6 INTRODUCTION TO THE *ACCESS* DATABASE
Keeping student records

LEARNING OUTCOMES

In this tutorial you will learn about databases in general and about the *Office 2016 Access* database in particular.

The concept of a database is not quite as easy to grasp as that of a word processor or a spreadsheet. So if this is the first time you are learning about databases you might like to read over the lesson first, away from the computer, and perhaps highlight the text to ease understanding.

Specifically, this tutorial will introduce you to the following:

- the general idea behind a database
- planning a new database
- creating a database template
- adding records to a new or existing database
- viewing the data in a database
- clearing entries and records from a database
- making a backup copy of a database

A caveat before you begin: You'll find it easiest to use the tutorial if you follow the directions carefully. On computers there are always other ways of doing things, but if you wander off on your own be sure you know your way back!

6.1 AN OVERVIEW OF THE DATABASE CONCEPT

Access[1]—the database component of Microsoft *Office 2016*—is designed to help an organization collect, organize, manage, and access institutional data in such a way that it can be quickly accessed and made available to users in a variety of useful ways. Not unlike a *manual* filing cabinet, a database enables you to:

- collect together sets of related data and, as long as you are careful and conscientious, keep the data organized;

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[1] *Access* is a professional-strength object-oriented relational database management system.

• update the data once you've collected them, adding or deleting records, sorting them, or changing the contents of existing records.

But as anyone who has had to maintain a *manual* filing cabinet knows, keeping things both current and accessible—in a desired chronological, alphabetical, or topical order, for example—*by hand* can quickly become a nightmare if maintenance is not carried out with great efficiency and considerable care.

A database, however, is an *electronic* filing cabinet that has been *programmed* to make it easy for you to quickly *work with* the data—read them, sort them, create reports, merge the data with other documents, and so forth—at the touch of the keys on a keyboard.

How is an *Access* database organized?
The various types of database objects that you can create using *Access*—Tables, Queries, Forms, and Reports—are listed in the *All Access Objects* menu in the left hand frame of the database window, as illustrated in Fig. 6.1.
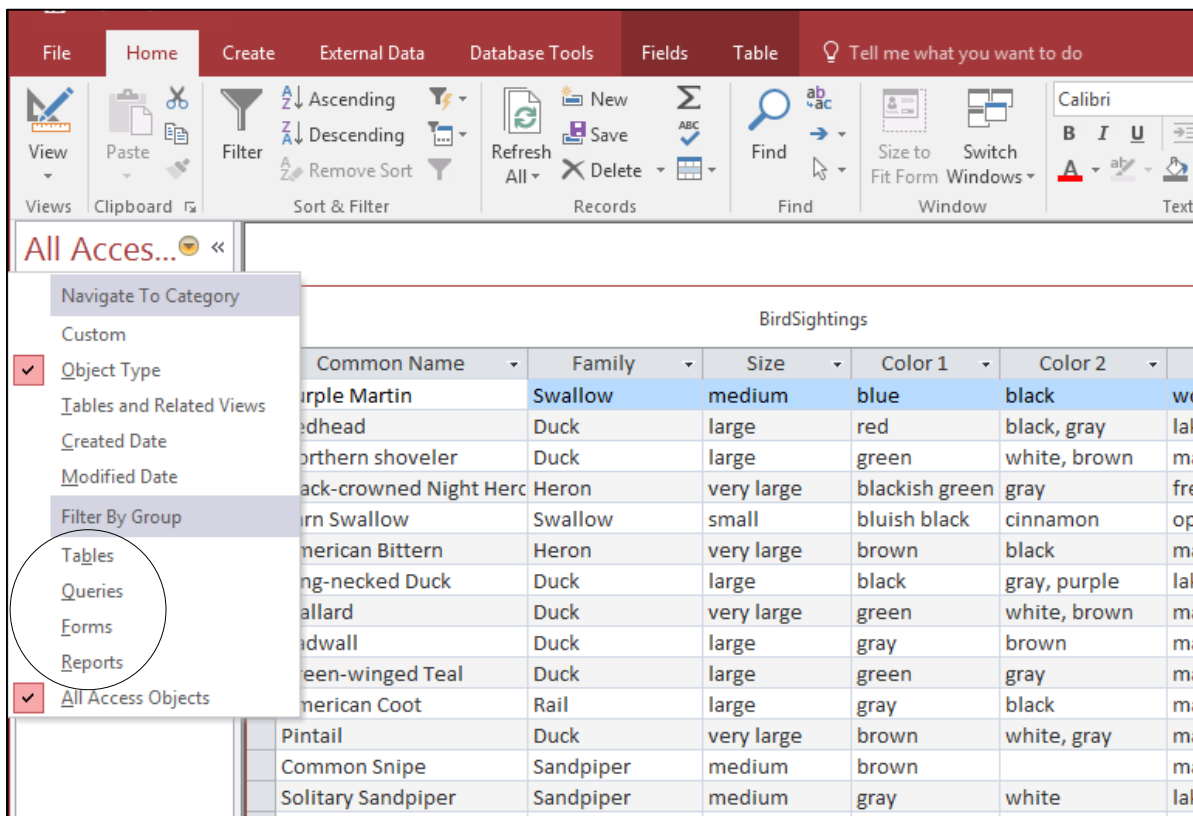

Fig. 6.1 The *Access* database objects

Let's take a look at each of these objects now to see how they can be used to help you organize and access the information collected into a database (in this case a database of information about different birds).

• A **Table** is the fundamental object in a relational database and tables use rows and columns to present the data—rather like a spreadsheet. For this reason, when you view the data as a table in an *Access* database, you are in what *Access* calls a *Datasheet View*. You will learn about Tables and Datasheets in this lesson, as well as how to use the Design View to create a table, add fields to a table, and define the type of data that is in a specific field.

- A **Query** makes a request to the database, asking it to find some specific data that are stored in the database. You will learn more about queries in Lesson 7.

- A **Form** gives the user another way of looking at the data in the database. Whereas a Table allows the user to view many records at once, a Form displays the contents of just one record at a time. Forms are very useful for entering data into new records or updating the data in existing records. You will learn about Forms in this lesson.

- A **Report** is used to present a selected set of information from a database in a format that is neatly laid out and thus easier for the user to mentally digest. You will learn about reports in Lesson 7.

The general terminology used to describe data storage

Words are our stepping stones to knowledge. For the most part, personal computers today still use electronic disks and drives of one sort or another to store data. The *Windows* computer operating system, like other operating systems, organizes data hierarchically on the disk using documents or files which are usually stored in directories or subdirectories that are part of the overall directory file management system.

Within documents, different terminology is used to describe the organization of data depending on the type of document in question.

- *Word processed* documents organize the data (mostly text) in paragraphs and sentences;
- *Spreadsheet* documents organize the data (mostly numbers) in rows and columns;
- *Databases* organize the data (of all kinds) into records and fields.

***Access* database terminology**

An *Access* database is able to contain thousands, hundreds of thousands, even millions of records, depending on the purpose for which the database has been designed. A teacher may have dozens of records in his or her class databases; a school district may well have hundreds or thousands of records to collect and maintain; a company like GM will have hundreds of thousands, maybe even millions of records in multiple databases containing information about employees, products and other kinds of data going back decades; a US government office, such as the IRS, will surely have databases with millions of records.

Maintaining masses of data such as this is hard. Actually, maintaining even small amounts of data is hard, so it's not surprising that the computer has been brought to the rescue of those of us who want to manage data.

To avoid a hodge-podge of data organized at random, people have come up with the idea of organizing data into records. Records contain fields. Each field contains entries made up of text and numbers, which are the basic building blocks of data.

For example, let us say you have given a student an assignment to study birds and to build a database to store the data collected. The student decides to set up a record for each bird sighted.

Each record will include several field names, such as Common Name of the bird, Type (Family) of the bird, Size of the bird, Habitat, etc. A field name such as Common Name, for example, might contain the entry "Seagull" or "Red Ibis."

A database thus contains records; records have fields; the fields contain entries. These entries are made accessible by the Data View (Table), Form, and Report functions of the *Access* database. At the end of a school year, for example, a student would be able to use the word processor (Word) to write a relatively sophisticated paper, and merge into the paper some of the data collected in the database of Birds information. The student might well also add illustrations of the birds.

6.2 LET'S GET PRACTICAL

It will be useful for you at this stage to see an actual *Access* database on the computer.

> Make sure you have the **USB drive** with your **Work Files for Office 2016** available on your computer, then open *Access 2016* (**Start** > **All Programs** > **Microsoft Office** > *Access* **2016**) and, in the **File menu** select **Open**
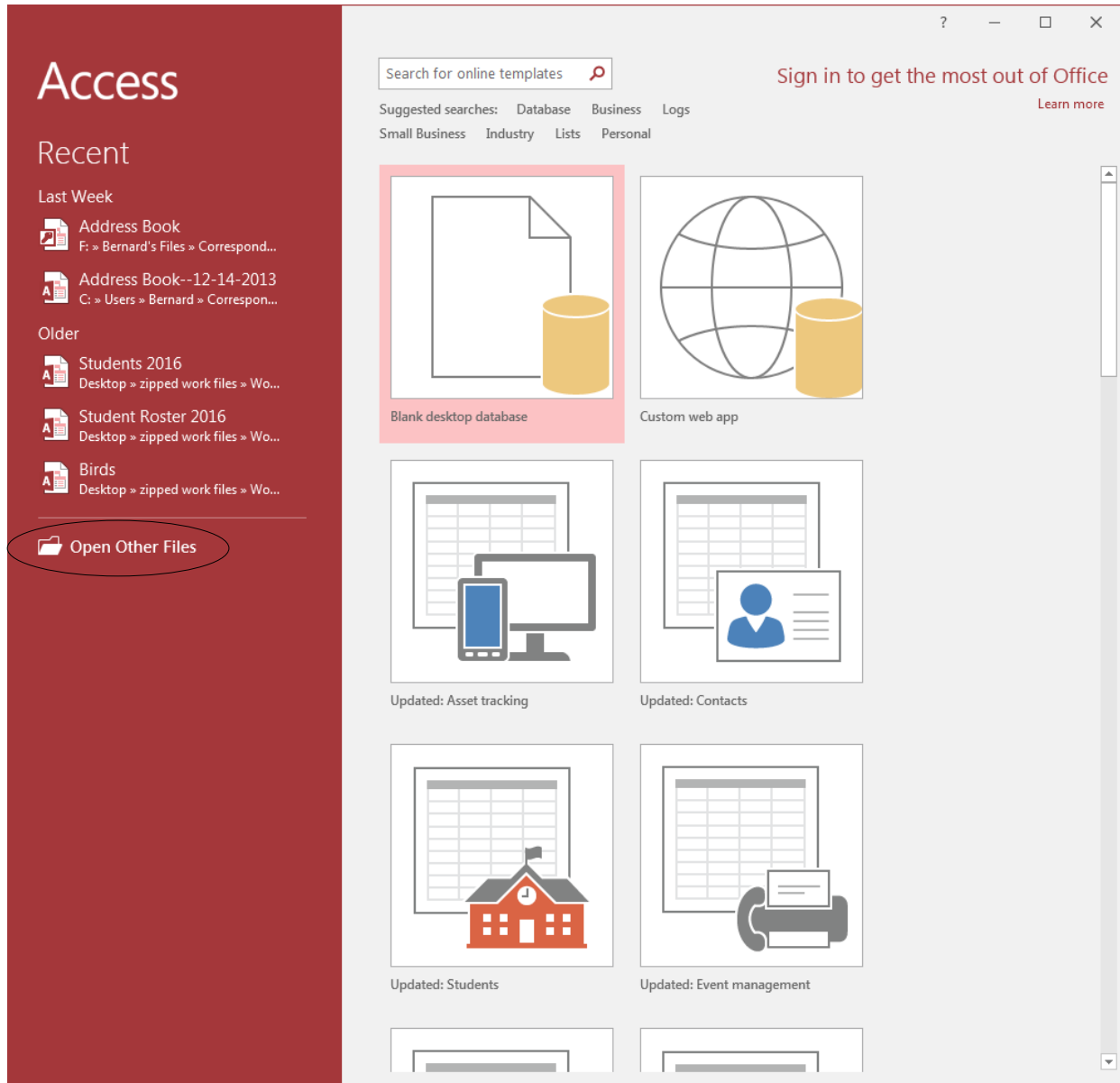
Access will display the Backstage View (Fig. 6.2).

Fig. 6.2 *Access* Backstage View

Since you haven't opened any *Access* files recently, you are told to click on *Open Other Files*.

> In the **Backstage View dialog box** click on **Open Other Files**

This brings up the Open window, still in the Backstage View.

In the **Open window**, click on **Browse** to bring up the **Open** dialog box

On your **USB flash drive** navigate to the **Work Files for Office 2016 >
Access Files folder**

The database document named **Birds** is listed in the dialog box (Fig. 6.3), so
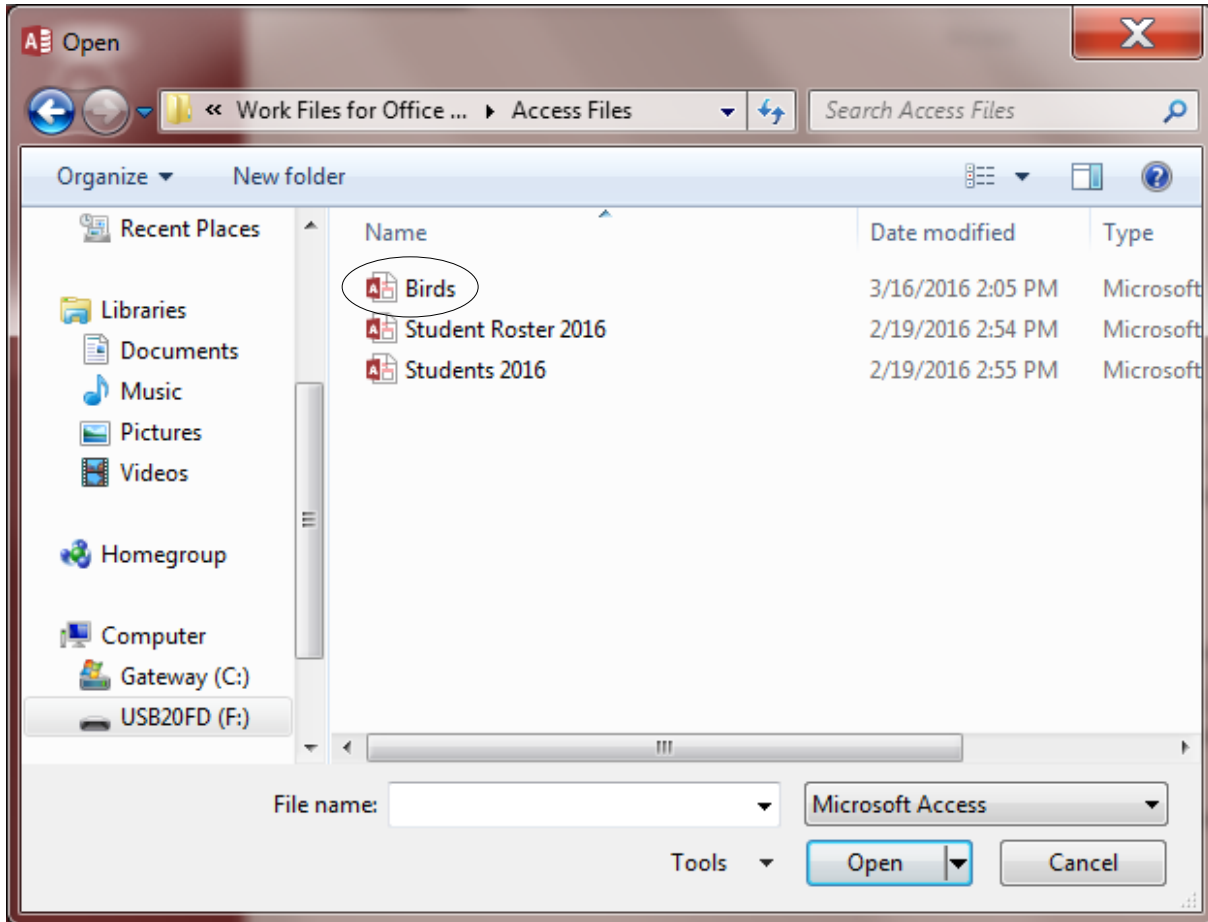**double click** on it to **Open** it

Fig. 6.3 File menu

Access displays a Security warning (Fig. 6.4), indicating that "*Some active content has been
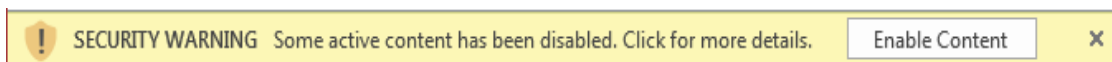disabled.*"

Fig. 6.4 Security warning

It's a standard security warning from Microsoft to alert you to the fact that the database does not
contain a digital signature validating its authenticity. You needn't worry about this with regard to
the Birds database we'll be working with, but it is good for you to know that Microsoft is watching
out for you to protect your computer from infiltration by viruses and so forth. You can remove
that warning for now.

In the **Security warning** box, click on **Enable Content**

Now you see the *Access* Objects listed in the menu on the left side of the database window (Fig. 6.5) represents one of the possible ways to view the data in the *Birds* database.
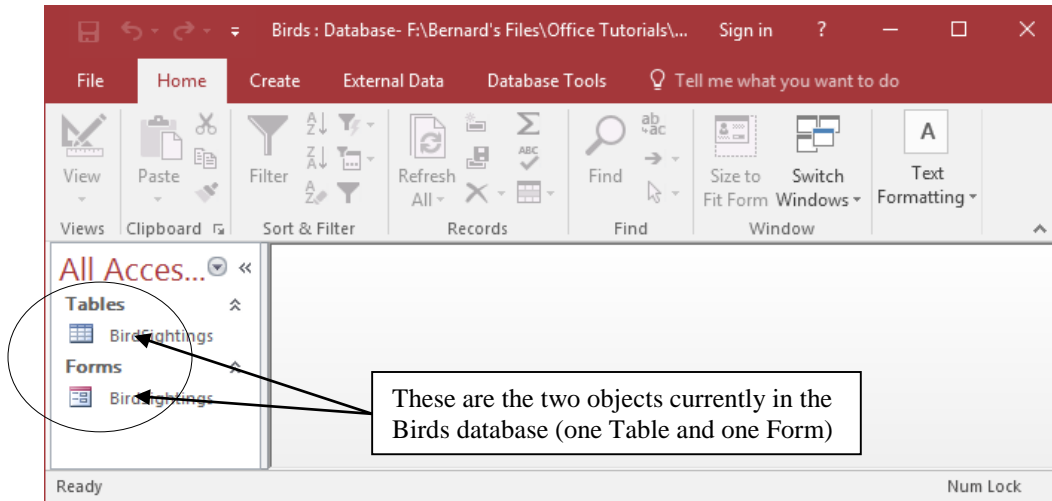

Fig. 6.5 How do you want to view the data in the database?

You can view the data as a *form*, record by record, as illustrated in Fig. 6.6.
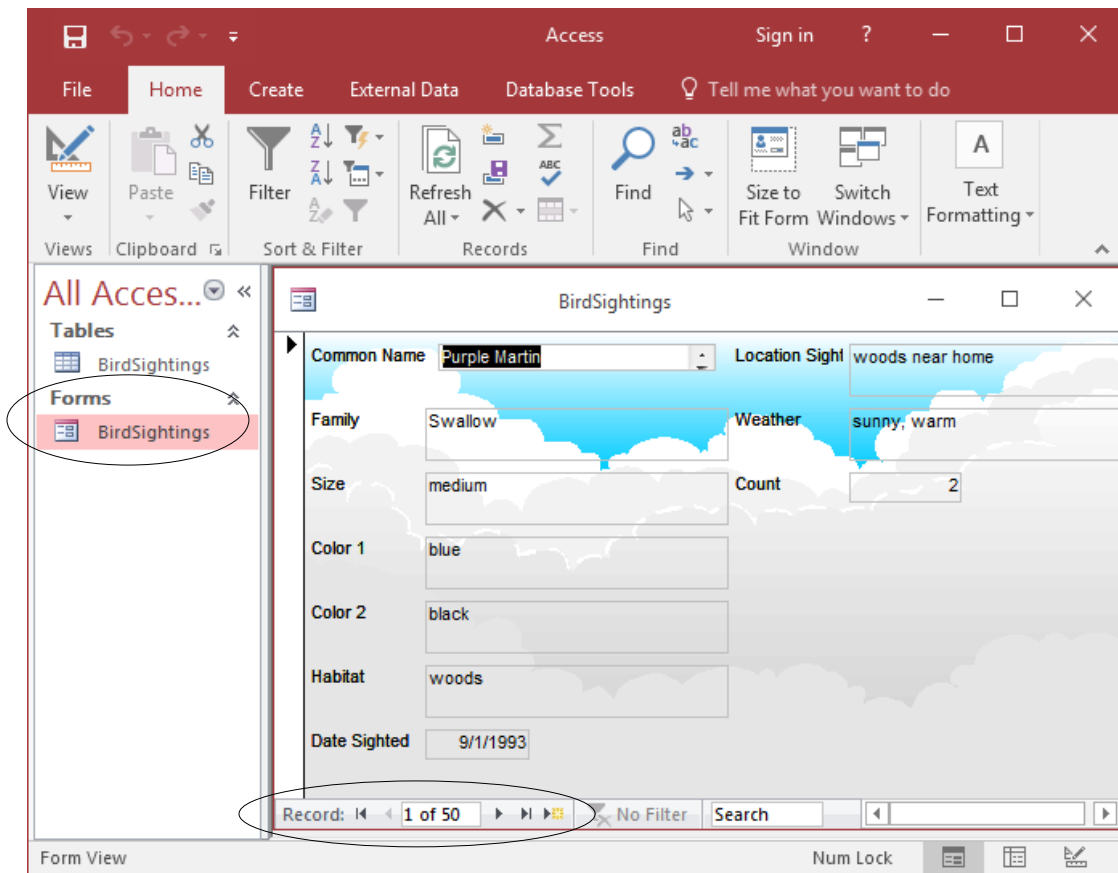

Fig. 6.6 The Form View of the database

This *Forms* view lets you review the records one by one. You use the tools in the lower left of the Forms window to toggle from one record to another in the database.

On the other hand, you can view the data as a Table, where the data for all the records in the database are displayed in columns or as a list (Fig. 6.7).
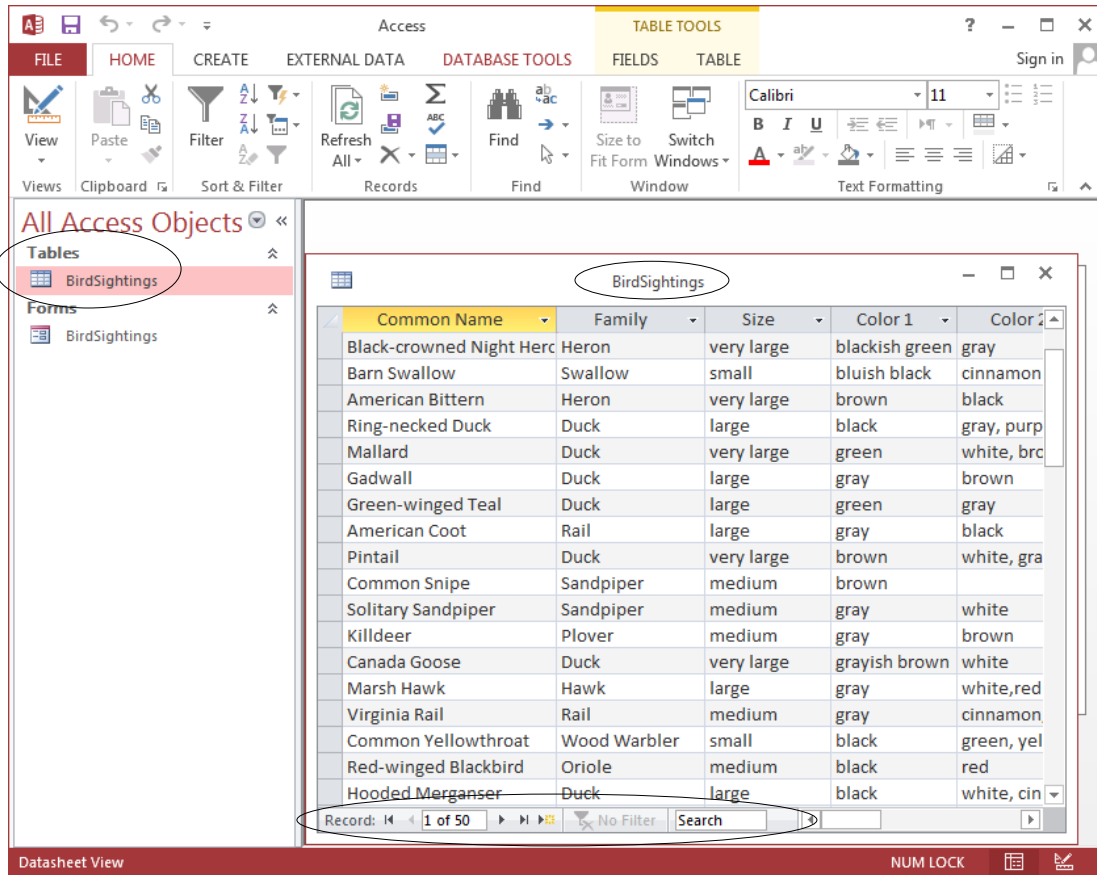

Fig. 6.7 Records listed in Table View

Let's use the *Table* view now to look at different sets of data in the *Birds* database.

> If you didn't already do so, in the **left frame** of the Birds database window **double click** on the **BirdSightings table** (see Fig. 6.7 above)

In the upper left corner of the Table or Form's window, in the window's Title bar, you see the Table or Form name—BirdSightings (Fig. 6.7 above). In the lower left of the Table window are tools to toggle through and access specific records in the database. Fig. 6.8 illustrates what each of these navigation tools does.
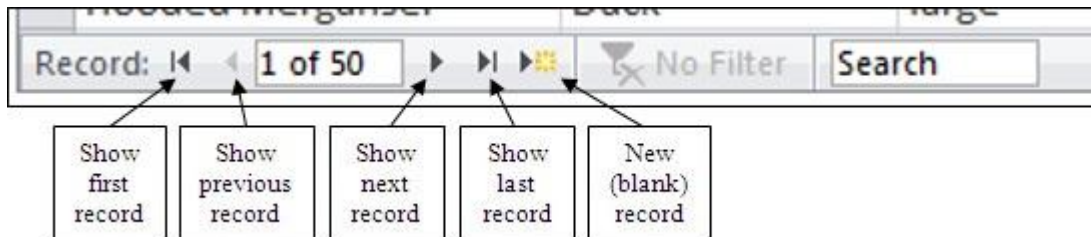

Fig. 6.8 Navigation tools in the *Access* database

There are 50 records in the *Birds* database. The field names (Common Name, Family, Size, etc.) are at the top of each column of data (Fig. 6.7 above). As you can see, the screen is not big enough

to allow you simultaneously to see *all* the records in the database. If you want to scroll through the records or look at any specific record, you have several options.

You can use the scroll bar on the right of the screen to scroll through the records.

Try this now

To move *one by one* through the records, you can click left or right on the arrows in the navigation tools in the lower left of the window (Fig. 6.8 previous page).

Try this now

To go directly to a specific record, you can select the number of the record you want to view by typing the number of that record in the small data entry box between the arrows (Fig. 6.8).

Try this now to select record **12** (type the number **12** in the box then hit **Enter**)

In the Home Ribbon > Find Group, you can use the *Go To* tool and go to either the First, Previous, Next, or Last record, or you can opt to create a New record.

Try this now

6.3 PLANNING A NEW DATABASE

So much for the nuts and bolts of databases. You are now ready to get your feet wet planning your own database of student records.

Click on the **File menu** and select **Close** to close the **Birds** database

It will be good for you to start from scratch for the next database exercise. Before you develop a new *Access* database, you need to have made up your mind where you are going to save the new database (which disk drive are you going to use?)—your hard disk drive or an external drive such as a USB Flash drive or Thumb drive, for example. Make sure you know where you are going to save the new database before you proceed. If you are completing this exercise in a computer lab at your school, your instructor will advise you what to do.

There are three rules of database design:

Rule 1—Plan;

Rule 2—Plan;

Rule 3—Plan!

The more complex the data, the more you need to plan. But even the simplest database should be thought through on paper before being created in *Access*. Poor planning often results in a database that fails to meet longer term needs.

So think about your database ahead of time—and PLAN!!

Points to ponder when planning a database

When planning a database, the rule of thumb that should guide you is this: it becomes increasingly difficult to make changes to anything the further along you go. If you think about it, this is true of anything you create.

Here, then, are some words of wisdom that you should bear in mind when designing a database.

If you take your time up front it will save time later on
The database you create will have a long, useful life if you take time to plan it carefully. After you have decided on the fields to include with each record, and *before* you create the database, you should still invest time designing layouts for reports. Thinking about reports will cause you to think about what data you plan to put in the database.

Teamwork helps
During the planning stage, run your ideas by others who are familiar with the kind of database you have in mind. Network among your colleagues and friends. Tell them what you have in mind. Ask them to review your design. You'll be surprised how many valuable ideas they'll come up with that may have escaped you if you had relied on your own resources. Another good idea is to involve your students in the design. This will help them learn skills that will benefit them throughout their lives.

Keep fields simple
The more "atomic" your fields the more flexible will be your database. Atomic here means "reduced to its simplest form." For example, in a database of names and addresses, you would keep each part of the person's names (first, middle, and last) as a separate field. Lumping the whole name under one field limits your options. The first name should be stored by itself; the same for the middle name and last name. You can print a listing last name first or first name last, with or without the middle name, and so on. By keeping the data *Atomic* you will have a wider range of choices when working with the data in the database.

Design guidelines for a Student Roster database
You have to build a database for a Student Roster. Let us say that your planning has helped you decide the following about the database and its use:

- You have decided that *the database will be accessible to, and managed by, your students*. Each of them will enter their own data at the beginning of the year. You will advise them that they are *not* obliged to fill out every field—that it is OK to leave entries blank. Privacy is an important issue to which our students need to be sensitized. We need to take every opportunity to teach them that they should exercise control over data about themselves. They must make decisions about what is, and is not, privileged information. In a world where, inevitably and increasingly, personal data will be available to whoever wants to use it, our students must learn early on in their lives that they have a responsibility to keep tabs on their own personal data so as to ensure, as far as is humanly possible, that the data are correct at all times. Managing their own records on the class database will give them valuable experience in dealing with issues of privacy such as this.
- You have decided on *a list of fields for each record in the database* (illustrated later in Table 6.1).
- You have decided that *all the fields will be treated as simple text*, except the Date of Birth field, which will be of *Date* type, and the Brothers and Sisters fields, which will be of *Number* type. When you declare a field as *Date* type you can later sort the records in the database chronologically, which has its uses. Likewise, if you declare fields as a *Number* type you can later sort them numerically. You can also manipulate numeric data mathematically, creating totals, averages, and so forth.
- You have decided that *in your class you will designate one student per week as the database manager*. A schedule will be drawn up for this purpose at the beginning of the year. As far as possible, any interaction with the database, including the teacher's interaction, will be

monitored by that student unless this is inappropriate for reasons of privacy. Other students may use the database only when the student manager is present.

• You have decided that *the database manager (one of the students in your class) will check the database for items of interest (birthdays, etc.) for the week he or she is in charge*, and will interact with the rest of the class to decide how to recognize such items of interest.

• You have decided that *the last activity on the database at the end of each week will be the process of making a backup of the database*. This will be necessary because changes to data can occur at any time (a student has a new brother or sister, for example). This would be done by the student database manager under the teacher's supervision.

You could add other features in an actual working environment. With all this in mind, you are ready to create the database which will hold your student records.

6.4 SOME HINTS BEFORE CREATING THE DATABASE TEMPLATE

You are going to start a new database of Student Records.

> *Access* should be open on your screen, so click on the **File menu** and, from the menu, select **New**

Access now presents you with the Backstage View, inviting you to select from among several different types of database templates. The one you want is *Blank desktop database*.

> Click **once** on the icon for **Blank desktop database**

You are now presented with a dialog box asking you to name the new database (Fig. 6.9).
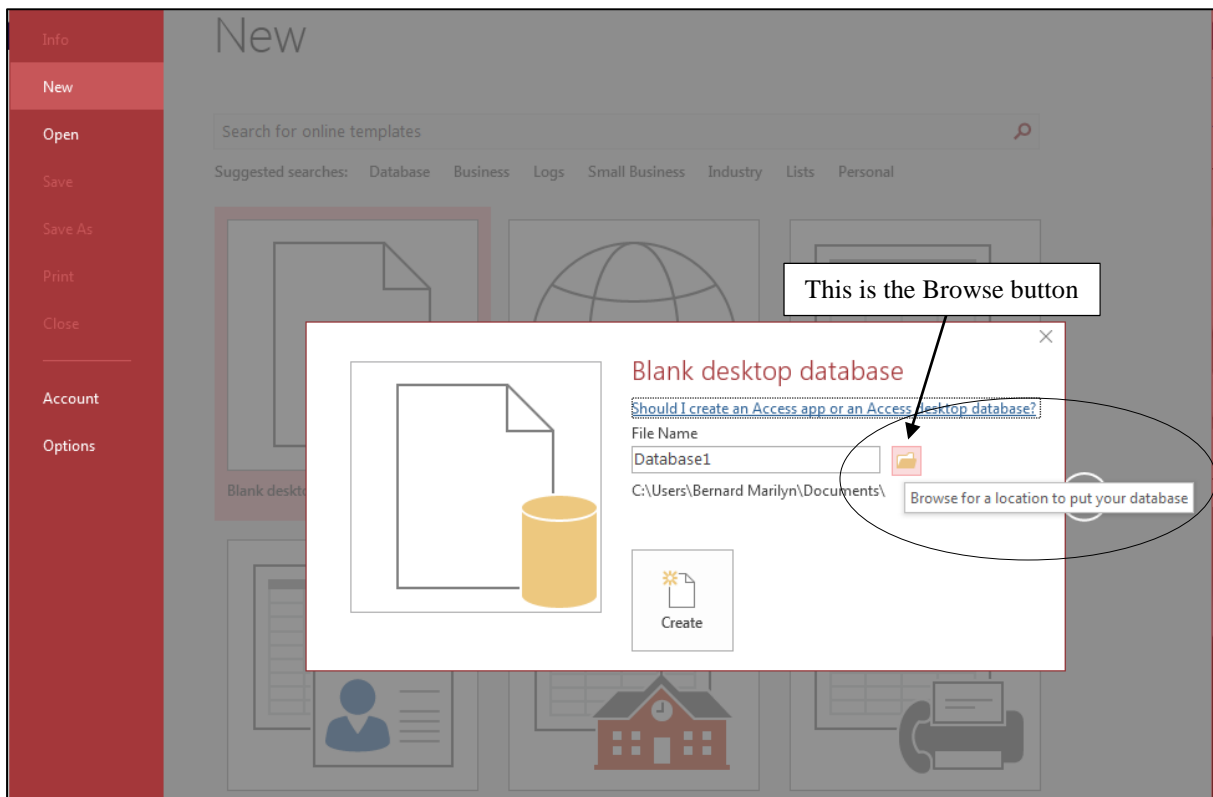

Fig. 6.9 Naming the new database and deciding where to save it

In the **File Name** data entry box type **Student Records Template**, then click on the **Browse** button next to the **File Name** box (Fig. 6.9 above)

In the **File New Database** dialog box that pops up, navigate to your **USB flash drive** > **Work Files for Office 2016** > **Data Files** folder and **double click** to open it

Inside the Data Files folder, you need to create a new folder for the databases you are going to build. You'll recall doing this in earlier lessons when you created a folder for your word processed documents and another for drawing documents, and then another for spreadsheets. Here are the steps to remind you how to create a new folder for your databases.

In the **File New Database** dialog box (Fig. 6.10), click on the **New Folder** icon and type the folder name **Database Documents**
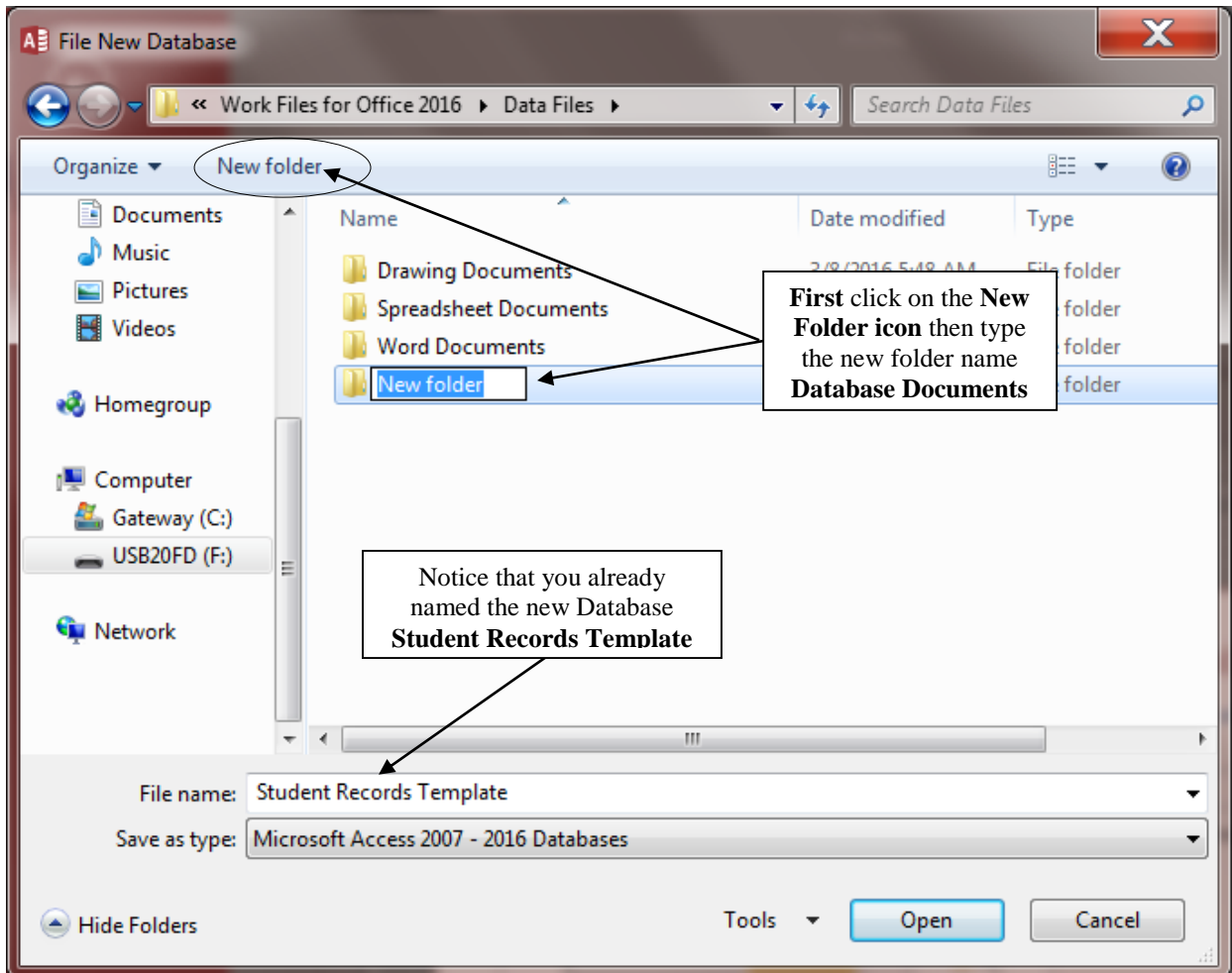

Fig. 6.10 Creating a new folder for your databases

Double click on the new **Database Documents** folder to **Open** it, then, still in the **File New Database dialog box**, click on **OK** to set up the **location on disk** of the new (as yet empty) **Student Records Template** database

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For the last step, you need to click on the **Create** button in the **Blank desktop database** window (Fig. 6.11)
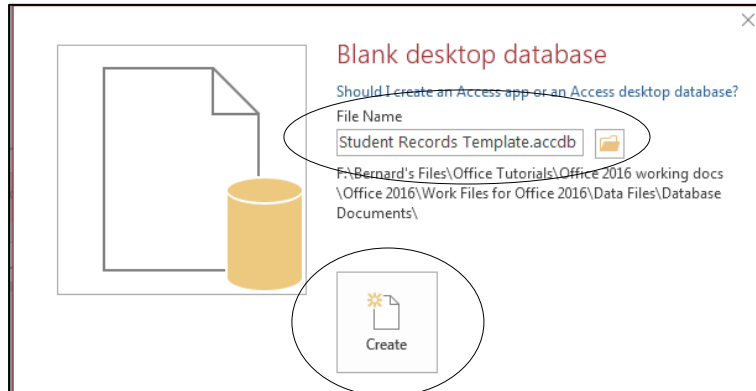

Fig. 6.11 Final step in creating a new database

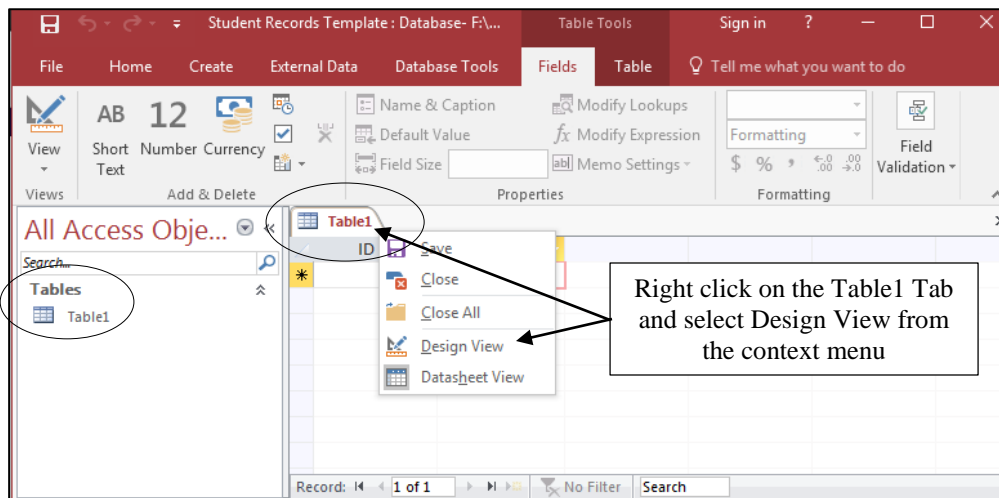*Access* now displays the newly created Student Records Template database (Fig. 6.12).

Fig. 6.12 The newly created Student Records Template database

Notice that the *Tables* object is selected in the frame on the left side of the *Access* window. A Table is the default object in a new *Access* database.

Now **right click** on the **Table1 tab** (Fig. 6.12 above) and, in the **context menu** that pops up, select **Design View**

Immediately you are asked to provide a meaningful name for the new table (Fig. 6.13).
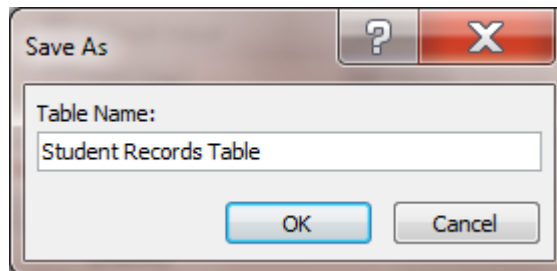

Fig. 6.13 Naming the new database table

> Type the name **Student Records Table** and hit **OK**

You'll notice that *Access* now lists the Student Records Table as one of the Table objects in the left hand frame of the database window. You also will see the Table Design View for the new Table named *Student Records Table* (Fig. 6.14).
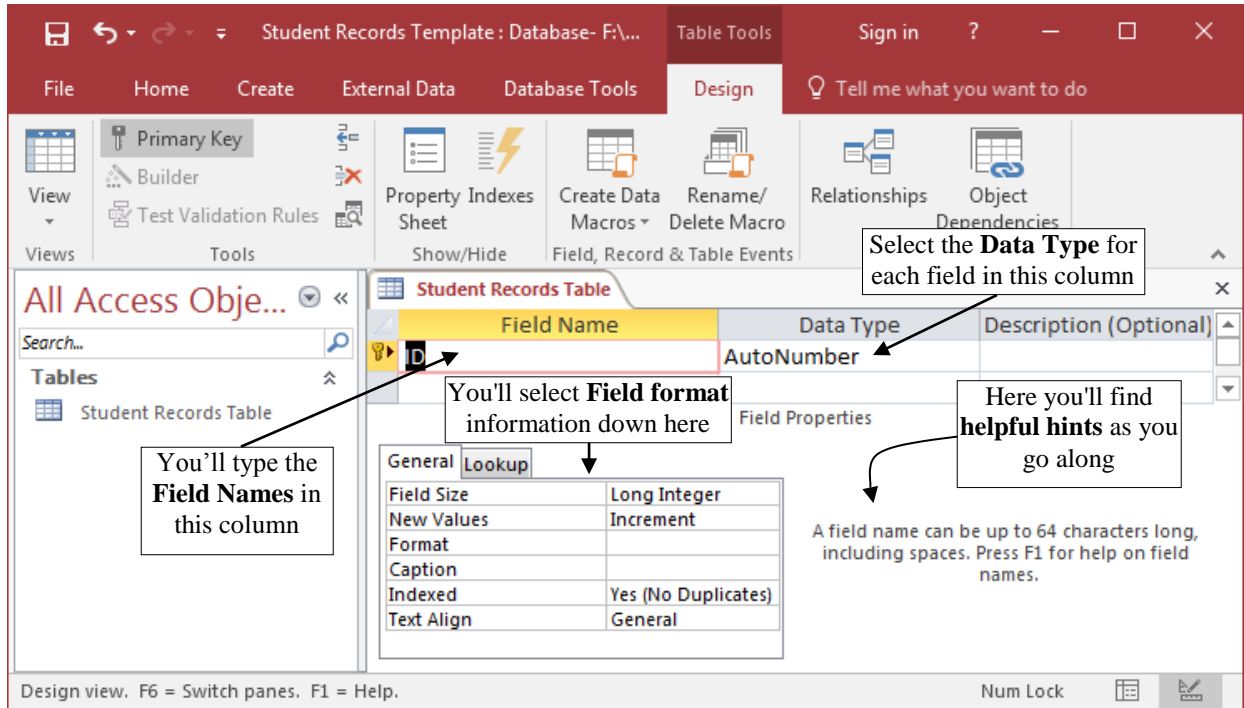

Fig. 6.14 Design View on Student Records Table

On the screen, *Access* is waiting for you to begin typing in the field names. The cursor is located in the first data entry box in the *Field Name* column, prompting you to type in a name for your first field. *Access* field names can be up to 64 characters in length, by the way, more than enough for any purposes. Before you enter the field names, however, read what follows.

Editing field names
Table 6.1 on the next page provides you the complete list of all the *field names* for this Student Records database (which will initially be a template that you will out with actual student data at a later time. Remember, you're building a template so that you can use it for other student record databases at a future date. You can easily change, add or delete fields at any time, though the purpose of planning is to try your best to avoid having to make significant changes after the database has been created.

Selecting the data type of a field
As illustrated in Fig. 6.14 above, after typing in the field name in the first column, you'll need to enter the *field's data type* in the second column. Table 6.1 below has all this information, too.

Setting up predefined entries for a field
To reduce the likelihood of bad data getting into the database, you can limit the user's choices when they enter the data for a particular field. For example, when they enter the Gender, you can limit the choices to M(ale) or F(emale). In the database you're going to build for this tutorial,

you'll be pre-defining the City and State fields as well. The tutorial will explain how to do this as you go along.

6.5 CREATING THE DATABASE TEMPLATE

Entering field names for the database

Table 6.1 below contains the complete list of field names for the Student Records Template database.

Field Name	Data Type	Required	Length	Comments
First Name	Short Text	Yes	20	
Middle Name	Short Text	Yes	20	
Last Name	Short Text	Yes	20	
Home Contact	Short Text	Yes	20	
Nick Name	Short Text	No	20	
Gender	Short Text	Yes	1	Use Lookup Wizard to predefine data
Address Line 1	Short Text	Yes	50	
City	Short Text	Yes	25	Use Lookup Wizard to predefine data
State	Short Text	Yes	2	Use Lookup Wizard to predefine data
Zip Code	Short Text	Yes	-	Use input mask to specify the format
Phone Number	Short Text	No	-	Use input mask to specify the format
Date of Birth	Short Text	Yes	-	Use input mask (Short Date) format
Brothers	Number	No	**-**	
Sisters	Number	No	**-**	
Place in Family	Number	No	**-**	
Clubs	Long Text	No	200	
Hobbies	Long Text	No	200	
Favorite Sports	Long Text	No	200	
Favorite Subjects	Long Text	No	200	

Table 6.1 Template Field Name listing

You'll be referring to this Table frequently as you work your way through the next several pages, so you might like to bookmark Table 6.1 so that you can find the Table easily when you need to. Here are some directions to help you along the way:

- Type only the *Field Names* that appear in the first column of Table 6.1 (there are 19 field names in all).
- The second column tells you what *Data Type* to choose (from a drop down list that pops up when you click on the down arrow at the right side of the entry box.
- The other columns in the table (*Required*, *Length* and *Comments* columns) are there to help you as you enter each field name and data type and explain whether data is to be "Required" for that field and what size (in text characters) the field is allowed to

be, along with tips on what to do. The idea here is to help the eventual users of the database when they come to enter student data into the fields.

Click in the **first** entry box in the **Field Name** column, **backspace** twice to **remove** the default[1] field name **ID**, then type **First Name** for the field name (Fig. 6.15)
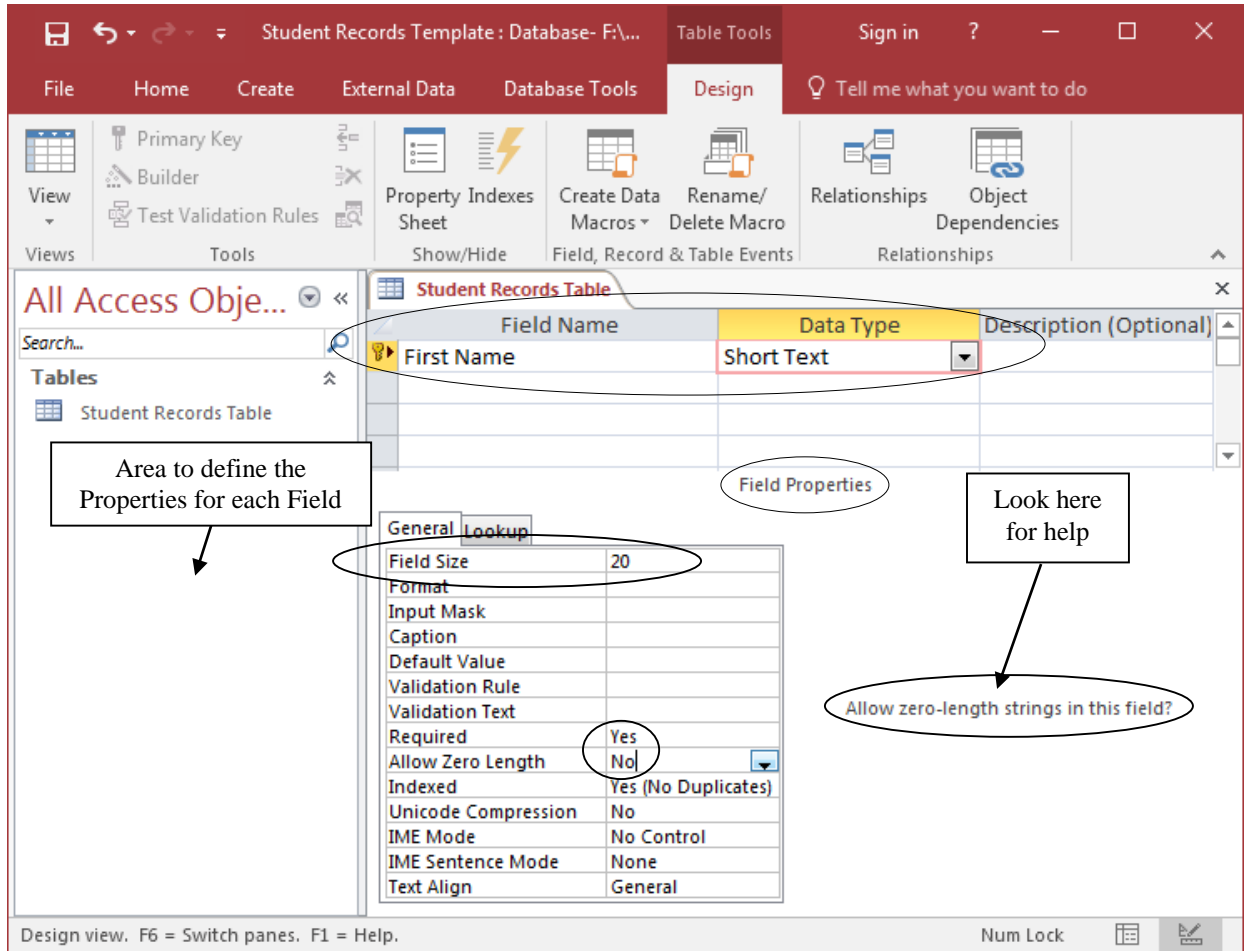

Fig. 6.15 Field Properties and Help

Notice that, in the <u>lower right</u> section of the Student Records Table window, *Access* provides help to guide you as you enter the data for each field in a record. Read this help as you go along.

If you take a look at Table 6.1 on page 225, the *Length* column specifies the number of characters (Field Size) required for several of the fields in the database.

Check **Table 6.1** to find out the **correct Field Size** for the **First Name** field (20 characters)

Now, look down at the **lower left** of the *Access* Design window (Fig. 6.15), where you can see a list of **Field Properties**, along with data entry boxes to specify **Field Size**, **Format**, and so forth

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[1] ID would normally be a numeric *Primary Key* for the database, but this primary key is not necessary for our small database of student records.

In the **Field Size** box type **20** (so as to allow up to 10 characters for the **First Name**)

Hit the **Tab** key to move the cursor over to the **Data Type** column, click on the **down arrow** to the **right** of the box, and select **Short Text** as the data type

For the First Name field, and for several other fields (again check out Table 6.1) you want the user to *definitely* fill in an entry—in other words, an entry is *required*. You don't want the field left blank. Here's how you can ensure that this happens in your database.

In the **Field Properties** area (Fig. 6.15 on the previous page), **double click** in the data entry box next to **Required** in order to toggle (switch) the entry from **No** to **Yes**

Since you must have a First Name, you don't want it to be zero length so, again in the **Field Properties** area, make sure the entry **Allow Zero Length** is set to **No**

Now go back up and click in the next **Field Name box** (below the **First Name** box) so you can enter the next field name

In the next successive field name boxes enter the following:

- **Middle Name** (with a Field Size of **20** characters and a Data Type of **Short Text**); enter **Yes** in the **Required** Field Property and **No** in the **Allow Zero Length** Field Property

- **Last Name** (**20** characters, **Short Text**); enter **Yes** in the **Required** Field Property and **No** in the **Allow Zero Length** Field Property

- **Home Contact** (**20** characters, **Short Text**), enter **Yes** in the **Required** Field Property and **No** in the **Allow Zero Length** Field Property

- **Nick Name** (**10** characters, **Short Text**), but leave **No** in the **Required** Field Property box and **Yes** in the **Allow Zero Length** Field Property box, since a Nick Name is **optional**

Using the Lookup Wizard to specify selected values for a field
The next series of steps show you how to specify *pre-selected values* for a field.
For the database fields Gender, City, and State (see Table 6.1 on page 225), the values that should be entered are predictable. For the Gender, it will be M or F, for example. For the City, it will be a couple of the towns or cities where your students live. For the State, it will be the abbreviation for the state in which your students live.

In the next **Field Name** box, enter the field name **Gender** and hit **Tab**

Now click on the **down arrow** in the **Data Type** box and select **Lookup Wizard…** in the drop down list

In the **Lookup Wizard** dialog box (Fig. 6.16) click on the **radio button** next to "I will type in the values that I want.", then click on **Next >**
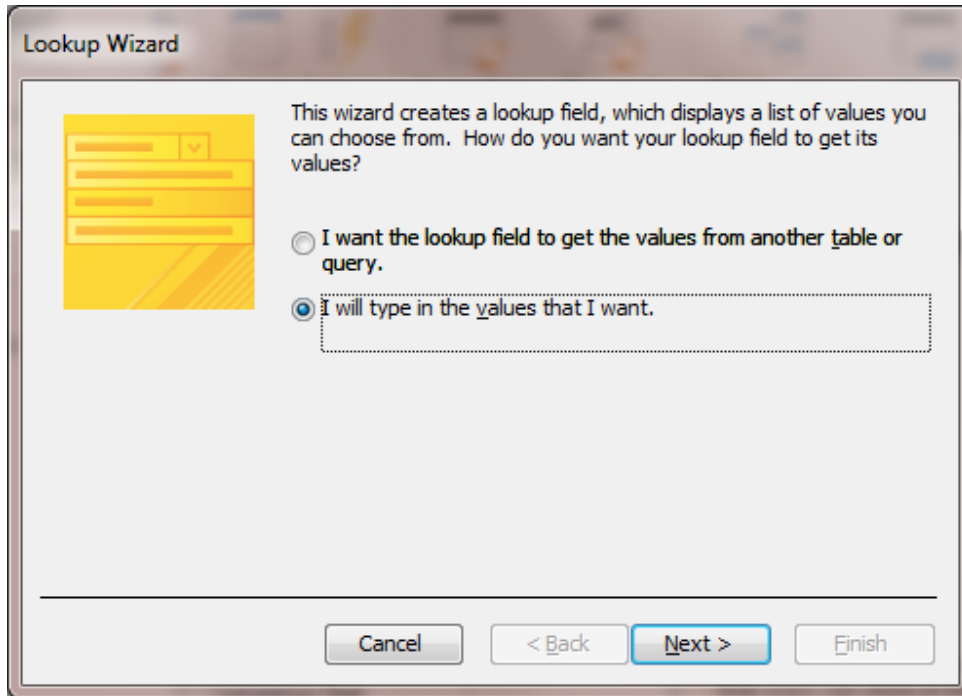

Fig. 6.16 Opting to enter the values yourself

In the next Lookup Wizard dialog box (Fig. 6.17), leave the default **1** for the **Number of columns**, hit **Tab** (or click in the data entry box under **Col 1**) and type **M** (for Male)
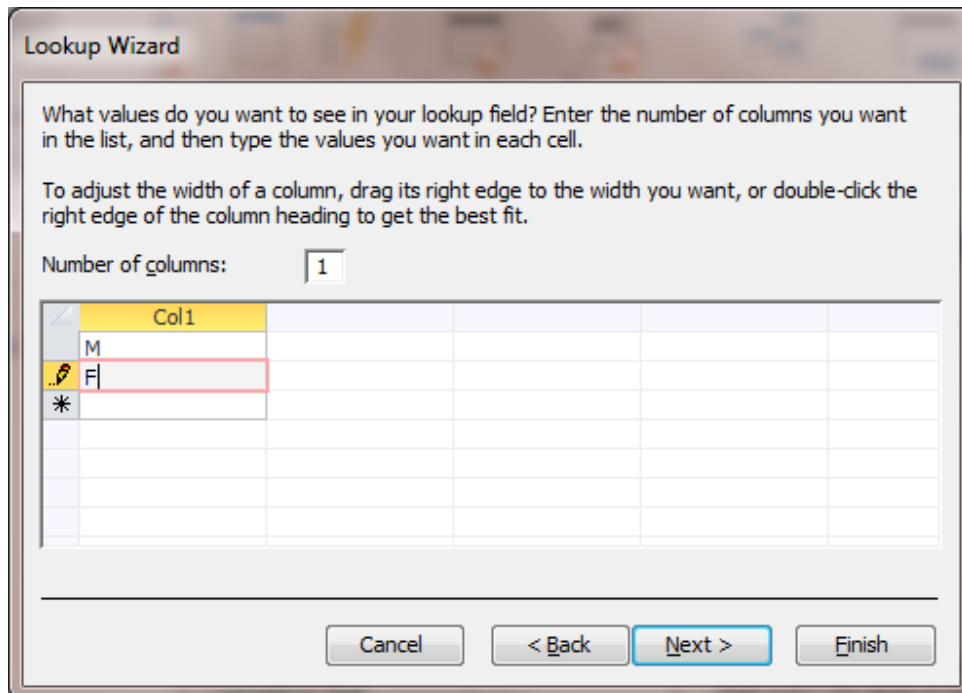

Fig. 6.17 Entering the values for the Gender field

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Hit **Tab** or click in the next data entry box in the **Col 1** column, and type **F** (for Female), then click on **Next >** to go to the next step in the Wizard

There's no need to change the label for the Lookup column (**Gender**), so click on **Finish** in the dialog box

Hit **Tab twice** to go to the next empty Field Name data entry box (after **Gender**), type the field name **Address Line 1**, hit **Tab**, leave the **Data Type** as **Short Text** then, in the **Field Properties** area, type **50** for the **Field Size** and make it a **Required** field, with **No** for the **Allow Zero Length** option

Now you are going to use the Lookup Wizard to define a set of common data if your students all come from the same one or two towns, a likely scenario in any school district. If you teach in a public school in the United States, your students also will all live in the same State.

So, for the City and State fields you'll use the same steps as you did to create the Gender field.

Click under **Address Line 1**, type the field name **City**, hit **Tab**, select **Lookup Wizard…** for the **Data Type** and follow the same steps as you did for the Gender field to enter the names of a couple of local cities or towns—you decide which cities or towns and how many

Create the **State** field with the **Lookup Wizard** Data Type, too, and enter the initials for your state as the value for the list

Make both the City and State a **Required** field, with **No** for the **Allow Zero Length** option

You will see later that the city or cities you name, along with the State, automatically will appear as selections when entering data into those fields in the database.

Using an input mask to control the format for a field
It is important to make sure that certain fields have a consistent format. This is true of fields such as zip codes or phone numbers, for example. You can have *Access* help you control the way the user enters data for such fields by using an *input mask*, which forces the user to enter the data in a specific way. If the user makes an error, the system will make an audible beep to draw attention to the error. This reduces the likelihood of incorrect data getting into the database.

A zip code, like a telephone number, is a good example of a field which has a very specific format. For this reason, it's a good idea to use a Field Property *Input Mask* to help the user enter the zip code in the correct format. So, let's see how this works with the Zip Code field, which is next in the list of Field Names (see again Table 6.1 on page 219).

In the list of field names, click in the data entry area under **State**, type the field name **Zip Code**, then hit **Tab** to move the cursor to the **Data Type** field box and make sure **Short Text** is selected for the **Data Type**

The rule for Input Masks is this: *You can only use an input mask with Text or Date/Time data types*. This makes sense, if you think about it. If the Zip Code is entered as *Number* type it will be treated as a mathematical (numeric) data type. Thus, the hyphen (-) between the two halves of the zip code will act as a math operator, resulting in the subtraction of the second half of the zip code from the first and returning the result of the math operation!

In the **lower left section** of the Design window, in the **Field Properties area**, click in the **Input Mask** data entry line—noticed that this brings up **ellipses (…)** at the end of the data entry line (Fig. 6.18)
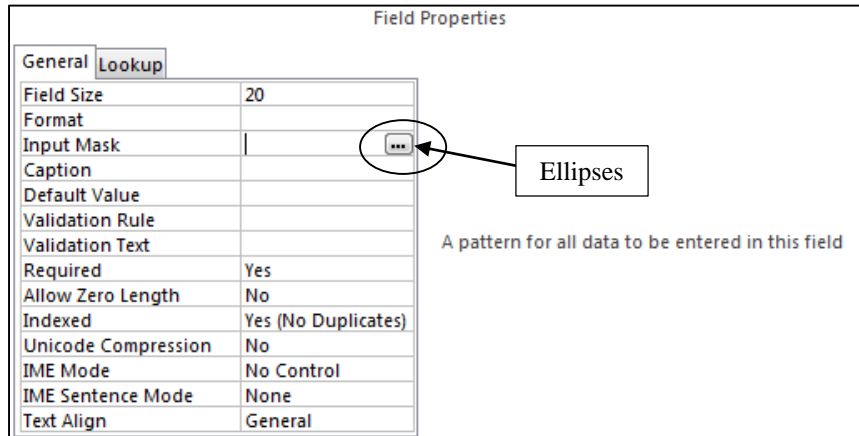

Fig. 6.18 When you click in the Input Mask box, ellipses (…) appear in the data entry line

Now click on the **ellipses (...)** that pop up at the **right** end of the data entry line

Access will prompt you to **Save** the table at this point so that you do not lose the work that you have completed, so click **Yes** to **Save the Table**, then click on **OK**

Now click on the **Zip Code input mask** in the **Input Mask Wizard** dialog box (Fig. 6.19)
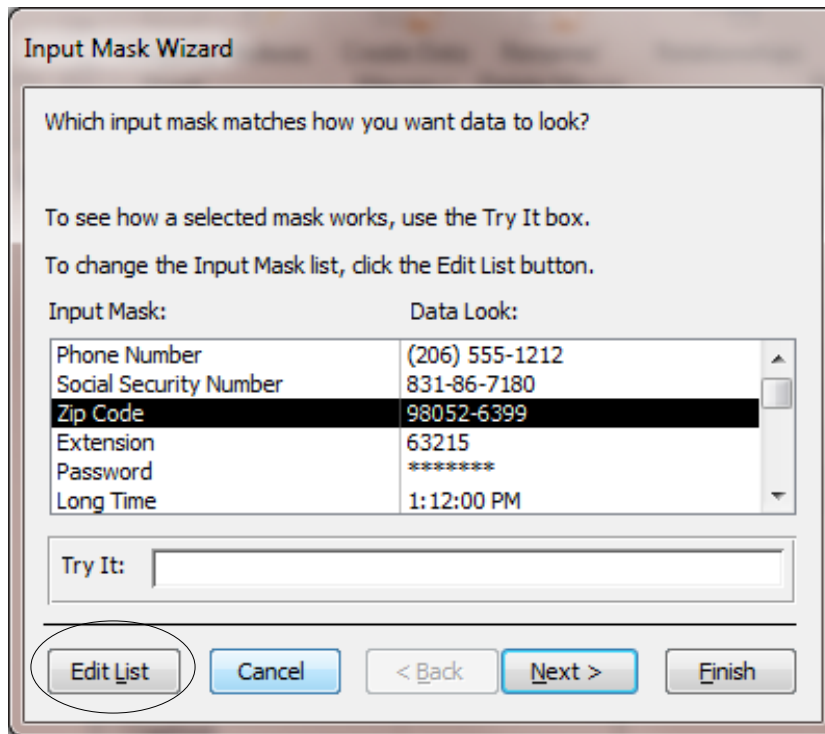

Fig. 6.19 Zip Code input mask

> To see how the mask works, click in the **Try it** box—try entering a zip code
> with **more than 9 digits**

The system will **beep** if you try to do so, thus showing you the purpose of the input mask, which
is to help users enter data *correctly* when they fill out a student record).

The Wizard asks you if you want to change (Edit) the input mask for the Zip Code (Postal
Code). If you live in the United States, you can skip the next set of directions.

> **If you live in a country other than the United States**, you may well use a
> different format for your postal code, so go ahead and click on the **Edit List**
> button (Fig. 6.19 above), enter the format of your choice, then click on **Next >**

The Wizard now asks you, in a new dialog box (Fig. 6.20), if you want to change the input mask
for the Zip Code. It also asks you to decide if you want to select a *placeholder* character to help
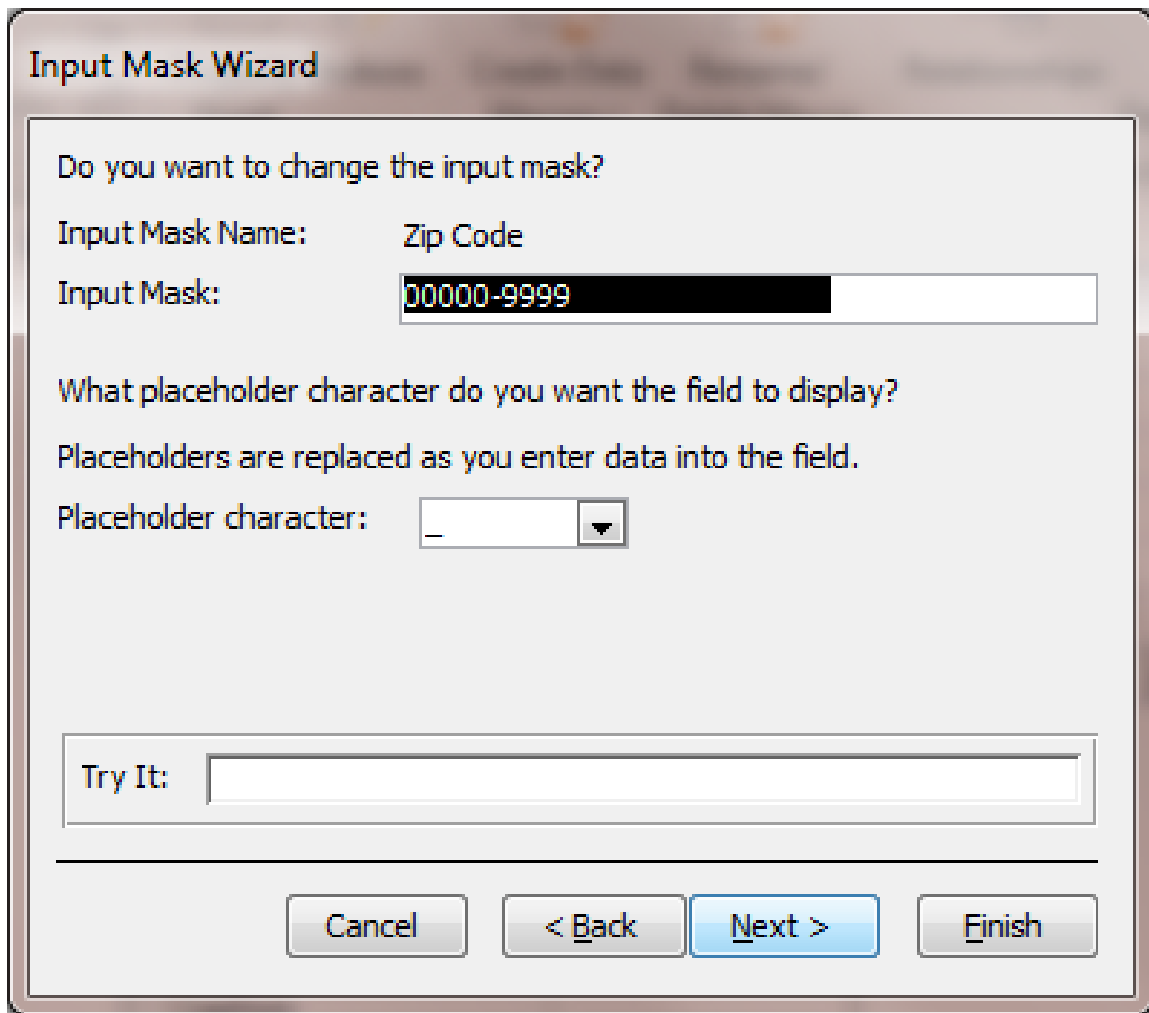the user when they enter zip codes into the database.

Fig. 6.20 Option to change Zip Code input mask

> The **underline** character is the default, as you can see, so accept it as the
> **placeholder** character for the **Zip Code** field, then click on **Next >** to proceed
> to the next step in the Wizard

In this last step in the Input Mask Wizard, click in the **radio button** to select "**With the symbols in the mask, like this:**" (Fig. 6.21), then click on **Finish**
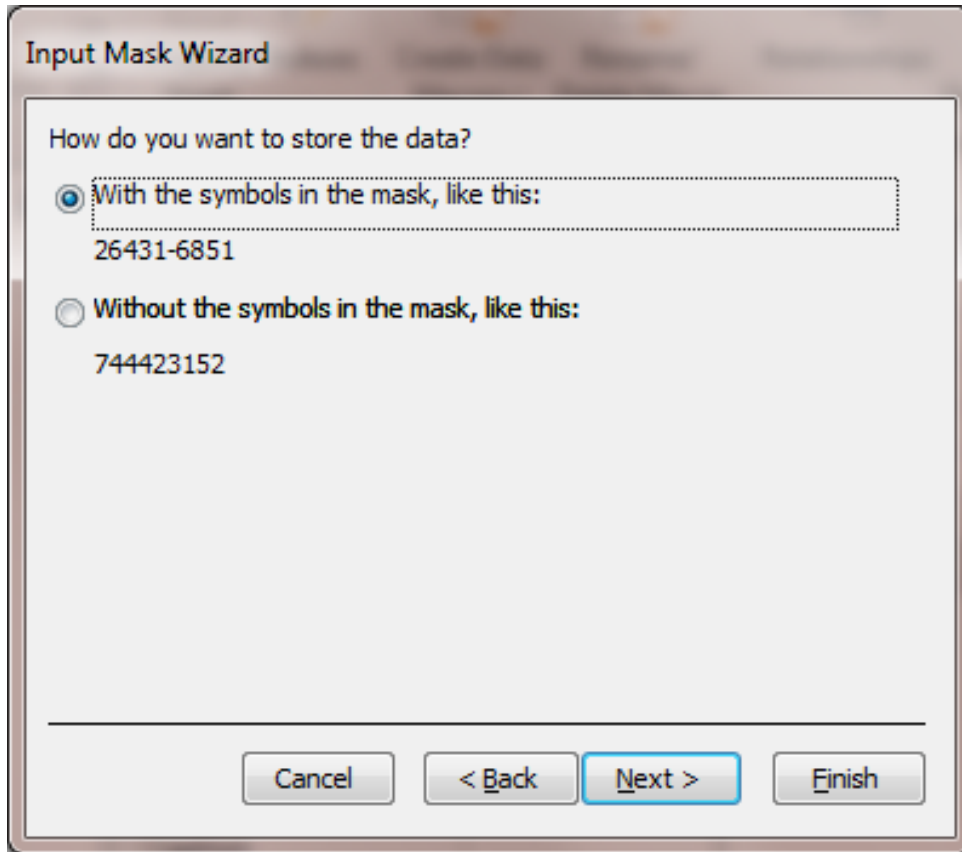

Fig. 6.21 You want to keep the symbol in the mask when you save the data

For the other **Zip Code Field Properties**, make the Zip Code a **Required** field with **No** for the **Allow Zero Length** option

Practice makes perfect

You next need to follow the same steps to use an input mask for the Phone Number field. Remember to select *Short Text* as the data type for the Phone Number.

Click in the data entry box **below Zip Code** and type the field name **Phone Number**

Make sure **Short Text** is selected for the **Data Type**, and make the Phone Number a **Required** field with **No** for the **Allow Zero Length** option, then click in the **Input mask** Field Properties data entry box

Now click on the **ellipses (...)** that pop up at the end of the data entry box and click on **Yes** to **Save** the Table when *Access* prompts you to do so

Next, in the **Input Mask Wizard** dialog box, click on the **Phone Number input mask** and click on **Try it** to see how the mask will look

The Wizard asks you if you want to change the input mask for the Phone Number. If you live in the United States, you can skip the next instruction.

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If you live in a country other than the United States, you may well use a different format for phone numbers, so go ahead and click on the **Edit List** button and enter the format of your choice, then click on **Next >**

You also need a placeholder character, which will guide the user when they eventually enter phone numbers into the database.

Click on the **underline** character, as you did for the Zip Code, to select it as the placeholder character for the **Phone Number** field

Click on **Next >** to proceed to the next step in the Wizard, then click in the **radio button** to select "**With the symbols in the mask, like this:**"

Click on **Next >** to proceed to the next step in the Wizard, and click on **Finish**

For the Date of Birth field, which is next in the listing in Table 6.1 on page 225, you want to apply an *input mask* for it, too, but this time you will select *Short Date* as the Data Type for the field.

Follow the same steps as you just did for the Zip Code and Phone Number fields, except select **Short Date** as the **Data Type** for the field

Entering the remaining fields in the database

Complete the remaining fields in the database—**Clubs**, **Hobbies**, **Favorite Sports**, and **Favorite Subjects**—each of which will be **Long Text** data type, allowing 255 characters in the field entry

Long Text lets the user type a longer entry if desired. Some students are involved in several sports, for example; others may have several hobbies.

When you have completed the entries for **all 19 field names**, **right click** on the **Student Records Table tab** (Fig. 6.22) and, in the pop up context menu, click on **Save**
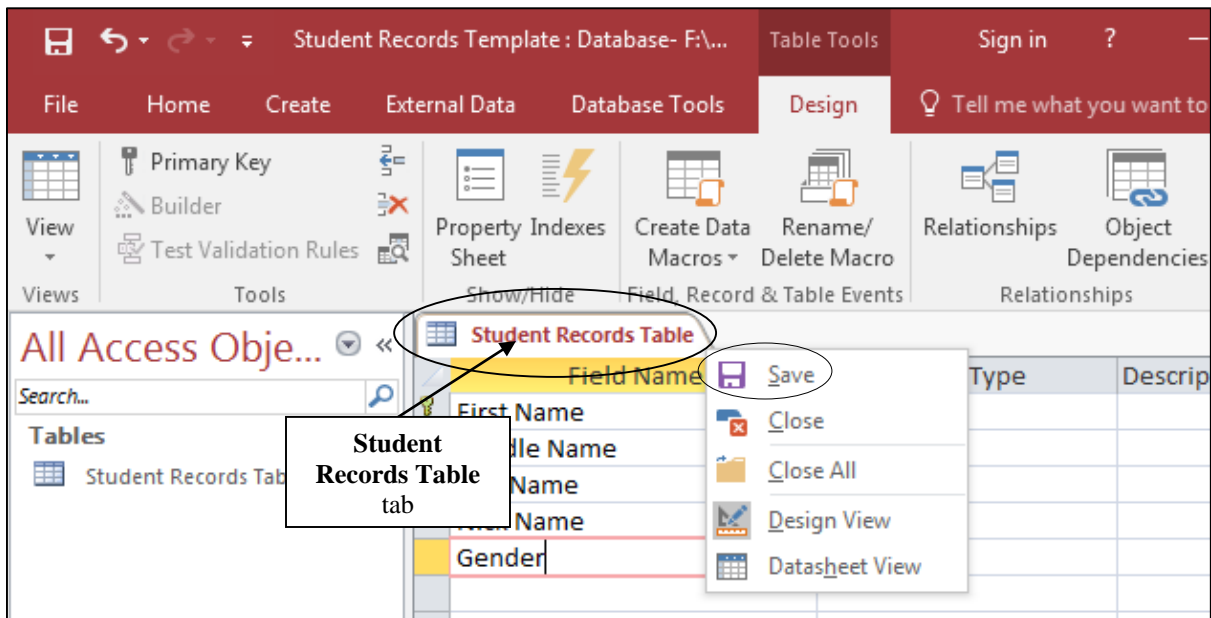

Fig. 6.22 The Student Records Table tab

6.6 COMPLETING PREPARATION OF THE DATABASE TEMPLATE

Creating a Form for the new database

The following exercises will help you learn how to prepare a database Form.

A Form is a database object which allows you to view the data one record at a time, unlike a Table where you can view the data as a continuous list of records—you may recall how the Table looked in the Birds database that you checked out at the beginning of this tutorial.

A Form is a convenient tool for data entry purposes because it allows the user to see all the Fields in a single record at one time, unlike the Table view (the Datasheet View), which will often be unable to show all the data fields of a single record across the screen. Let's create a Form for our Student Records Template database now.

> Click on the **Create Ribbon** > **Forms** group

> In the **Forms Group**, click on the **Form Wizard** tool to bring up the **Form Wizard dialog box** (Fig. 6.23)
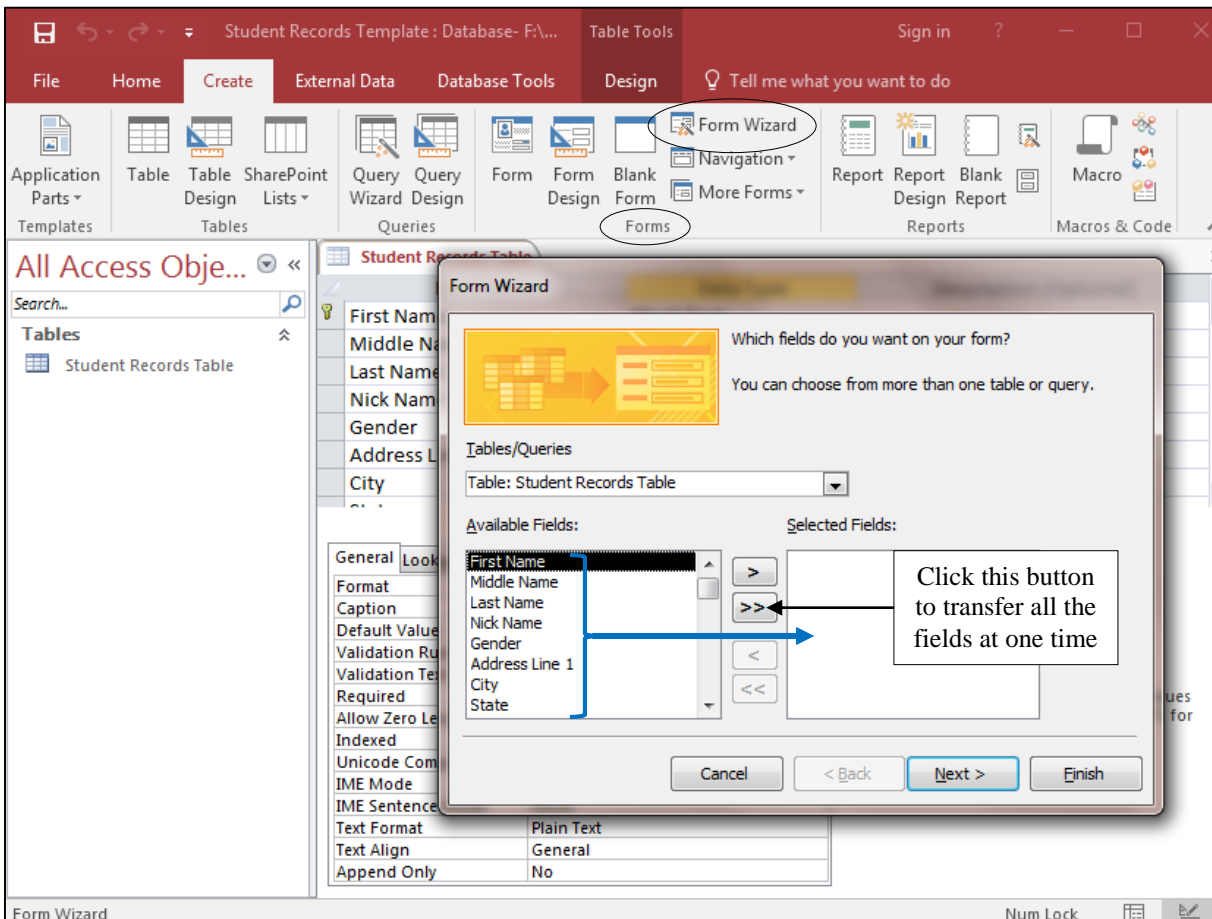

Fig. 6.23 The Form Wizard tool in the Forms group of the Create Ribbon

The Wizard will help you design the Form based on the fields and data types (including input masks) you have selected. You'll begin by telling *Access* to include all the *Available Fields* in the Form.

> Click on the **double arrow icon** (Fig. 6.23 above) in order to transfer all **19** Fields across to the **Selected Fields:** scroll box, then click on **Next >**
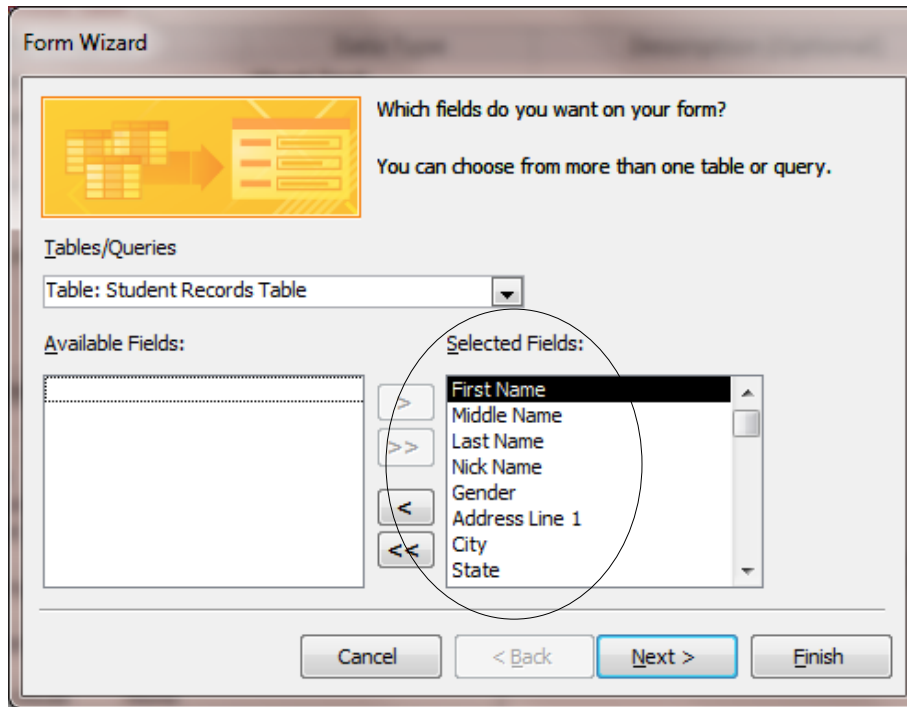
Fig. 6.24 All the Available Fields have been transferred to the Selected Fields box

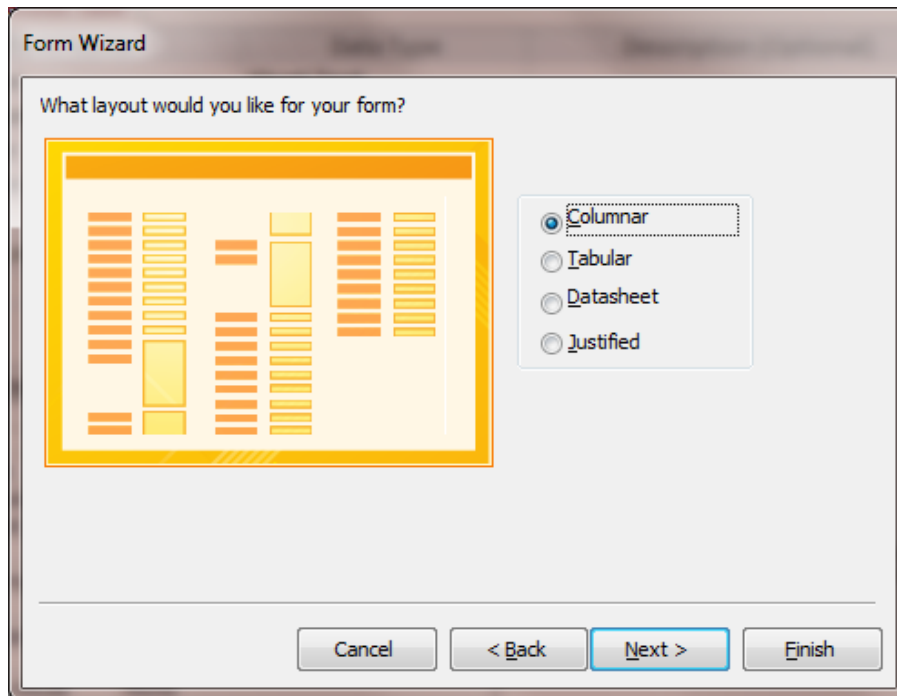The Form Wizard now asks what layout you want for the new Form (Fig. 6.25).

Fig. 6.25 The Form Wizard layout options dialog box

Columnar layout will work well for our purposes, and that is the default. But check out the sample layouts by clicking on each of the radio buttons in the Form Wizard.

With the **Columnar** radio button selected, click on **Next >** again

In the next dialog box, the Wizard asks you to name the new Form and also whether you want to modify the design in any way (Fig. 6.26).
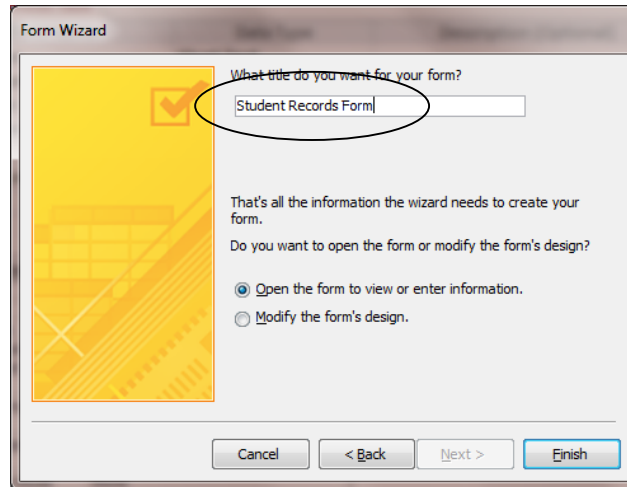

Fig. 6.26 Option to name and modify the form

For the Form's title, type **Student Records Form** (not Table), and make sure the **radio button** next to "**Open the form to view or enter information.**" is selected (Fig. 6.26), then click on **Finish**

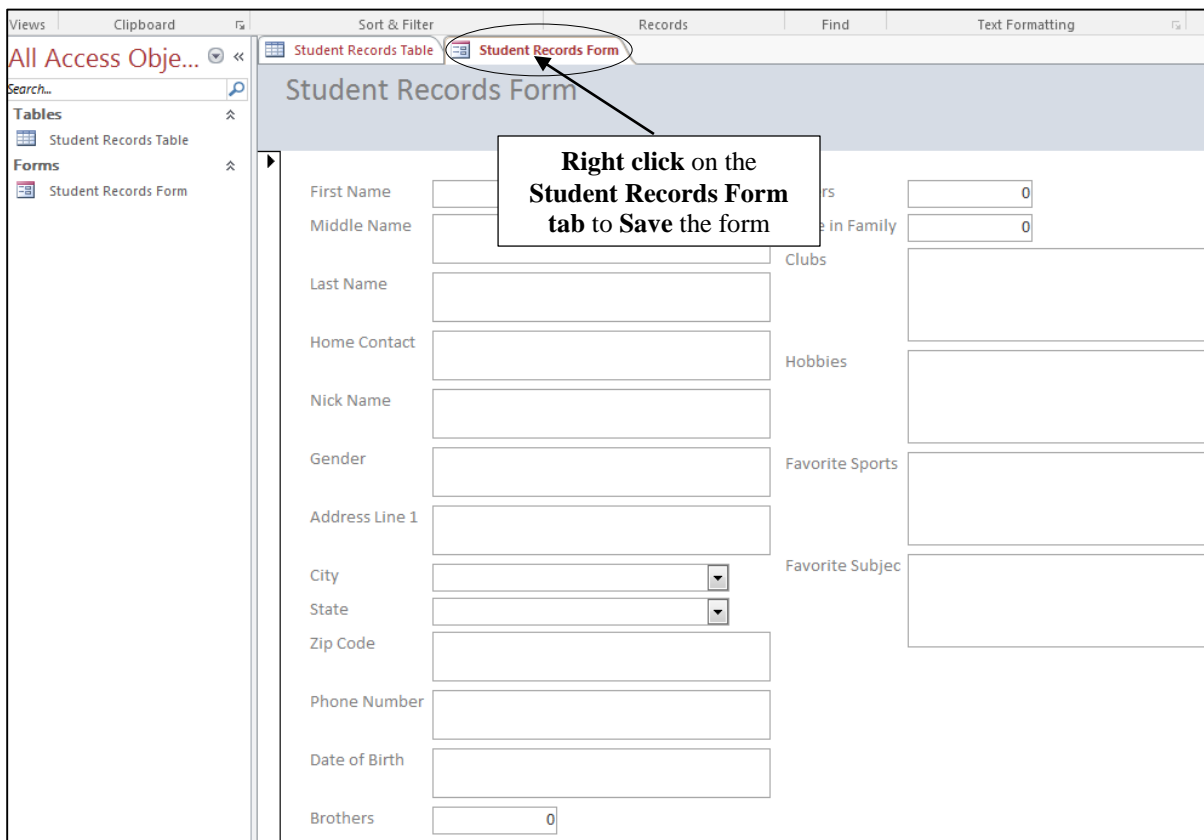*Access* now displays the Wizard's default layout for the Form (Fig. 6.27).

Fig. 6.27 The new form in Form View

> **Right click** on the **Student Records Form tab** (see Fig. 6.27 above) and click on **Save** in the pop up context menu

If you wanted to, you could make changes to the layout of the Form you see on the screen. But the default layout is fine in this case, so we'll leave well alone for now. Later, in Lesson 7, you will learn how to make layout changes to forms such as this when you learn how to create new reports.

Now is where all your hard work pays off. You should see the new form on your screen, and it should look something like Fig. 6.27 on the previous page. You can now go ahead and start adding records to the new database.

6.7 ADDING RECORDS TO A NEW OR EXISTING DATABASE

Creating a new database based on the Student Records Template database

The *Access* database called *Student Records Template* is so named because you want to use this same template document (with its table *Student Records Table*) and data entry form (*Student Records Form*) over and over for class records in the years ahead.

Before you start adding data about this semester's or this year's students, you need to create a new database using this template as the model. You will use a *copy* of the *original* template to store actual student data for a hypothetical class (or a real class, if you are a practicing teacher). The *original* template will remain unchanged so that you can use it in the future as the basis for other class databases.

How you name documents is important. For the sake of this exercise, you're going to call the new database *Roster 2016* (or some other appropriate name if you prefer). The name indicates that the document will contain the database of student records for a 2016 class. If you are currently teaching, feel free to use a different name if you want to use this tutorial to build an actual database for your own class. Wherever we refer to *Roster 2016*, substitute the name of your choice.

The Student Records Template database should still be displayed on your screen (you already saved it). You can have only one (1) *Access* database open at a time, so *Access* will automatically close the Template database when you start to create a new one.

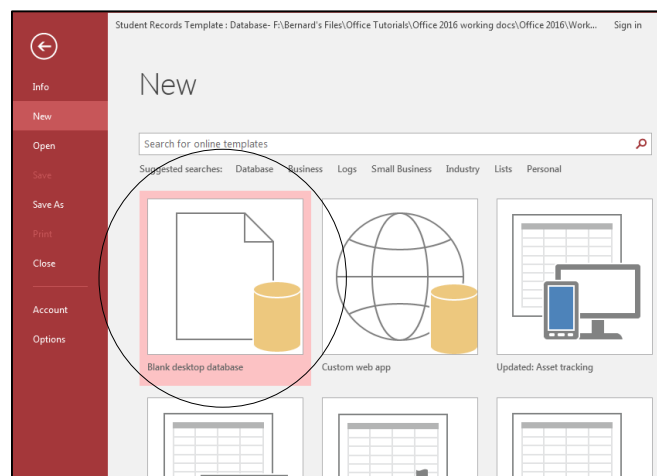> In the **File menu** select **New** and click on **Blank Desktop Database** (Fig. 6.28)

Fig. 6.28 Opening a New database

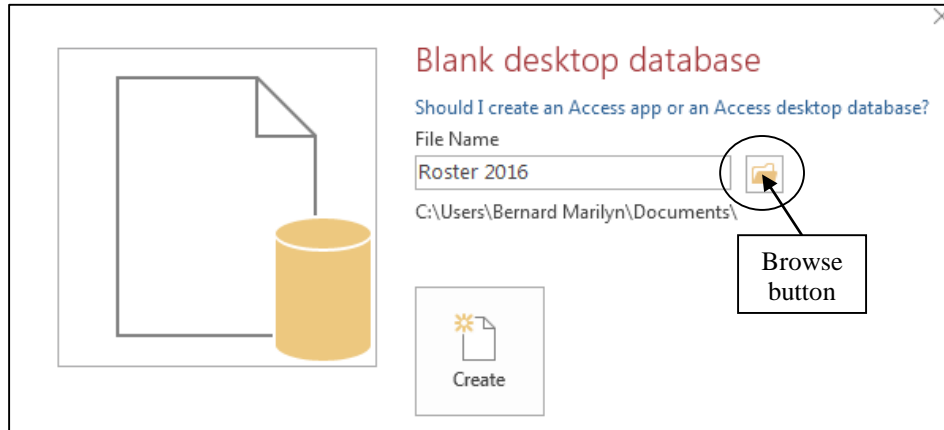In the **New** database dialog box that pops up (Fig. 6.29), type the new database name **Roster 2016**

Fig. 6.29 Browse button

Click on the **Browse** button and navigate to your **USB drive** > **Work Files for Office 2016** > **Data Files** folder, then open the **Database Documents** folder (which is where you are going to save the new Roster 2016 database)

Click **OK** then, back in the **Blank desktop database** dialog box, click on the **Create** button

Importing a Table

You are going to start by importing the table called *Student Records Table* from the *Student Records Template* database. This will save you having to recreate the table all over again with the Field Name data for the new class of students that you are going to enter into the *Roster 2016* database. Notice, however, that there is already a default Table called Table1 listed as an object in the left hand column of the new database window (Fig. 6.30).

Before importing the table from the *Student Records Template* database, you need to delete this Table1, which you can do by simply closing it.

Right click on the **Table1 Tab** (Fig. 6.30) and, in the pop up menu, select **Close**
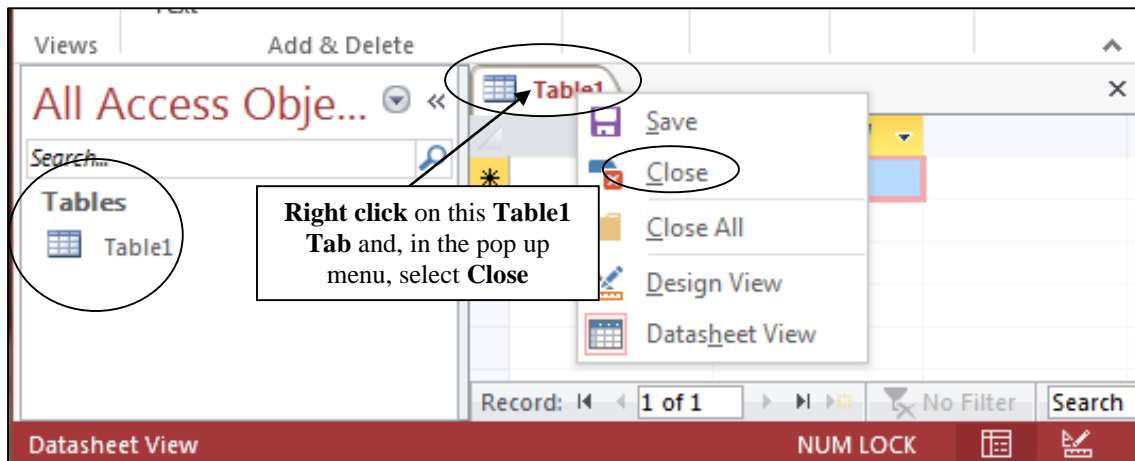

Fig. 6.30 Closing and deleting the default Table1

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Now, in the **External Data Ribbon** > **Import & Link group** click on the **Access icon** (Fig. 6.31) in order to import an existing *Access* database table, form, or report
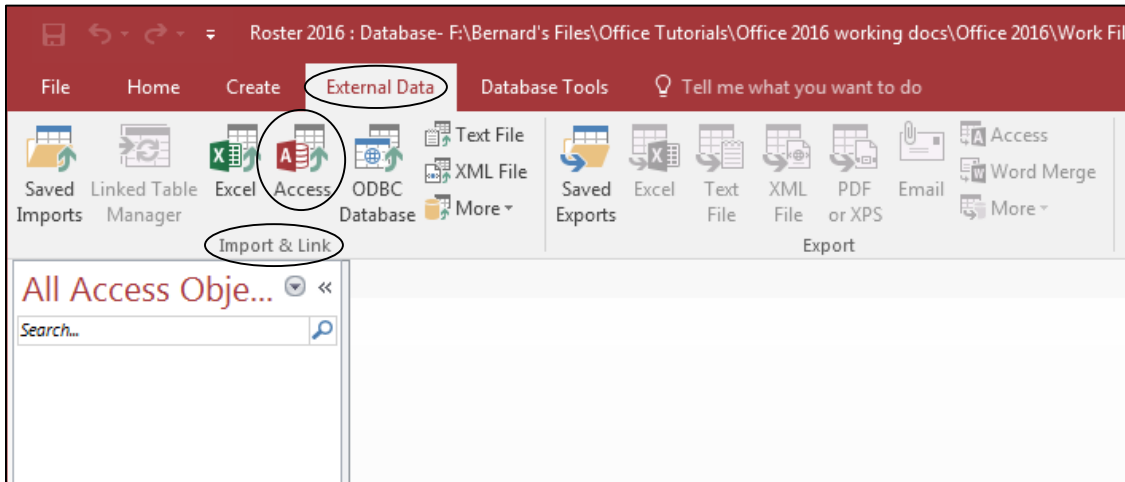

Fig. 6.31 Importing an *Access* database from an External Data Source

In **Get External Data – *Access* Database** (Fig. 6.32 below), click on the **Browse** button then, in the **File Open** dialog box, navigate to your **USB drive** > **Work Files for Office 2016** > **Data Files** > **Database Documents** folder

Double click on the **Student Records Template** database to **Select** it and, in the **Get External Data – *Access* Database** dialog box, notice that the path to your Student Records Template is in the File Name box (Fig. 6.32), and click on **OK**
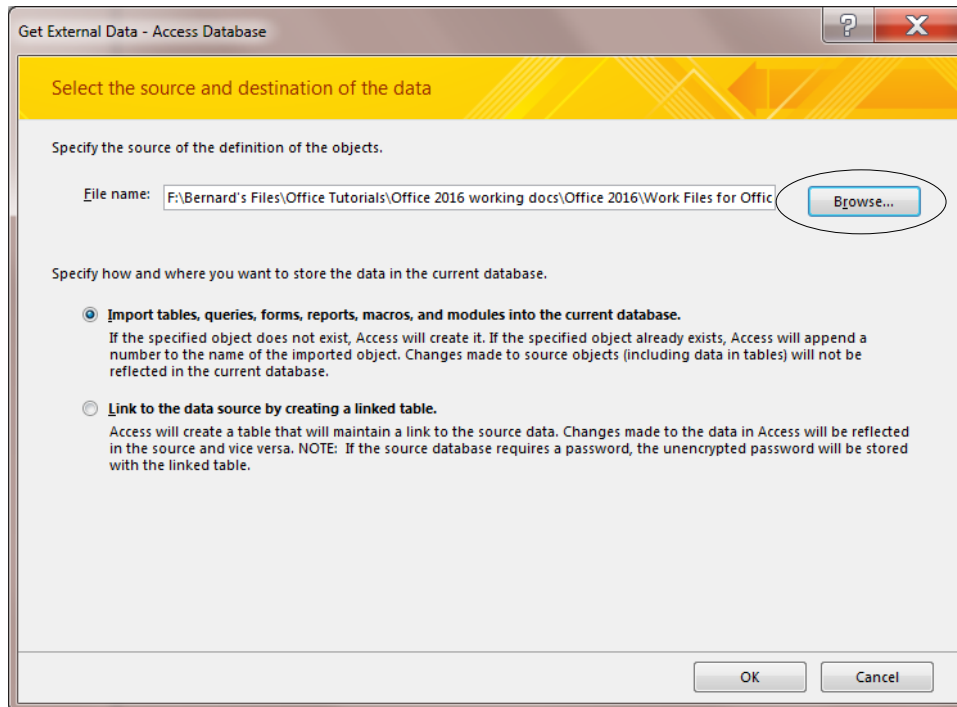

Fig. 6.32 Get External Data – Access Database dialog box

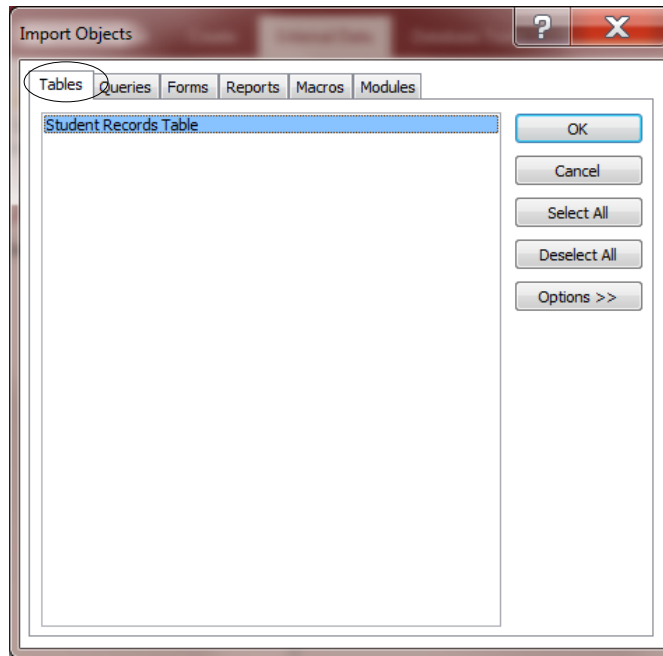Now you should see the Import Objects dialog box (Fig. 6.33)

Fig. 6.33 Import Objects dialog box

In the **Import Objects** dialog box, make sure the **Tables tab** is selected, then click on the **Student Records Table** and click **OK**

There's no need to save the import steps you just carried out, so click on **Close** to close the **Get External Data – *Access* Database** dialog box

The Table has now been imported from the *Student Records Template* into your *Roster 2016* database (Fig. 6.34).
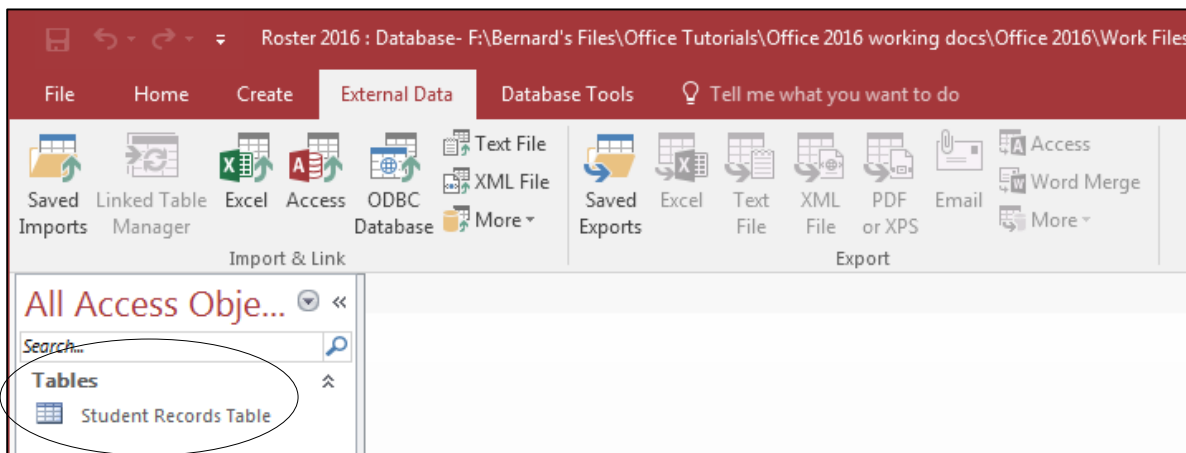

Fig. 6.34 Student Records Table imported into the Roster 2016 database

Now you need to import the form you created for the template database.

Importing a Form
Here now are the steps to import the *Student Record Form* from the *Student Records Template* database.

Once again, in the **External Data Ribbon** > **Import & Link group** click on the *Access* **icon** to import an existing *Access* database table, form, or report

In the **Get External Data – *Access* Database** dialog box, **Browse** to your **USB Drive** > **Work Files for Office 2016** > **Data Files** > **Database Documents** folder

Double click on the **Student Records Template** to **Select** it and, in the **Get External Data – *Access* Database** dialog box, click on **OK**

Now you should again see the Import Objects dialog box.

In the **Import Objects** dialog box, first click on the **Forms tab** (Fig. 6.35), then click on the **Student Records Form** to select it, and click **OK**
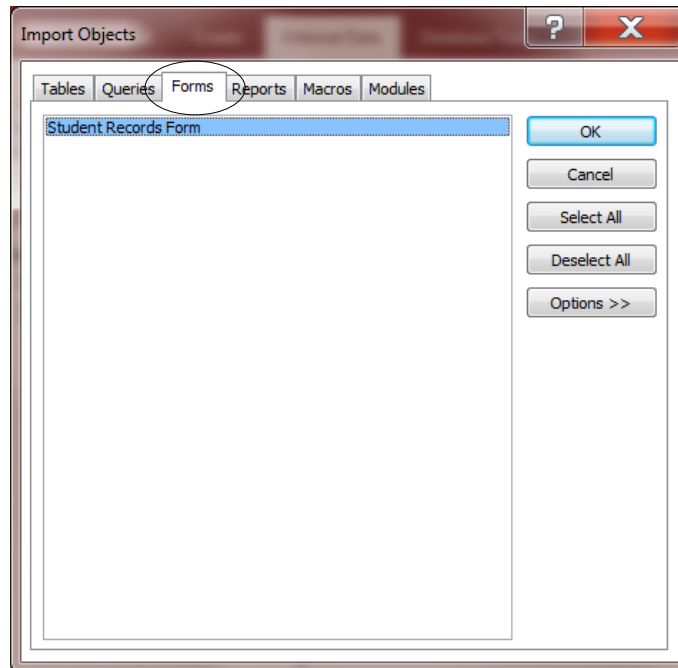

Fig. 6.35 Importing the Student Records Form

No need to save the steps you just carried out, so in the next dialog box click on **Close**

The Form is now imported from the *Student Records Template* into the *Roster 2016* database (Fig. 6.36).
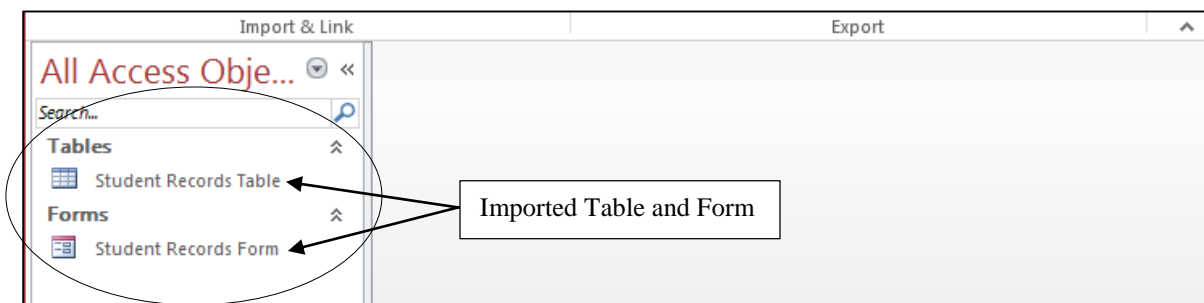

Fig. 6.36 Student Records Form imported from the Student Records Template

The *Roster 2016* database now has a Table and a Form identical to the table and form that you created for the *Student Records Template* database. You can add student records to the database any time you like. So if you are *not* yet ready to insert new records at this stage, you can close the database. If you want to start entering data now, you can proceed with the tutorial. There's not much more to do.

Entering the data for the records in the database document

> You should still have the **Roster 2016** database open, so **double click** in the left hand frame on **Student Records Form** to open it

Remember that each record in the Roster 2016 database is made up of the data for a full set of 19 entries for each student. If you are an in-service teacher, and you want to add the data for the students in your class, you should practice entering at least one or two records on your own. But you might then want to see how your students can handle this job. There is a lot of data for each record after all. If you have a Windows computer in your home room, and you have *Access* installed, get your students involved in the data entry process. They will enjoy it, and you will be able to delegate an otherwise tedious task.

If you are a student teacher, you may or may not have the opportunity to complete this exercise with a real class. Whatever the case, you will need to enter a few records at this stage (five will do nicely for now) so that you can complete the rest of this tutorial.

> Begin by selecting the **First Name** field of **record #1** by clicking in the data entry box (the cursor is probably waiting there, unless you have already clicked elsewhere)
>
> Type in the **First Name** of one of the students in your roster

The names don't have to be in any particular order since you can quickly sort them later on. Check the name you just typed. Is it correct?

> If so, hit the **Tab** key to proceed to the next field (you'd press **Shift-Tab** if you wanted to move to a previous field)

Notice that the data are now stored in the data entry box for the First Name field in Record 1. If you wanted to correct the data, you would do so by clicking in the data entry box and then make any changes as if you were in the word processor.

> Continue entering data for **Record 1** (the data for the first student in the roster); make up the data as you go along if you don't have actual students in mind

Adding a New Record to the database

> After you type the **last field entry** for each record, press **Tab**, and *Access* will automatically present a **new record Form**

Access will also automatically save each completed record into the database on your disk, so you don't have to worry about losing your work as you go along, and you also won't need to save the database at the end.

> Type the entries into each field one by one; be sure to press the **Tab** key after each entry to get to the next field (eventually you should have **at least 5 records** in the **Roster 2016** database)

Adding a record to an existing database is just the same. New records are always added at the end of the database. If you want the new record to appear in a specific place in the Datasheet view you would use the Sort function. You'll learn how to do this in Lesson 7.

The new record will always have the same layout and format characteristics as the others in the database. Also, remember that *Access* automatically saves a new record in the database after you have filled in the data for every entry.

6.8 VIEWING THE DATA IN THE DATABASE

Here are some of the ways to move about in a database. *Access* makes it easy for you to get around. Take a few moments to move from field to field and from record to record. Try these exercises.

> Click anywhere in the **data entry box** next to a **field name**

This allows you to edit or add data if needed.

> Hit the **Tab** key to move to the **next field** in the **same record**

> To move to the **same field** in the **next** or **previous** *record*, click on the left or right arrows in the **Navigation tools** at the bottom of the Form window (Fig. 6.35)
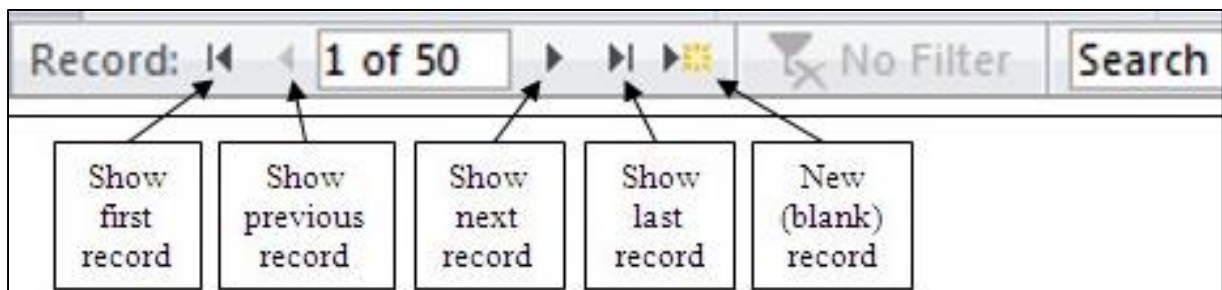

Fig. 6.35 The *Access* database navigation tools

In Lesson 7 you will learn other ways of searching through the database, along with other ways of selecting sets of records from the database, and so forth. For now, as a final exercise in Lesson 7, let's just learn how to update (change) the data in an *Access* database record.

6.9 UPDATING ENTRIES AND RECORDS IN THE DATABASE

The following exercises will give you the opportunity to practice working with the data in a database.

Updating the contents of a field (one item of data in a student record)

> You should still be looking at the **Student Records Form**

To change the contents of a field in a record, click on the field data entry box, then erase characters or words in the same way as you would if you were in the word processor.

Deleting (clearing) a record

In order to delete a single record from a database, you would select the record that you want to remove, then, in the Home Ribbon, select Delete Record from the Delete menu in the Records Group menu.

Try this for practice.

> Click on the **second record** in the **Roster 2016** database to select it

> In the **Home Ribbon** > **Records Group**, from the **Delete menu** select **Delete Record**

Access will warn you that you are about to delete a record and will tell you that you will not be able to undo the deletion. This gives you the opportunity to change your mind, which you can do in this case. *Access* will otherwise immediately permanently remove the record if you click on *Yes*.

> Click on **No** in the dialog box

Deleting several records at once

You can use the Datasheet View to clear several records that are listed next to each other. To delete several records at one time here's what you do.

> You need to be in the **Datasheet View** of the database, so, in the left hand frame, **double click** on **Student Records Table**

> Now drag in the **left hand margin** of the Table to **highlight** any two **adjacent records** that you want to delete

> In the **Home Ribbon** > **Records Group**, from the **Delete menu** select **Delete Record**

The database will warn you that you are about to delete however many records you have selected, and will ask you if you are sure you want to do this.

> You don't, so click on **No** in the dialog box

Bear in mind that the Delete Record command completely removes a record, such that it is irretrievable.

6.10 SAVING A BACKUP COPY OF YOUR WORK

Your last task before completing this session at the computer is to make a backup of your *Student Records Template* and *Roster 2016* databases. The Roster 2016 database is still open. Both databases are also saved in the *Work Files for Office 2016* on your disk, which should still be in the disk drive. It's usually best to make a backup on another disk (or even in Microsoft's Cloud, if you have access to that). But for this exercise we'll just rename each of the databases and save them in the same folder as the original.

Let's make a backup of the Roster 2016 database first.

> Go to **File** > **Save As** > **Save Database As** then click on the **Save As** button to **Browse** to your **USB drive** > **Work Files for Office 2016** > **Data Files** > **Database Documents** folder

> Name the file **Roster 2016 Backup** and click on **Save**

Now you need to make a backup copy of the Student Records Template.

> First **close** the **Roster 2016 Backup** database, then go to File > Open > and Browse to your **USB drive** > **Work Files for Office 2016** > **Data Files** > **Database Documents** folder and **open** the **Student Records Template**

> Go to **File** > **Save As** > **Save Database As** then click on the **Save As** button to **Browse** to once again to your **USB drive** > **Work Files for Office 2016** > **Data Files** > **Database Documents** folder

> Name the file **Student Records Template Backup** and click on **Save**

> Finally **Close** the *Access* database

LOOKING BACK

You have learned how to build an *Access* database. The concepts that have been covered in this tutorial apply in general to all computer-based databases. You have to plan first. Then you have to define, or set up, the database, telling the system what fields you need in each record. This done, you enter the data for each record and save everything on the disk.

You practiced scanning the database in multiple (Datasheet or columnar) or single (Form) record layout. You also learned how to clear records and change entries.

LOOKING FORWARD

There is a great deal more to learn about the *Access* database, especially with regard to searching for specific sets of data, sorting (arranging) data, and producing various types of reports. Lesson 7 will provide you with the opportunity to practice these skills. In the meantime, in Lesson 7 you will learn how to do Mail Merge. This is an especially useful skill for teachers, since you will often want to "mass mail" correspondence to the parents of your students. Mail Merge is also useful for other types of projects such as various kinds of forms that need to be tailored for individual needs. Mail Merge involves the use of the *Access* database, too; so now that you are familiar with *Access 2016*, you are ready to tackle Mail Merge.

SKILL CONSOLIDATION

Complete these exercises to reinforce what you have learned in Lesson 6.

1. Design and create a database for the names, addresses, and telephone numbers you have in your address book. Enter as many names and addresses as you like (as long as you have at least 6). Don't forget to save the database records as you go along.

2. Add a couple of records to the database you created in exercise 1. Clear a record.

3. Add a field to the address book database—say Association (how are the people associated to you—friend, colleague, etc.). Then enter the data for each record for the new field.

4. Imagine you are teaching a class and you want your students to do research on a topic. Design and create a database around that topic. You could discuss the fields with your students. The students would then go off, do the research, and enter the data into the database as a basis for a paper they must prepare. This would be a nice group (team) exercise.

5. Design and create a database for a Birthday List of your family and friends. Include fields such as Name, Birthday, Greek sign, Favorite color, Clothes sizes, Hobby, etc. Have at least 6 records in the database, with each record containing at least 5 fields. Create a Form for the database as well as a Table.

6. Open the *Access* database Roster 2016 and enter a complete new record for a student named Jane Doe.

7. Open the *Access* database named Template. Change the name to Grade X.2016 so you won't lose the template, and add three (3) records. Then save the updated database.