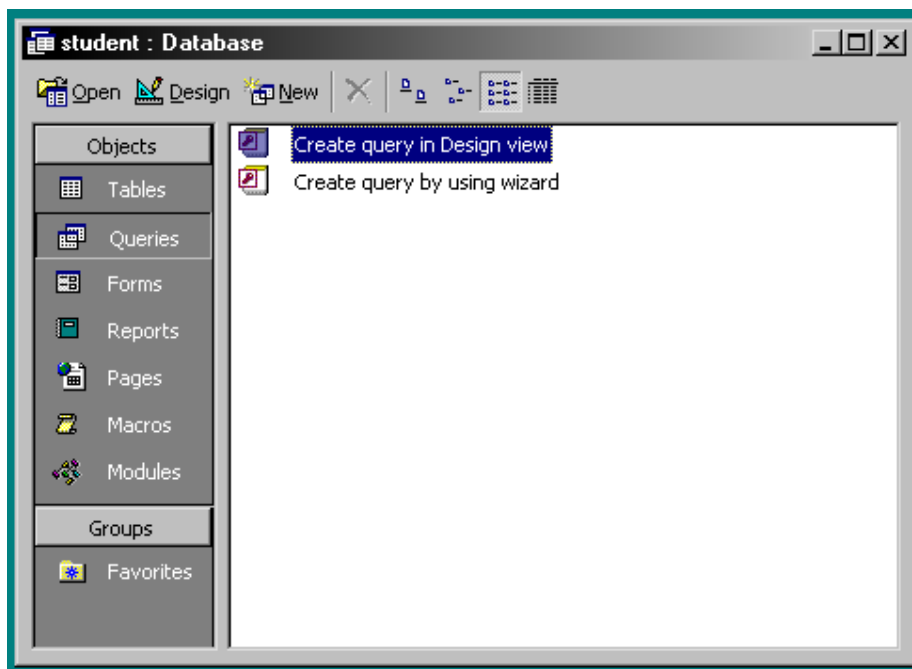
5.4 Understanding Queries:

Queries are the most important aspect of any database, as they help us to filter data and get useful information. A *query* can be simply defined as a request to find records satisfying a given criteria set. But, in Access, the word *query* not only refers to the question but also to the resultant *object*, a set of records.

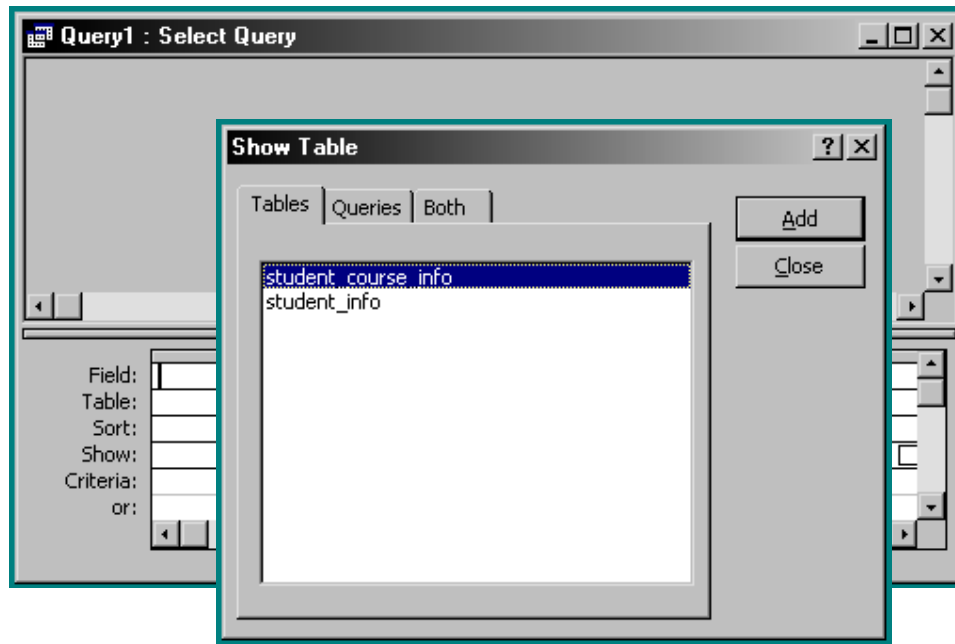
There are six different types of *Query* in Access, each used for different purposes. They are:

- i **Select Query** - A select query is the most common type of query. It retrieves data from one or more tables and displays the results in a datasheet where you can update the records (with some restrictions). You can also use a select query to group records and calculate sums, counts, averages, and other types of totals.
- i **Crosstab Query** – Crosstab queries calculate a sum, average, count, or other type of total for data that is grouped by two types of information —one down the left side of the datasheet and another across the top.
- i **Make-table Query** - Creates a new table from all or part of the data in one or more tables.
- i **Update Query** – With an update query, you can change data in existing tables.
- i **Append Query** – Adds a group of records from one or more tables to the end of one or more tables.
- i **Delete Query** - Deletes a group of records from one or more tables.

The last four queries are also called *Action Queries*. There is another query called a *Parameter Query*, which is a special type of query. A parameter query is a query that when run displays its own dialog box prompting you for information, such as criteria for retrieving records or a value you want to insert in a field. You can design the query to prompt you for more than one piece of information; for example, you can design it to prompt you for two dates. Access can then retrieve all records that fall between those two dates.



Create query by using wizard is not a great way of writing queries, as the facilities provided by the wizard are minimal. *Create query in Design view* is what you need to make your queries flexible and make them work in a controlled manner. You are presented with the initial screens as shown below. As seen, you are required to add the necessary tables, other existing *queries*. One thing now becomes clear that, you can use other *queries* as a base for forming new *queries*. Great!



You now have to build the *query* by entering the required fields, whether they will be showed or not when the query is run, sorting required or not and most importantly the criteria(s). To set the criteria, you need to have some knowledge about the relational operators like $>$, $<$, etc., the logical operators like not, or and, etc. If you have knowledge about SQL, then working with complex *queries* is relatively easy.

Finally you have to run the *query* by going to the *run* option in the Query option in the main menu that is displayed when you are working with the *Select Query* window. The other way is to directly click at the run (!) button.

The type of the query can be selected by going to the Query option in the main menu. The rest is nearly the same as that of the *Select Query*.

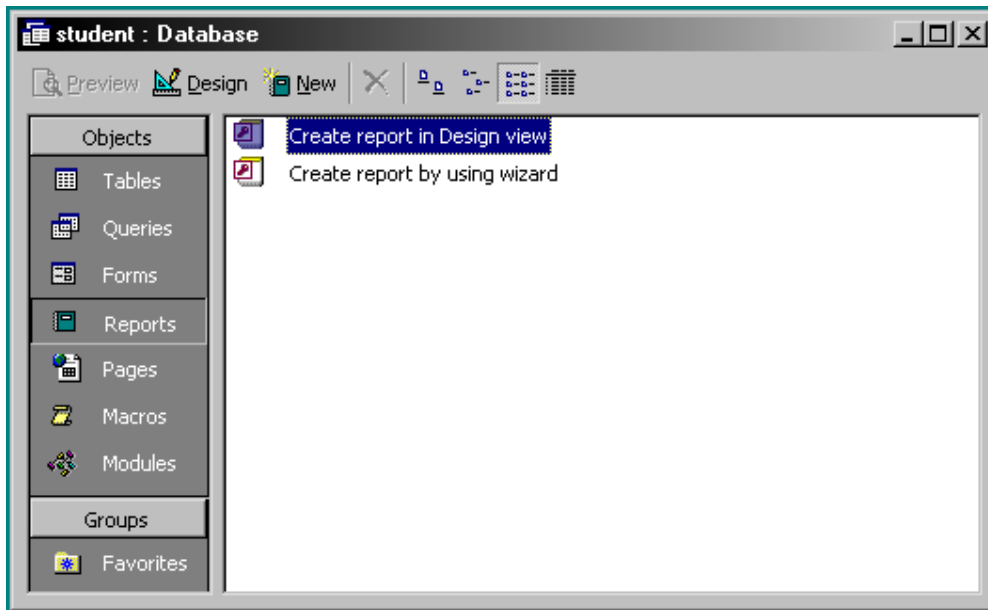
It is just about some practice and patience before you become proficient in designing and executing your *queries*. Just keep the faith!

5.5 Reports as a Tool for Displaying Information:

A report is an effective way to present your data in a printed format with the necessary customizations. The source of the data contained in the report is the underlying table(s) or in many cases *queries*.

Create report in Design view is difficult to start with, the same as the one with *forms*. So, we adapt to the more friendlier way – *Create report by using wizard*. Follow the instructions as per the *Report Wizard* and your report will be ready. Take the printouts if you so desire and relax!

Printing of reports is similar to that of taking any general printout. Before taking the printout, page setting is done to set the margins etc. This is done by selecting the report in question and then selecting *Page Setup..* from the *File* option in the main menu.



Before we end this tutorial, one thing should always be kept in mind that Access has a very handy and elaborate *help* system. Whenever you are in doubt just pressing the F1 key is sufficient in most cases. Or you may go to the *Help* option in the main menu. Or better still, you can just key in your requirements after clicking at the *Office Assistant* which always keeps floating around! Learning to use the *help* system is the key to understanding Access better. Take my word for it.