6 Access 365

Contents at a Glance

IN THIS CHAPTER

- Understanding how databases work
- Looking at tables, queries, forms, and other database objects
- Creating a database
- Designing the tables, queries, forms, and the other parts of a database

Chapter 1
Introducing Access

The word *database* is prone to making most people feel kind of queasy. Can you blame them? Database terminology — record, field, and filter — is the worst of the worst. It even puts other computer terminology to shame. Databases intimidate most people. Even brave souls with a considerable amount of experience in Word and Excel shy away from *Access,* the Office 365 database program. However, Access can be invaluable for storing and organizing customer lists, inventories, addresses, payment histories, donor lists, and volunteer lists.

This chapter introduces databases and the concepts behind databases. It shows you how to create a database and database tables for storing information. The second half of this chapter explains how to design databases. Sorry, but you have to know about database design before you can start fooling with databases. You can't jump right in as you can with the other Office programs.


TIP

Access offers a practice database called Northwind that you can experiment with as you get to know your way around databases. To open this database, click the File tab and choose New. Then, in the New window, enter **Northwind** in the Search box and click the Start Searching button.

What Is a Database, Anyway?

You may not know this, but you're no stranger to databases. The address book on your computer is a database. The telephone directory in the desk drawer is, too. A recipe book is also a database, in that recipes are categorized under different

headings. If you ever arranged a CD collection in a certain way — in alphabetical order or by musical genre, for example — you created a database of CDs, one that makes finding a particular CD easier. Any place where information is stored in a systematic way can be considered a *database.* The only difference between a computerized database and a conventional database, such as a telephone directory, is that storing, finding, and manipulating data is much easier in a computerized database.

Imagine how long it would take to find all the New York addresses in an address list with 10,000 entries. In Access, you can query a 10,000-entry database and find all New York addresses in a matter of seconds. For that matter, you can query to find all the addresses in a certain ZIP code. You can put the list in alphabetical order by last name or in numerical order by ZIP code. Doing these chores without a computer requires many hours of dreary, monotonous labor.

Tables, Queries, Forms, and Other Objects

One problem with getting to know a database program — and the primary reason that people are intimidated by databases — is that you can't jump right in. You have to know how data is stored in a database and how it is extracted, to use database terminology. You have to know about *objects,* Access's bland word for database tables, queries, forms, and all else that makes a database a database. To help you get going, these pages offer a crash course in databases. They explain the different *objects* — tables, queries, forms, and reports — that make up a database. Fasten your seatbelt. If you complete the crash course without crashing, you're ready to create your first database.

Database tables for storing information

Information in databases is stored in *database tables* like the one in Figure 1-1. In a database table, you include one field for each category of information you want to keep on hand. *Fields* are the equivalent of columns in a table. Your first duty when you create a database table is to name the fields and tell Access what kind of information you propose to store in each field. The database table in Figure 1-1 is for storing employee information. It has eight fields: ID, First Name, Last Name, E-mail Address, Business Phone, Company, Job Title, and Home Phone.

A database can comprise one database table or many different tables that are linked together. If you're dealing with a lot of information, storing data in more than one table is to your advantage. Later in this chapter, "Separating information into different database tables" explains why storing data across several database tables is advantageous.

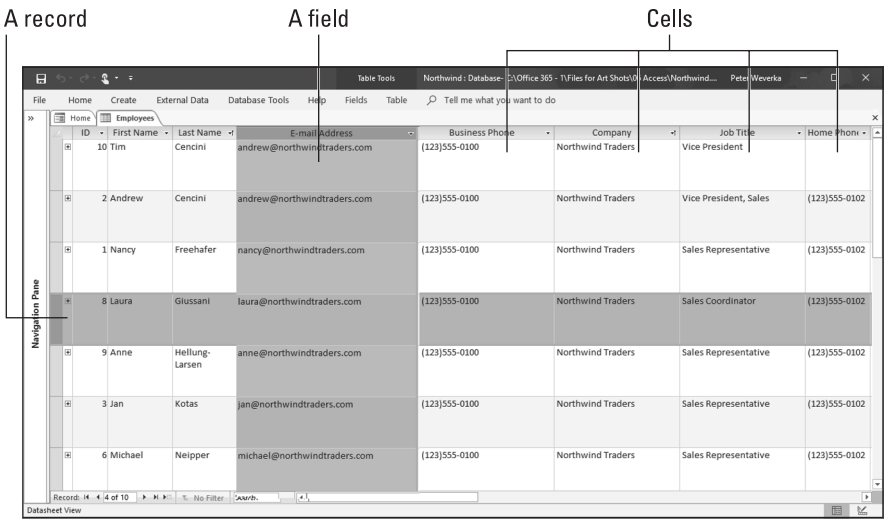

FIGURE 1-1: A database table.

ACCESS DATABASE TERMINOLOGY

Stumbling over database terminology is easy. To keep yourself from stumbling, fold back the corner of this page and return here if one of these database terms puzzles you:

- **Cell:** In a database table, a place for entering one piece of data. Cells appear in a database table where a field and record intersect.
- **Database:** A systematic way of organizing information so that it can be retrieved and manipulated easily.
- **Database table:** A collection of data records arranged into well-defined categories, or fields. Most relational databases have more than one table.
- **Dynaset:** The results of a search for data in a database. (This term is short for dynamic set.) A dynaset is not to be confused with a dinosaur.
- **Field:** One category of information in a database table. Fields are the equivalent of columns in a conventional table.
- **Filtering:** Finding the records in a database table that have the same or nearly the same field value. Filtering is a more convenient but not as sophisticated means of querying a database.
- **Foreign key field:** In a relationship between two database tables, the field that is on the "many" side of a one-to-many relationship. The primary key field is on the "one" side.

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- **Form:** Similar to a dialog box, a place with text boxes and drop-down lists for entering records in a database table.
- **Module:** A Visual Basic procedure whose job is to perform a certain task in Access.
- **Object:** The catch-all term for the tables, queries, forms, and reports that you create and open starting in the Navigation pane.
- **Primary key field:** The field in a database table where unique, one-of-a-kind data is stored. To query more than one database table at a time, the tables must have primary key fields.
- **Query:** A question asked of a database that yields information. Queries can be made of a single database table, several tables, or even other queries.
- **Record:** In a database table, all the data that has been recorded about one person or thing. A record is the equivalent of a row in a conventional table.
- **Relational database:** A database program in which data is kept in more than one database table, relationships are established between tables, and queries can be conducted and reports made by assembling data from different tables. Access is a relational database. A database that permits only one table is a *flat-file database.*
- **Report:** Information gathered from a database and laid out in such a way that it's easy to read and understand. Reports are meant to be printed and distributed.
- **Sort:** To rearrange records in a database table so that the records appear in alphabetical, numerical, or date order in one field.

Forms for entering data

After you create the fields in the database table, you can start entering the records. A *record* describes all the data concerning one person or thing. Although you can enter records straight into a database table, the easiest way to enter a record is with a *form.* Similar to a dialog box, a form has convenient text boxes and drop-down lists for entering information, as shown in Figure 1-2. On a form, you can see clearly what kind of information needs entering in each field.

Queries for getting the data out

Figure 1-3 shows a simple query for finding out which employees in the database table shown in Figure 1-1 are Sales Representatives. A *query* is a question you ask of a database. The question here is, "Who is a Sales Representative?" Notice the criterion "Sales Representative" in the Job Title field on the Query grid.

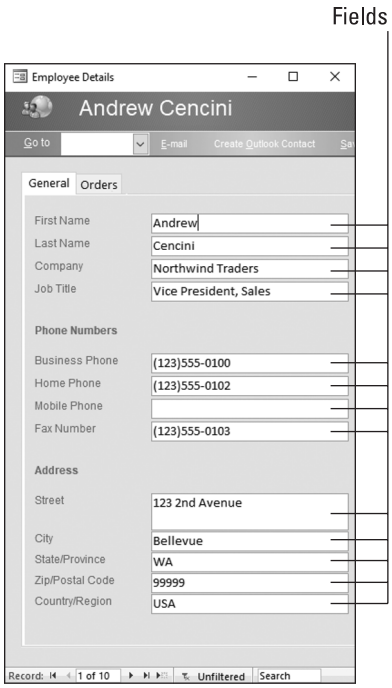


FIGURE 1-2: A form for entering data.

In an address database, you can use a query to find all the people in a particular ZIP code or state. If information about contributions is stored in the database, you can find out who contributed more than $500 last year. Queries can get very complex. For example, you can find all the people in a particular city who contributed between $50 and $500 and volunteered more than eight hours in the past year. You can construct the query so that it produces each person's name and telephone number, or you can construct it so that all the information you have concerning each person appears in the query results.

When you get junk mail, it likely comes to your mailbox as the result of a database query. Companies routinely buy and sell customer databases. They query these databases to gather the names of people who they believe are well-disposed to purchasing the products they sell. Next time you get junk mail solicitation, study the letter and ask yourself, "How did I get in this database, and which database query produced my name?" The junk mailer is probably targeting extraordinarily beautiful, intelligent people.

After you create a query, you can save it and run it again. You can use it as the basis for constructing new queries. The information in database tables usually changes over time. Customers change addresses. New products come online, and others are discontinued. But no matter how much the data changes, you can find out exactly what you want to know from a database by running a well-crafted query.

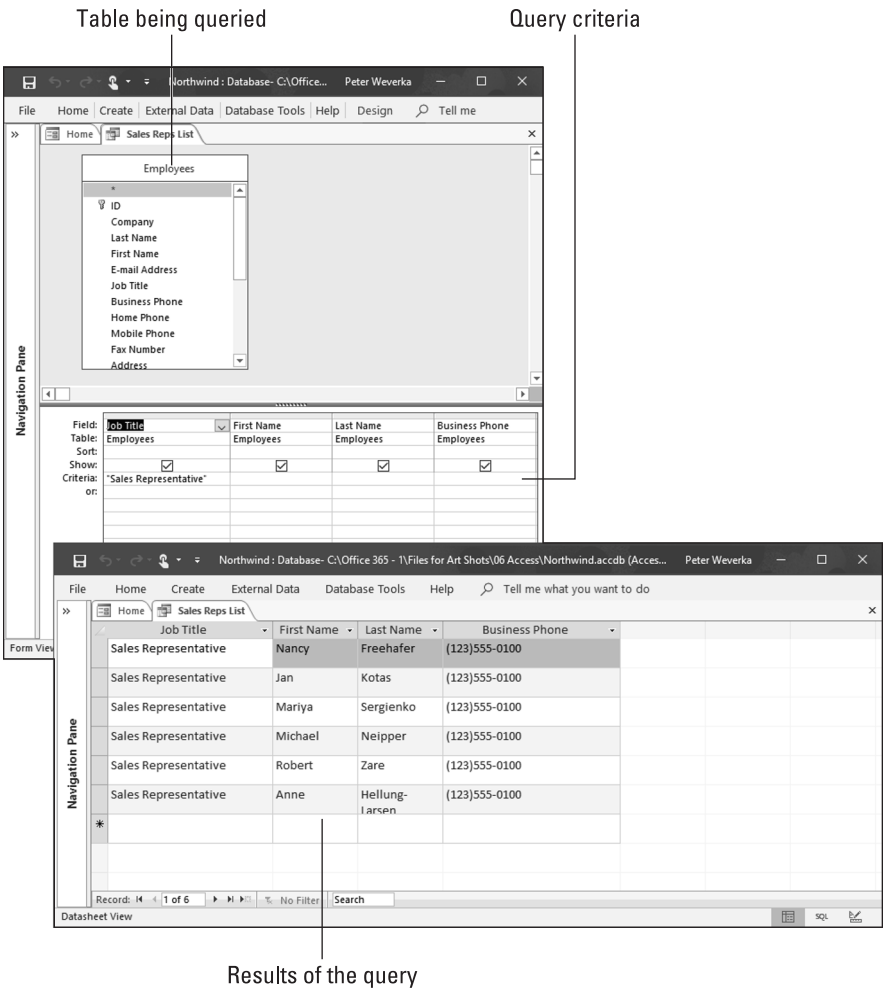


FIGURE 1-3: Querying a database.

Reports for presenting and examining data

Figure 1-4 shows a *report.* Reports can be made from database tables or from the results of queries. Reports are usually read by managers and others who don't get their hands dirty in databases. They're meant to be printed and distributed so that the information can be scrutinized and analyzed. Access offers many attractive reports. Don't worry: The program does most of the layout work for you, and exporting reports to a Word file is easy.

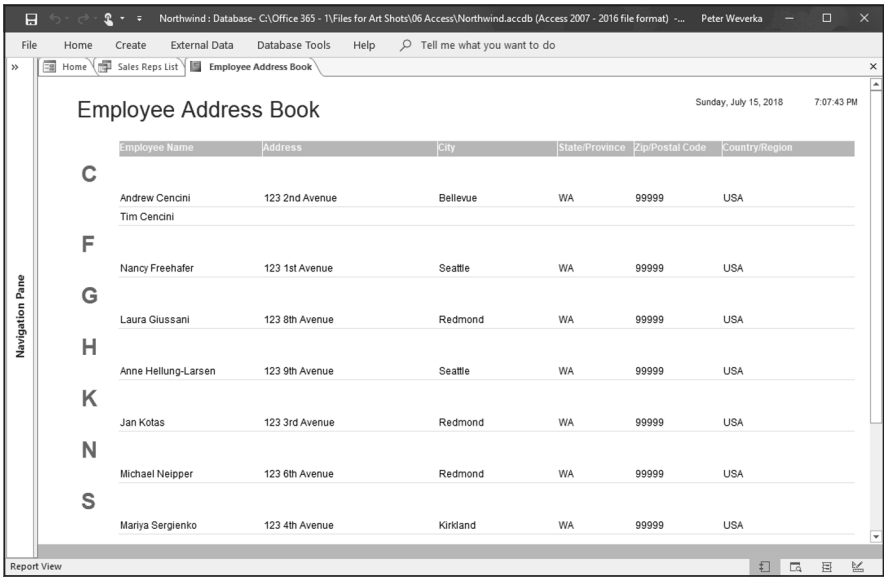


FIGURE 1-4: A report gathers data for scrutiny and analysis.

Macros and modules

Macros and modules aren't covered in this minibook, but they are also database objects. A *macro* is a series of commands. You can store macros for running queries and doing other Access tasks. A *module* is a collection of Visual Basic procedures and declarations for performing tasks in Access.

Creating a Database File

Creating a database is a lot of work, at least in the beginning. You have to design the database (a subject that I explain shortly). You have to enter the raw information into the tables. You have to construct queries that allow yourself and others to read meaning into the data (see Chapter 4 of this minibook). By contrast, creating a database file for storing the information is the easy part.

Access offers two ways to create a new database file. You can do it from scratch or get the help of a template. With a template, some of the work is done for you. The template comes with prefabricated queries, forms, and reports. However, templates are for people who already know their way around Access databases. To make use of a template, you have to know how to modify a preexisting database.

REMEMBER

Before you create a database file, start by deciding where in your computer to store it. Unlike other Office programs, Access requires you to save and name a new database file as soon as you create it.

Creating a blank database file

Follow these instructions to create a blank database file:

1. **On the File tab, choose New.**

   The New window appears.

2. **Click the Blank Desktop Database icon.**

   A dialog box appears for choosing the folder where you will store your new database.

3. **Click the Browse button.**

   You see the File New Database dialog box.

4. **Select the folder where you want to keep the database file, enter a name in the File Name text box, and click OK.**

5. **Click the Create button.**

   The Navigation pane and a blank table appear. Later in this chapter, "Finding Your Way around the Navigation Pane" explains what this pane is all about. I suggest you go there without delay or deferral.

Getting the help of a template

As I explain earlier, templates are wonderful if you have the wherewithal to modify them. Access offers prefabricated databases for tracking assets, keeping inventory, scheduling resources, and doing other things. Unfortunately, the only way to find out whether one of the templates is worthwhile is to go to the trouble to create a database from a template, open the database file, and look around.

Follow these steps to create a database file from a template:

1. **On the File tab, choose New.**

   The New window opens.

2. **Select a template or use the Search box to obtain a template online from Microsoft.**

   Templates showing the globe icon are applications, not databases. Access applications are designed for use with web browsers.

3. **Click the Browse button.**

   The File New Database dialog box opens.

4. **Select the folder where you want to keep the database file, enter a name in the File Name text box, and click OK.**

5. **Click the Create button.**

   The Navigation pane and a blank table appear. Read on to find out how to find your way around the Navigation pane.

Finding Your Way around the Navigation Pane

The first thing you see when you open most database files is a Navigation pane like the one in Figure 1-5. This is the starting point for doing all your work in Access. From here, you can select an object — that horrible word again! — and begin working. Tables, queries, and other objects you create are added to the Navigation pane when you create them.

Here are shorthand instructions for doing this, that, and the other thing in the Navigation pane:

- **Choosing an object type:** Select a group (Tables, Queries, Forms, Reports, and so on) from the Object Type drop-down list at the top of the Navigation pane, or select All Access Objects to see all the groups, as shown in Figure 1-5.
- **Creating a new object:** Go to the Create tab and choose what type of object you want to create. When creating new forms and reports, click a table or query in the Navigation pane to base the new form or report on a table or query.
- **Opening an object:** To open a database table, query, form, or report, do one of the following: Double-click it; select it and press Enter; or right-click it and choose Open on the shortcut menu.
- **Opening an object in Design view:** The task of formulating database tables, forms, and queries is done in Design view. If an object needs reformulating, right-click it and choose Design View on the shortcut menu.
- **Finding objects:** Use the Search bar (located at the top of the Navigation pane) to search for objects.
- **Opening and closing the Navigation pane:** Click the Shutter Bar Open/Close button on upper-right corner of the Navigation pane (or press F11) when you want to shrink it and get it out of the way. You can also resize this pane by clicking the far right edge and dragging it left or right.

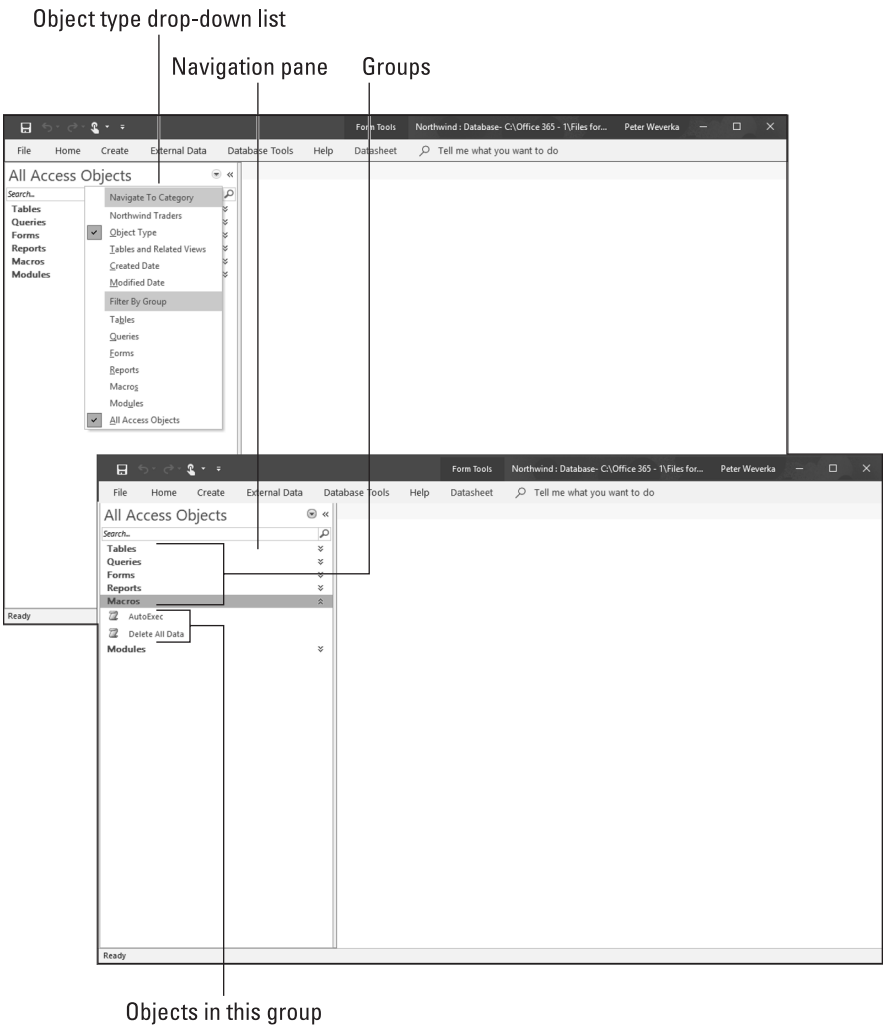


FIGURE 1-5: Finding and selecting objects with the Navigation pane.

Designing a Database

Being a database designer isn't nearly as glamorous as being a fashion designer, but it has its rewards. If you design your database carefully and correctly, it can be very useful to you and others. You can enter information accurately. When the time comes to draw information from the database, you get precisely the information you need. These pages explain everything you need to consider when designing a database. Pay close attention to "Separating information into different database tables," later in this chapter, because the hardest part about designing a database is deciding how to distribute information across database tables and how many database tables to have.

Deciding what information you need

The first question to ask yourself is about the kind of information you want to get out of the database. Customer names and addresses? Sales information? Information for inventory tracking? Interview your coworkers to find out what information could be helpful to them. Give this matter some serious thought. Your goal is to set up the database so that every tidbit of information your organization needs can be recorded.

TIP

A good way to find out what kind of information matters to an organization is to examine the forms that the organization uses to solicit or record information. These forms show precisely what the organization deems worthy of tracking in a database. Figure 1-6, for example, shows the paper form that players fill out to sign up for a baseball league whose database tables appear in Figure 1-7. Compare Figure 1-6 with Figure 1-7 and you can see that the Players, Teams, and Divisions database tables all have fields for entering information from this form.

FIGURE 1-6: Paper forms also have fields.

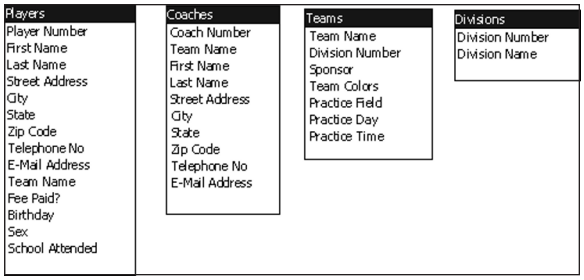


FIGURE 1-7: Plans for database tables and field names.

Separating information into different database tables

After you know the information you want to record in the database, think about how to separate the information into database tables. Many are tempted to put

all the information into a single database table, but because Access is a *relational database*, you can query more than one table at a time, and in so doing, assemble information from different tables.

To see how it works, consider the simple database, as shown in Figure 1-7. The purpose of this little database and its four tables is to store information about the players, coaches, and teams in a baseball league. The Team Name field appears in three tables. It serves as the link among the tables and permits more than one to be queried. By querying individual tables or combinations of tables in this database, you can assemble team rosters, make a list of coaches and their contact information, list teams by division, put together a mailing list of all players, find out which players have paid their fee, and list players by age group, among other things. This database comprises four tables:

- **Players:** Includes fields for tracking players' names, addresses, birthdays, which teams they're on, and whether they paid their fees
- **Coaches:** Includes fields for tracking coaches' names, addresses, and the names of the teams they coach
- **Teams:** Includes fields for tracking team names and which division each team is in
- **Divisions:** Includes fields for tracking division numbers and names

Deciding how many database tables you need and how to separate data across the different tables is the hardest part of designing a database. To make the task a little easier, do it the old-fashioned way with a pencil and eraser. Here are the basic rules for separating data into different tables:

- **Restrict a table to one subject only:** Each database table should hold information about one subject only — customers, employees, products, and so on. This way, you can maintain data in one table independently from data in another table. Consider what would happen in the Little League database (refer to Figure 1-7) if coach and team data were kept in a single table, and one team's coach was replaced by someone new. You would have to delete the old coach's record, delete information about the team, enter information about the new coach, and reenter information about the team that you just deleted. But by keeping team information separate from coach information, you can update coach information and still maintain the team information.
- **Avoid duplicate information:** Try not to keep duplicate information in the same database table or duplicate information across different tables. By keeping the information in one place, you have to enter it only once, and if you have to update it, you can do so in one database table, not several.

Entire books have been written about database design, and this book can't do the subject justice. You can, however, store all your data in a single table if the data you want to store isn't very complex. The time you lose entering all the data in a single table is made up by the time you save not having to design a complex database with more than one table.

Choosing fields for database tables

As I explain earlier, *fields* are categories of information. Each database table needs at least one field. If the table itself is a subject, you could say that its fields are facts about the subject. An Address database table needs fields for recording street addresses, cities, states, and ZIP codes. A Products database table needs fields for product ID numbers, product names, and unit prices. Just the facts, ma'am. Within the confines of the subject, the database table needs one field for each piece of information that is useful to your organization.

When you're planning which fields to include in a database table, follow these guidelines:

- Break up the information into small elements. For example, instead of a Name field, create a First Name field and a Last Name field. This way, you can sort database tables by last name more easily.
- Give descriptive names to fields so that you know what they are later. A more descriptive name, such as *Serial Number,* is clearer than *SN.*
- Think ahead and include a field for each piece of information your organization needs. Adding a field to a database table late in the game is a chore. You have to return to each record, look up the information, and enter it.
- Don't include information that can be derived from a calculation. As I explain in Chapter 4 of this minibook, calculations can be performed as part of a query or be made part of a table. For example, you can total the numbers in two fields in the same record or perform mathematical calculations on values in fields.

Deciding on a primary key field for each database table

REMEMBER

Each database table must have a *primary key field.* This field, also known as the *primary key,* is the field in the database table where unique, one-of-a-kind data is stored. Data entered in this field — an employee ID number, a part number, a bid number — must be different in each record. If you try to enter the same data in the primary key field of two different records, a dialog box warns you not to do

that. Primary key fields prevent you from entering duplicate records. They also make queries more efficient. In a query, you tell Access what to look for in database tables, Access searches through the tables, and the program assembles information that meets the criteria. Primary key fields help Access recognize records and not collect the same information more than once in a query.

Social security numbers make good primary key fields because no two people have the same social security number. Invoice numbers and serial numbers also make excellent primary key fields. Returning to the sample baseball league database (refer to Figure 1-7), which fields in the Little League database tables are primary key fields? In the Teams table, Team Name can be the primary key field because no two teams have the same name. Division Number can also be a primary key field because divisions in the league are numbered and no two divisions have the same number.

The Players and Coaches database tables, however, present a problem when it comes to choosing a primary key field. Two players might have the same last name, which rules out Last Name as a primary key field. A brother and sister might have the same telephone number, which rules out a Telephone No. field. Because no field holds values that are certain to be different from record to record, I introduce fields called Player Number and Coach Number. For the purpose of this database, players and coaches are assigned numbers. (Chapter 2 in this minibook explains how Access can assign sequential numbers for you in a database table.)

Mapping the relationships between tables

If your database includes more than one table, you have to map how the tables relate to one another. Usually, relationships are formed between the primary key field in one table and the corresponding field in another, called the *foreign key*. Figure 1-8 shows the relationships between the tables in the Little League database. Because these tables are linked by common fields, you can gather information from more than one table in a query or report. Chapter 2 in this minibook takes up the subject of linking tables in more detail. For now, when you design your database, consider how to connect the various tables with common fields.

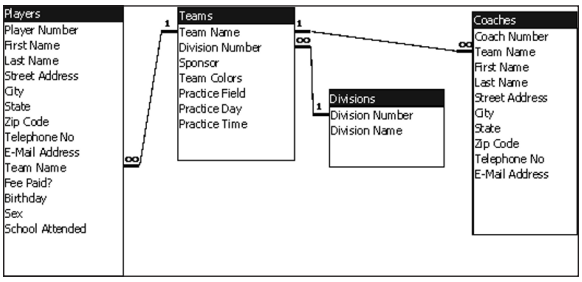


FIGURE 1-8: Table relationships.

IN THIS CHAPTER

- Creating database tables
- Using field properties to make data entries more accurate
- Indexing fields in a table
- Forming relationships among tables

Chapter 2
Building Your Database Tables

Database tables are the building blocks of a database. They hold the raw data. Relationships among the tables permit you to query and generate reports from several different tables. How well your database tables are put together and how accurately data is entered in the tables determine whether your database is a thing of beauty or a wilted flower.

This chapter explains how to create database tables and fields for the tables. It explains what primary key fields are and how primary key fields and indexed fields make it easier for Access to sort, search, and query a database. This chapter describes how to forge relationships among tables. Fasten your seatbelts. In this chapter, you find numerous tips and tricks for making sure that data is entered accurately in your database tables.

Creating a Database Table

Raw data is stored in database tables (or in a single table, if you decide to keep all the data in one place). The first and most important part of setting up a database is creating the tables and entering the data. After you enter the data, you can

harass your database for information about the things and people your database keeps track of. If you haven't done so already, read the sections in Chapter 1 of this minibook that pertain to storing information and designing a database before you create a database table. Chapter 1 of this minibook explains what database tables are and how to fashion a splendid one.

The business of creating a database table starts on the Create tab. As I explain in detail in the next few pages, Access offers three ways to create a database table:

- **Create the database table from scratch:** Enter and format the fields one at a time on your own.
- **Get the help of a template:** Get prefabricated fields assembled in a table. This is the way to go if you know Access well and you can modify database tables and table fields.
- **Import the database table from another database:** This technique can be an enormous timesaver if you can recycle data that has already been entered in a database table in another Access database.

Creating a database table from scratch

Creating a table from scratch entails creating the table and then entering the fields one by one. After you open a database file, follow these steps to create a database table from scratch:

1. **Go to the Create tab.**
2. **Click the Table Design button.**

   The Design window appears. From here, you enter fields for your database table. I hate to be like a City Hall bureaucrat who gives everybody the runaround, but I can't help myself. Turn to "Entering and Altering Table Fields," later in this chapter, to find out how to enter fields in a database table.
3. **Click the Save button on the Quick Access toolbar.**

   The Save As dialog box appears.
4. **Enter a descriptive name for your table and click OK.**

   Return to the Navigation pane and you see the name of the table you created. If you don't believe me, click the Tables group to see the names of tables in your database.

Creating a database table from a template

If you know your way around Access and know how to modify database tables, you can do worse than create a database table with a template. Access offers four template types: Contacts (for storing contact addresses and phone numbers); Issues (for prioritizing issues); Tasks (for tracking projects, their status, and when they are due); and Users (for storing email addresses). As well as creating a table, Access creates ready-made queries, forms, and reports to go along with the table. After you create a table with a template, you can remove fields that you don't want. Deleting fields is always easier than adding new ones.

Follow these steps to use a template to create a table (and accompanying queries, forms, and reports):

1. **Close all objects if any objects are open.**

   To close an object, click its Close button or right-click its tab and choose Close on the shortcut menu.

2. **On the Create tab, click the Application Parts button.**

   A drop-down list with options for creating forms and tables appears. (The tables are listed under "Quick Start.")

3. **Choose Contacts, Issues, Tasks, or Users.**

   If you have other tables in your database, a dialog box asks whether you want to create a relationship between the table you're creating and another table.

4. **Select the There Is No Relationship option button and click Create.**

   Later in this chapter, "Establishing Relationships among Database Tables" explains how to create relationships on your own. If you want to create these relationships now and you have the wherewithal to do it, select an option besides There Is No Relationship, choose a table on the drop-down list, and click the Next button to choose which field to forge the relationship with.

5. **On the Navigation pane, right-click the name of the table you created and choose Design View (or click the Design View button in the lower-right corner of the screen).**

   In Design view, you can see the names of the fields in the table. If the table contains fields you don't want or you want to change the names of the fields, turn to "Entering and Altering Table Fields," later in this chapter.

Importing a table from another database

Few things are more tedious than entering records in a database table. If the records you need were already entered elsewhere, more power to you. Follow these steps to get a database table from another Access database:

1. **Go to the External Data tab.**
2. **Click the New Data Source button, choose From Database on the drop-down list, and choose Access on the sublist.**

   The Get External Data – Access Database dialog box opens.
3. **Click the Browse button, and in the File Open dialog box, select the Access database with the table you need and click Open.**

   You return to the Get External Data – Access Database dialog box.
4. **Select the first option button (Import Tables, Queries, Forms, Reports, Macros, and Modules into the Current Database) and click OK.**

   You see the Import Objects dialog box, as shown in Figure 2-1.
5. **On the Tables tab, select the database table you want.**

   You can import more than one database table by clicking several table names or clicking the Select All button.

FIGURE 2-1: Fetching a table from another database.

TIP

You can import a table structure — its field names and formats — without importing the data in the table. To do so, click the Options button in the Import Objects dialog box, and under Import Tables, select the Definition Only option button (refer to Figure 2-1).

6. **Click OK.**

WARNING

If the table you want to import includes lookup fields, import the tables or queries that the lookup fields refer to as well as the table itself. Without those tables or queries, the lookup fields won't be able to obtain any values. Later in this chapter, "Creating a lookup data-entry list" explains what lookup fields are.

Opening and Viewing Tables

To open a table, start in the Navigation pane and select the Tables group to view the names of database tables you created. How you open a table depends on whether you want to open it in Datasheet view or Design view. Here's the difference between these views (see Figure 2-2):

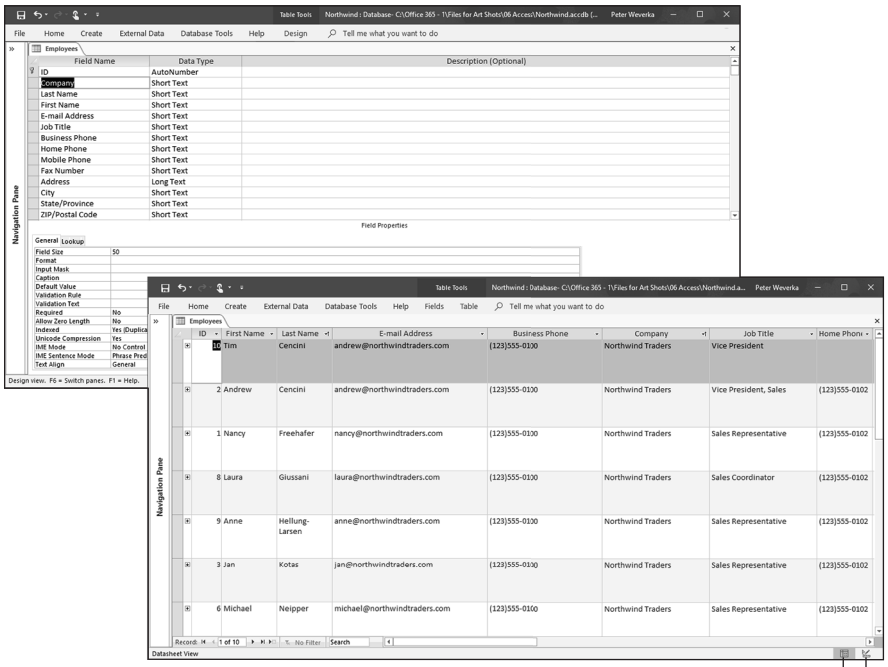


FIGURE 2-2: A table in Design view (top) and Datasheet view (bottom).

- Datasheet view is for entering and examining data in a table.
- Design view is for creating fields and describing their parameters.

Select a table on the Navigation pane and use one of these techniques to open and view it:

- **Opening in Design view:** Right-click the table's name in the Navigation pane and choose Design View on the shortcut menu.
- **Opening in Datasheet view:** On the Navigation pane, double-click the table's name or right-click its name and choose Open on the shortcut menu.
- **Switching between views with the View button:** On the Home tab, click the View button and choose Datasheet View or Design View.
- **Switching between views on the status bar:** Click the Datasheet View or Design View button on the right side of the status bar (refer to Figure 2-2).
- **Switching between views by right-clicking:** Right-click the table's tab and choose Datasheet View or Design View.

Entering and Altering Table Fields

After you create a database table, the next task is to enter the fields, or if Access created the table for you, alter the fields to your liking. As Chapter 1 of this minibook explains, fields represent categories of information in a database table. They are the equivalent of columns in a conventional table. Fields determine what kind of information is stored in a database table.

These pages explain how to create a field, choose the right data type, display data in fields, and designate the primary key field in a table. While I'm on the subject of fields, W.C. Fields said, "Horse sense is the thing a horse has which keeps it from betting on people."

Creating a field

Create a field on your own or get Access's help and create a ready-made field. Both techniques are described here. Ready-made fields include fields designed especially for storing currency data, hyperlinks, and date information.

Creating a field on your own

To create a field on your own, open the table that needs a new field and follow these steps on the (Table Tools) Design tab:

1. **Switch to Design view if you aren't already there.**

   To switch to Design view, click the Design View button on the status bar.

2. **If necessary, insert a new row for the field.**

   To do so, click in the field that is to go after the new field, and then click the Insert Rows button on the (Table Tools) Design tab.

3. **Enter a name in the Field Name column.**

   Names can't include periods or be longer than 64 letters, but you don't want to enter a long name anyway because it won't fit very well along the top of the table.

   WARNING

   Some database programs don't permit spaces in field names. If you intend to export Access data to other database programs, don't include spaces in field names. Instead, run the words together or separate words with an underscore character, like this: underscore_character.

4. **Press the Tab key or click in the Data Type column, and choose a data type from the drop-down list, as shown in Figure 2-3.**

   Data types classify what kind of information is kept in the field. The next topic in this chapter, "All about data types," explains data types.

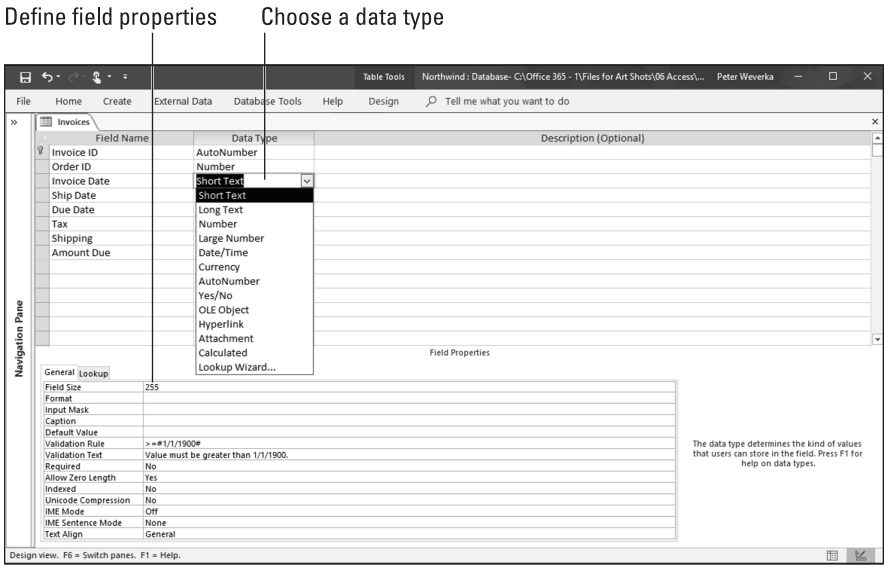


FIGURE 2-3: Choosing a data type.

5. **If you want, enter a description in the Description column.**

   These descriptions can be very helpful when you need to reacquaint yourself with a field and find out what it's meant to do.


TIP

In case the name you choose for your field isn't descriptive enough, you can give the field a second name. The name appears in Datasheet view, on forms, and on reports. To enter a second, descriptive field name, enter the name in the Caption field on the General tab of the Design view window.

Later in this chapter, "Field Properties for Making Sure That Data Entries Are Accurate" demonstrates how to define field properties in the Design view window to make it easier for data-entry clerks to enter the data.

Taking advantage of ready-made fields

You can get a head start creating a field by using a ready-made field and then modifying it, if necessary. To create a ready-made field, switch to Datasheet view and select the field that you want your new field to go after. Then, on the (Table Tools) Fields tab, click a field button or click the More Fields button and choose the name of a field on the drop-down list.

Look for field buttons in the Add & Delete group. Field buttons include Short Text, Number, and Currency. After you create your new field, switch to Design view and examine its field properties. Some of these properties may need modifying. See "Field Properties for Making Sure That Data Entries Are Accurate" for information about field properties.

All about data types

To choose a data type for a field, open the Data Type drop-down list in the Design view window and choose a data type (refer to Figure 2-3). Data types are the first line of defense in making sure that data is entered correctly in a table. Try to enter text in a field assigned the Currency or Number data type, and Access tells you that your entry is invalid. You get the chance to fix your mistake as soon as you make it.

Table 2-1 explains the options on the Data Type drop-down list. Choose data types carefully because how you classify the data that is entered in a field determines how you can query the field for information. Querying for a number range is impossible, for example, if the field you're querying isn't classified as a Number or Currency field on the Data Type drop-down list.

Designating the primary key field

As I explain in Chapter 1 of this minibook, no database table is complete without a primary key field. The *primary key field* identifies which field in the table is unique and contains data that differs from record to record. Duplicate values and null values can't be entered in the primary key field. (A *null value* indicates a missing or unknown value.) Choosing a primary key field is so important that Access doesn't let you close a table unless you choose one.

TABLE 2-1 Data Types for Fields

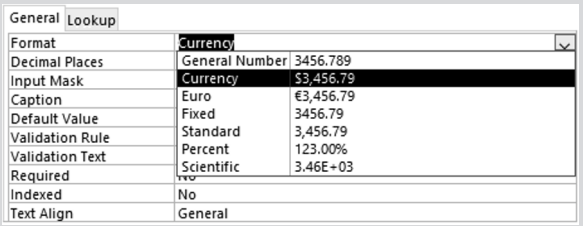
Data Type	What It's For
Short Text	For storing text (city names, for example), combinations of text and numbers (street addresses, for example), and numbers that won't be calculated or used in expressions (telephone numbers, ZIP codes, and social security numbers, for example). A Short Text field can be no longer than 255 characters.
Long Text	For storing long descriptions. Fields assigned this data type can hold 65,535 characters, not that anyone needs that many.
Number	For storing numbers to be used in calculations or sorting. (If you're dealing with monetary figures, choose the Currency data type.)
Large Number	For importing and linking to BigInt (big integer) data. This data type is for working with calculations involving extremely large numbers.
Date/Time	For storing dates and times and being able to sort data chronologically or use dates and times in calculations.
Currency	For storing monetary figures for use in calculations and sorting.
AutoNumber	For entering numbers in sequence that will be different from record to record. Use the AutoNumber data type for the primary key field if no other field stores unique, one-of-a-kind data.
Yes/No	For storing True/False, Yes/No, On/Off type data. Choose this data type to enter data with a check box in the field. When the box is selected, the data in the field is True, Yes, or On, for example.
OLE Object	For embedding an OLE link in your Access table to another object — an Excel worksheet or Word document. (Consider the using the Attachment data type as well.)
Hyperlink	For storing hyperlinks to other locations on the Internet or on the company intranet.
Attachment	For storing an image, spreadsheet, document, chart, or other file. Attaching a file to a database table is similar to attaching a file to an email message. Attachments do not require as much disk space as OLE objects because they don't require Access to store a bitmap image of the original file.
Calculated	For entering a mathematical expression that uses data from other fields in the database table.
Lookup Wizard	For creating a drop-down list with choices that a data-entry clerk can choose from when entering data. See "Creating a lookup data-entry list," later in this chapter.

DECIDING HOW THE DATA IN FIELDS IS DISPLAYED

To decide how numbers, times, dates, currency values, and Yes/No data are displayed in fields, go to the General tab in the Field Properties part of the Design view and choose an option on the Format drop-down list. The display options are useful indeed. Choose the Currency format, for example, and you don't have to enter the dollar signs or commas when you enter a dollar figure in the field because the dollar sign and commas are entered for you.

Moreover, you can create a format of your own by entering these placeholder symbols in the Format text box:

- @ (at symbol): A character or space is required. For example, @@@@-@@ inserts a hyphen between the first set of numbers and the second. You don't have to enter the hyphen, only the text or numbers.
- & (ampersand): A character or space is optional. For example, @@@@@-&&&& in a ZIP Code field tells Access that either entry is correct, a five-character ZIP code or the ZIP code that has five characters plus the four extra characters.
- > (right bracket): Displays all characters in the field as uppercase. Merely by entering this symbol in the Format text box, you can display all entries in the field as uppercase without the data-entry clerk's having to hold down the Shift or Caps Lock key.
- < (left bracket): Displays all characters in the field as lowercase.



TIP

If no field in your table holds one-of-a-kind data that is different from record to record, get around the problem with one of these techniques:

- **The AutoNumber data type:** Create a new field, give it a name, choose AutoNumber from the Data Type drop-down list (refer to Figure 2-3), and make your new field the primary key field. This way, when you enter data,

Access enters a unique number to identify each record in the field. (To generate random numbers instead of sequential numbers in an AutoNumber field, go the General tab of the Design view window, open the New Values drop-down list, and choose Random instead of Increment.)

- **A multiple-field primary key:** Combine two or more fields and designate them as the primary key. For example, if you're absolutely certain that no two people whose names will be entered in your database table have the same name, you can make the First Name and Last Name fields the primary key. The problem with multiple-field primary keys, however, is that it takes Access longer to process them, and you run the risk of entering duplicate records.

Follow these steps on the (Table Tools) Design tab to designate a field in a database table as the primary key field:

1. **In Design view, select the field or fields you want to be the primary key.**

   To select a field, click its *row selector,* the small box to its left; Ctrl+click row selectors to select more than one field.

2. **Click the Primary Key button.**

   A small key symbol appears on the row selector to let you know which field or fields are the primary key fields.

To remove a primary key, click its row selector and then click the Primary Key button all over again.

Moving, renaming, and deleting fields

Suppose that you need to move, rename, or delete a field. To do so, switch to Design view and follow these instructions:

- **Moving a field:** Select the field's row selector (the box to its left) and release the mouse button. Then click again and drag the selector up or down to a new location.
- **Renaming a field:** Click in the Field Name box where the name is, delete the name that's there, and type a new name.
- **Deleting a field:** Click in the Field Name box, go to the (Table Tools) Design tab, and click the Delete Rows button. You can also right-click the field and choose Delete Rows on the shortcut menu.

Field Properties for Making Sure That Data Entries Are Accurate

Unfortunately, entering the data in a database table is one of the most tedious activities known to humankind. And because the activity is so dull, people are prone to make mistakes when they enter data in a database table. One way to cut down on mistakes is to take advantage of the Field Properties settings on the General tab in the Design view window. Figure 2-4 shows the General tab.

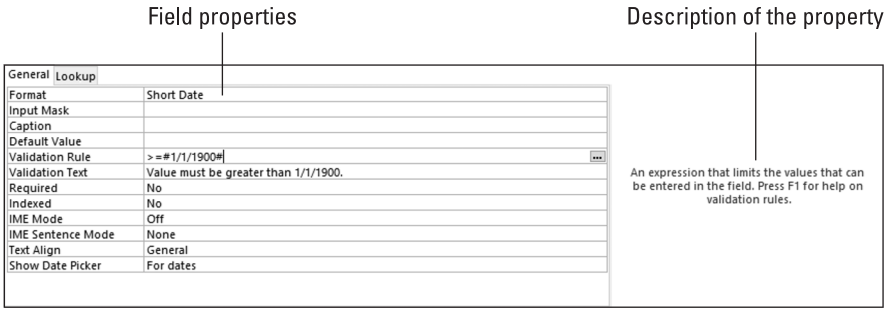


FIGURE 2-4: Establishing field properties.

These properties determine what can and can't be entered in the different fields of a database table. Some of the settings are invaluable. The Field Size property, for example, determines how many characters can be entered in a field. In a State field where two-letter state abbreviations are to be entered, make the Field Size property 2 to be certain that no one enters more than two characters. If the majority of people you're tracking in an address database live in New York, enter NY in the Default Value property. That way, you spare data-entry clerks from having to enter NY the majority of the time. They won't have to enter it because NY is already there.

The Lookup tab in the Field Properties part of the Design view window is for creating a data-entry drop-down list. It, too, is invaluable. If you happen to know that only four items can be entered in a field, create a drop-down list with the four items. That way, data-entry clerks can choose from a list of four valid items instead of having to enter the data themselves and perhaps enter it incorrectly. (See "Creating a lookup data-entry list," later in this chapter.)

A look at the Field Properties settings

Especially if yours is a large database, you're encouraged to study the field properties carefully and make liberal use of them. The Field Properties settings safeguard data from being entered incorrectly. Following is a description of the

different properties (listed here in the order in which they appear in the Design view window) and instructions for using them wisely. Which properties you can assign to a field depends on which data type the field was assigned.

Field Size

In the Field Size box for Text fields, enter the maximum number of characters that can be entered in the field. Suppose that the field you're dealing with is ZIP code, and you want to enter five-number ZIP codes. By entering **5** in the Field Size text box, only five characters can be entered in the field. A sleepy data-entry clerk couldn't enter a six-character ZIP code by accident.

For Number fields, select a value for the field size from the drop-down list. Table 2-2 describes these field sizes.

TABLE 2-2 Numeric Field Sizes

Field Size	Description
Byte	An integer that holds values from 0–255.
Integer	An integer that holds values from –32,768– +32,767.
Long Integer	An integer that holds values from –2,147,483,648– +2,147,483,647.
Single	A floating point number that holds large values up to 7 significant digits.
Double	A floating point number that holds large values up to 15 significant digits.
Replication ID*	A globally unique identifier (GUID) required for replication; this number is generated randomly.
Decimal	A number with defined decimal precision. The default precision is 0, but you can set the scale up to 28.

**Not supported by the .accdb file format.*

The Single, Double, and Decimal field size options hold different ranges of numbers. For now, if you need to store numbers after the decimal point, choose the Double field size so that you cover most situations.

Format

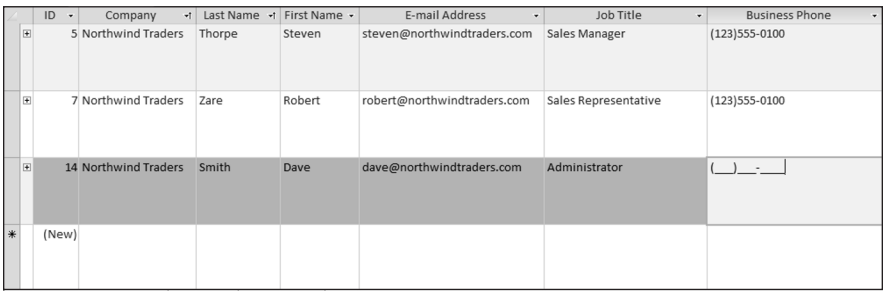
Earlier in this chapter, "Deciding how the data in fields is displayed" (a sidebar) explains the Format property. Click the drop-down list and choose the format in which text, numbers, and dates and times are displayed.

Decimal Places

For a field that holds numbers, open the Decimal Places drop-down list and choose how many numbers can appear to the right of the decimal point. This property affects how numbers and currency values are displayed, not their real value. Numbers are rounded to the nearest decimal point. The Auto option displays the number of decimal places permitted by the format you chose on the Format drop-down list.

Input Mask

For Text and Date field types, this feature provides a template with punctuation marks to make entering the data easier. Telephone numbers, social security numbers, and other numbers that typically are entered along with dashes and parentheses are ideal candidates for an input mask (another ridiculous database term!). On the datasheet, blank spaces appear where the numbers go, and the punctuation marks stand at the ready to receive numbers, as shown in Figure 2-5.



ID	Company	Last Name	First Name	E-mail Address	Job Title	Business Phone
5	Northwind Traders	Thorpe	Steven	steven@northwindtraders.com	Sales Manager	(123)555-0100
7	Northwind Traders	Zare	Robert	robert@northwindtraders.com	Sales Representative	(123)555-0100
14	Northwind Traders	Smith	Dave	dave@northwindtraders.com	Administrator	(___)___-____
(New)						

FIGURE 2-5: Input masks make data entry easier.

In the Input Mask text box, enter a **0** where numbers go and enter the punctuation marks where they go. For example, enter (000) 000-0000 or 000/000-0000 to enter an input mask for a telephone number like the one shown in Figure 2-5. You can also create input masks by clicking the three dots beside the Input Mask text box. Doing so opens the Input Mask Wizard dialog box, where you can fashion a very sophisticated input mask.

Caption

If the field you're working on has a cryptic or hard-to-understand name, enter a more descriptive name in the Caption text box. The value in the Caption property appears as the column heading in Datasheet view, as a label on forms, and on reports in place of the field name. People entering data understand what to enter after reading the descriptive caption.

Default Value

When you know that the majority of records require a certain value, number, or abbreviation, enter it in the Default Value text box. That way, you save yourself the trouble of entering the value, number, or abbreviation most of the time because the default value appears already in each record when you enter it. You can always override the default value by entering something different.

Validation Rule

As long as you know your way around operators and Boolean expressions, you can establish a rule for entering data in a field. For example, you can enter an expression that requires dates to be entered in a certain time frame. Or you can require currency figures to be above or below a certain value. To establish a validation rule, enter an expression in the Validation Rule text box. To use dates in an expression, the dates must be enclosed by number signs (#). Here are some examples of validation rules:

>1000	The value you enter must be over 1,000.
<1000	The value you enter must be less than 1,000.
>=10	The value you enter must be greater than or equal to ten.
<>0	The value you enter cannot be zero.
>=#1/1/2019#	The date you enter must be January 1, 2019, or later.
>=#1/1/2019# And <#1/1/2020#	The date you enter must be in the year 2019.

To get help forming expressions, click the three dots beside the Validation Rule text box to open the Expression Builder, as shown in Figure 2-6, and build an expression there. Try clicking the Help button in the Expression Builder dialog box. Doing so opens the Access Help program, where you can get advice about building expressions.

Validation Text

If someone enters data that violates a validation rule that you enter in the Validation Rule text box, Access displays a standard error message. The message reads, "One or more values are prohibited by the validation rule set for [this field]. Enter a value that the expression for this field can accept." If this message is too cold and impersonal for you, you can create a message of your own for the error message dialog box. Enter your friendly message in the Validation Text text box.

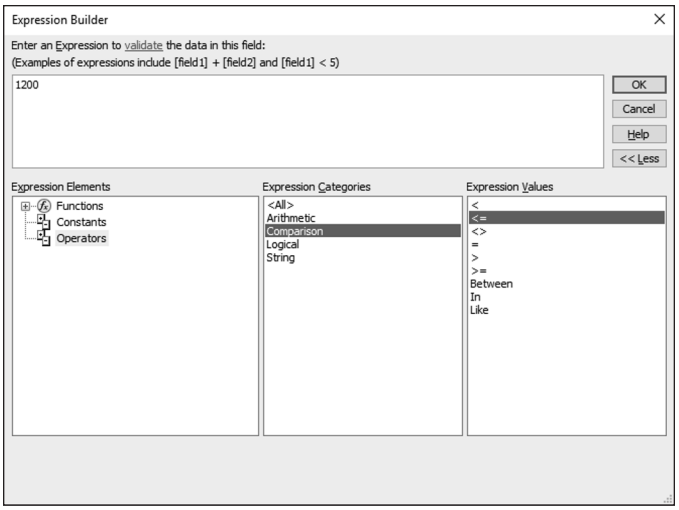


FIGURE 2-6: Creating a validation rule.

Required

By default, no entry has to be made in a field, but if you choose Yes instead of No in the Required box and you fail to make an entry in the field, a message box tells you to be sure to make an entry.

Allow Zero Length

This property allows you to enter zero-length strings in a field. A *zero-length string* — two quotation marks with no text or spaces between them ("") — indicates that no value exists for a field. To see how zero-length strings work, suppose that your database table calls for entering email addresses. If you didn't know whether one person has an email address, you would leave the E-Mail Address field blank. If, however, you knew that the person didn't have an email address, you could indicate as much by entering a zero-length string. Choose Yes on the drop-down list to permit zero-length strings to be entered in the field.

Indexed

This property indicates whether the field has been indexed. As "Indexing for Faster Sorts, Searches, and Queries" explains, later in this chapter, indexes make sorting a field and searching through a field go faster. The word *No* appears in this text box if the field has not been indexed.

Unicode Expression

Choose Yes from the Unicode Expression drop-down list if you want to compress data that is now stored in Unicode format, which is a standardized encoding

scheme. Storing data this way saves on disk space, and you probably don't want to change this property.

Smart Tags

If you intend to enter Smart Tags in the field, indicate which kind you enter by clicking the three dots next to the Smart Tags box and choosing an option in the Action Tags dialog box.

Text Align

This property determines how the text is aligned in a column or on a form or report. Select General to let Access determine the alignment, or select Left, Right, Center, or Distribute.

Text Format

Available on Long Text fields, this drop-down list lets you choose to allow rich text in the field. With this property set to Rich Text, you can make different words bold, italic, underline, and change font sizes and colors. Set it to Plain Text for plain, boring text with no formatting. I wonder why that isn't the setting's name.

Append Only

Available on Long Text fields, this property lets you add data only to a Long Text field to collect a history of comments.

Show Date Picker

This property is available on Date/Time fields. Choose For Dates to place a button next to the column that data-entry clerks can click to open a calendar and select a date instead of typing numbers.

IME Mode/IME Sentence mode

These options are for converting characters and sentences from East Asian versions of Access.

Creating a lookup data-entry list

Perhaps the best way to make sure that data is entered correctly is to create a data-entry drop-down list. That way, anyone entering the data in your database table can do so by choosing an item from the list, not by typing it in, as shown in

Figure 2-7. This method saves time and prevents invalid data from being entered. Access offers two ways to create the drop-down list:

- **Create the list by entering the items yourself:** Go this route when you're dealing with a finite list of items that never change.
- **Get the items from another database table:** Go this route to get items from a column in another database table. This way, you can choose from an ever-expanding list of items. When the number of items in the other database table changes, so does the number of items in the drop-down list because the items come from the other database table. This is a great way to get items from a primary key field in another table.

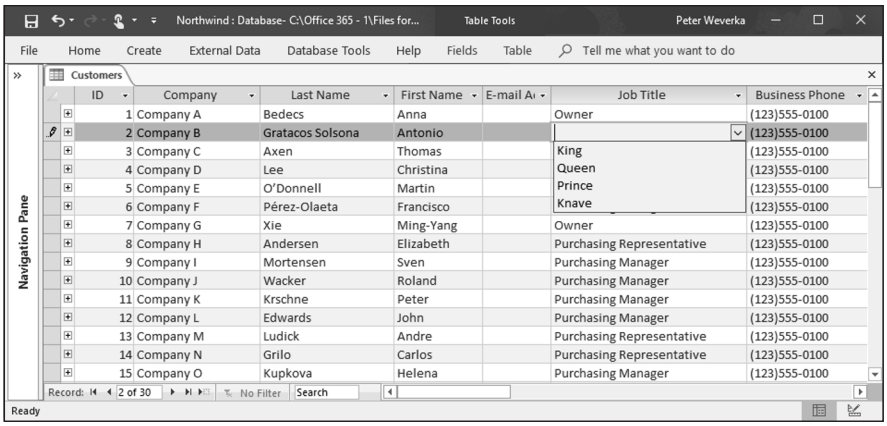


FIGURE 2-7: A so-called lookup list.

Creating a drop-down list on your own

Follow these steps to create a drop-down, or *lookup*, list with entries you type:

1. **In Design view, click the field that needs a drop-down list.**
2. **Open the Data Type drop-down list and choose Lookup Wizard, the last option in the list.**

   The Lookup Wizard dialog box appears.
3. **Select the second option, I Will Type in the Values That I Want, and click the Next button.**
4. **Under Col1 in the next dialog box, enter each item you want to appear in the drop-down list; then click the Next button.**

   You can create a multicolumn list by entering a number in the Number of Columns text box and then entering items for the list.

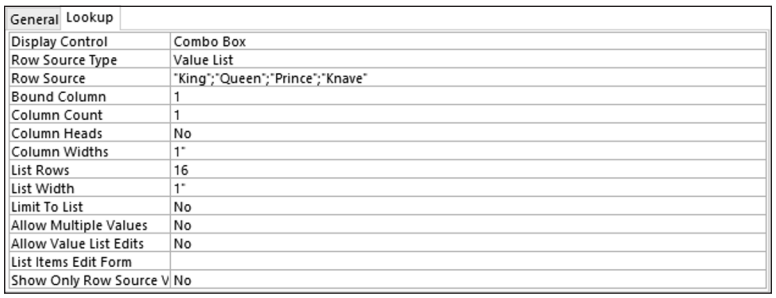
5. **Enter a name for the field, if necessary, and click the Finish button.**

   Switch to Datasheet view and open the drop-down list in the field to make sure that it displays properly.

To remove a lookup list from a field, select the field, go to the Lookup tab in the Design view window, open the Display Control drop-down list, and choose Text Box.

TIP

To see what's on a drop-down list, select the field for which you created the list, switch to Design view, and select the Lookup tab in the Field Properties pane. As shown in Figure 2-8, you can edit the list by editing or removing items in the Row Source text box. Be sure that a semi-colon (;) appears between each item.



General | Lookup

Display Control	Combo Box
Row Source Type	Value List
Row Source	"King";"Queen";"Prince";"Knave"
Bound Column	1
Column Count	1
Column Heads	No
Column Widths	1"
List Rows	16
List Width	1"
Limit To List	No
Allow Multiple Values	No
Allow Value List Edits	No
List Items Edit Form	
Show Only Row Source V	No

FIGURE 2-8: Lookup field properties.

Getting list items from a database table

Before you can get list items from another database table, you might want to define a relationship between the tables; it's not required, but it's recommended. Later in this chapter, "Establishing Relationships among Database Tables" explains how to do that. Follow these steps to get items in a drop-down list from another database table:

1. **In Design view, click the field that needs a list, open the Data Type drop-down list, and choose Lookup Wizard.**

   The Lookup Wizard dialog box appears.

2. **Select the first option, I Want the Lookup Field to Get the Values from Another Table or Query, and click Next.**

   You see a list of tables in your database.

3. **Select the table with the data you need and click the Next button.**

   The dialog box shows you a list of available fields in the table.

4. **Select the field where the data for your list is stored.**

5. **Click the > button.**

   The name of the list appears on the right side of the dialog box, under Selected Fields.

6. **Click the Next button.**

   Normally, lists are displayed in ascending order, but you can select a field and click the Ascending button to reverse the order of the list. (Note that the button turns into the Descending button.)

7. **Click the Finish button.**

   If you're so inclined, you can change the width of the list before clicking Finish, but you can always do that on the datasheet, as Chapter 3 of this minibook explains.


TIP

Suppose that you obtain the items from the wrong field or wrong database table. To fix that problem, select the field for which you created the list, and in Design view, select the Lookup tab (refer to Figure 2-8). Choose Text Box instead of Combo Box on the Display Control drop-down list and start all over.

Indexing for Faster Sorts, Searches, and Queries

Indexing means to instruct Access to keep information about the data in a field or combination of fields. Because Access keeps this information on hand, it doesn't have to actually search through every record in a database table to sort data, search for data, or run a query. In a large database table, indexes make sorting, searching, and querying go considerably faster because Access looks through its own data rather than the data in tables. The performance difference between querying a database table that has and has not been indexed is astonishing. That's the good news. The bad news is that indexes inflate the size of Access files.


TIP

By default, the field you choose as the primary key field is indexed. I recommend choosing other fields, in addition to the primary key field, for indexing if you often conduct queries and searches. When you choose a field to index, choose one with data that varies from record to record and is likely to be the subject of searches, sorts, and queries. That way, the index means something. However, a field with data that is mostly the same from record to record is a waste of a good index, not to mention disk space. By the way, Access automatically indexes fields whose names include the words *ID*, *Code*, *Num*, and *Key*, the idea being that these fields are likely to store essential information worthy of indexing.

Indexing a field

To index a field, switch to Design view, select the field you want to index, and on the General tab of the Field Properties part of the Design window, open the Indexed drop-down list and choose one of these options:

- **Yes (Duplicates OK):** Indexes the field and allows duplicate values to be entered in the field.
- **Yes (No Duplicates):** Indexes the field and disallows duplicate values. If you choose this option, the field works something like a primary key field in that Access does not permit you to enter the same value in two different records.

Indexing based on more than one field

An index created on more than one field is called a *multifield index.* Multifield indexes make sorting, querying, and searching the database table go faster. They are especially valuable in sorting operations where records in one field are usually the same but records in a companion field are different. In a large database table that stores names and addresses, for example, many names in the Last Name field are the same, so indexing on the Last Name field isn't worthwhile, but indexing the First Name and Last Name fields helps Access distinguish records from one another.

Follow these steps to generate a multifield index:

1. **Switch to Design view, and on the (Table Tools) Design tab, click the Indexes button.**

   You see the Indexes dialog box, as shown in Figure 2-9. The dialog box lists the primary key field already because it's indexed by default. You also see any fields to which you set the Indexed property to Yes.

2. **On a blank line in the dialog box, enter a name for the index in the Index Name column.**

3. **In the Field Name column, open the drop-down list and choose the first field you want for the multifield index.**

   Access sorts the records first on this field and then on the second field you choose.

4. **In the next row, leave the Index Name blank and choose another field name from the drop-down list.**

   This field is the second field in the index. You can use as many as ten different fields in a multifield index. In Figure 2-9, two fields are in a multifield index: First Name and Last Name.

5. **Choose Descending in the Sort Order column if you want the field sorted in descending order.**

   Most of the time, you want leave the Sort Order set to Ascending because most people read from A to Z.

6. **Click the Close button.**

   Click the Indexes button in Design view if you need to return to the Indexes dialog box and change how fields are indexed.

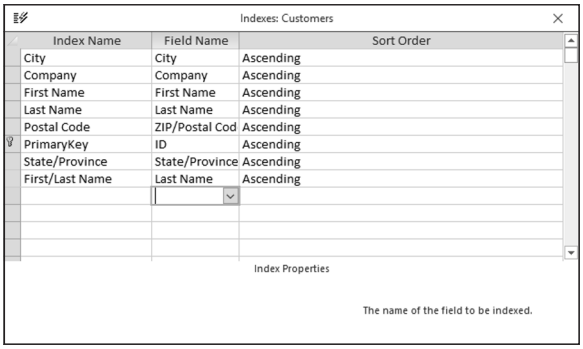


FIGURE 2-9: The Indexes dialog box.

Establishing Relationships among Database Tables

As Chapter 1 of this minibook explains, you have to establish relationships among tables if you want to query or generate reports with data from more than one database table. Relationships define the field that two different tables have in common. To understand why relationships between tables are necessary, consider the query shown in Figure 2-10. The purpose of this query is to list all companies that ordered items in 2019, list the companies by name, and list the city where each company is located.

Consider what Access does to run this query:

- Access deals with two database tables, Customers and Orders.
- In the Orders table, Access looks in the Order Date field to isolate all records that describe orders made in the year 2019. The expression for finding these records is shown on the Criteria line in Figure 2-10: `Between #1/1/2019# And #12/31/2019#`.

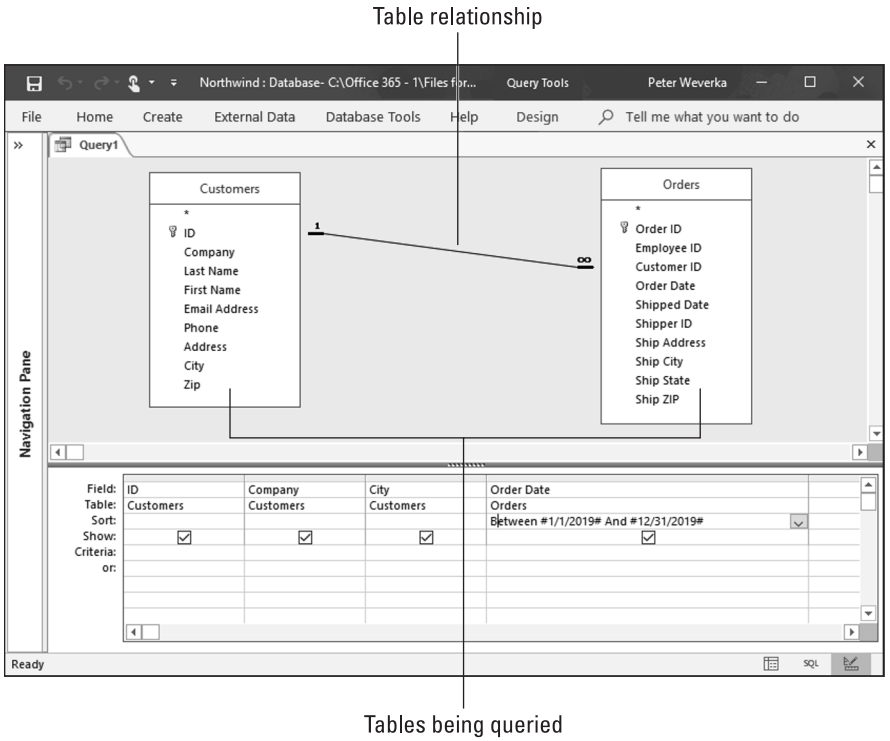


FIGURE 2-10: To conduct a query with more than one table, the tables must have a relationship.

- Because a relationship exists between the ID field in the Customers table and the Customer ID field in the Orders table — that is, the two fields hold the same type of information — Access can match the 2019 records it finds in the Orders table with corresponding records in the Customers table. Where the Customer ID of a 2019 record in the Orders table and an ID in the Customers table match, Access assembles a new record and places it in the query results.
- Data for determining which records appear in the query results is found in the Order Date field in the Orders table. But the information compiled in the query results — customer IDs, company names, and cities — comes from fields in the Customers table. Thanks to the relationship between the ID and Customer ID fields in these tables, Access can draw upon information from both tables.

Types of relationships

The vast majority of relationships between tables are *one-to-many relationships* between the primary key field in one database table and a field in another. Table relationships fall in these categories:

- **One-to-many relationship:** Each record in one table is linked to many records in another table. The relationship in Figure 2-10 is a one-to-many relationship. Each ID number appears only once in the ID field of the Customers table, but in the Orders table, the same Customer ID number can appear in many records because the same customer can order many different products. When you link tables, Access creates a one-to-many relationship when one of the fields being linked is either a primary key field or an indexed field that has been assigned the No (No Duplicates) setting. (See "Indexing for Faster Sorts, Searches, and Queries," earlier in this chapter.)
- **One-to-one relationship:** Two fields are linked. This relationship is rare and is sometimes used for security purposes.
- **Many-to-many relationship:** This complex relationship actually describes crisscrossing relationships in which the linking field is not the primary key field in either table. To create a many-to-many relationship, an intermediary table called a *junction table* is needed. This relationship is rare.

REMEMBER

Sometimes, fields in separate tables that hold the same data also have the same name, but that isn't necessary. For example, a field called ZIP Code in one table might be called Postal Code in another. What matters is that fields that are linked have the same data type. For example, you can't create a relationship between a text field and a number field.

Handling tables in the Relationships window

To display the tables in a database and link tables to one another or see how they're related to each other, go to the Database Tools tab and click the Relationships button. You see the Relationships window, as shown in Figure 2-11. Notice the field names in each table. The primary key field is shown with a picture of a key next to it. Lines in the window show how relationships have been established between tables.

PLACING TABLES IN THE RELATIONSHIPS WINDOW

The first time you open the Relationships window, you see the Show Table dialog box. Use this dialog box to tell Access which tables to put in the Relationships window. Ctrl+click to select tables and then click the Add button.

If you create a new database table and want to place it in the Relationships window, click the Relationships button to display the Relationships window; then click the Show Table button on the (Relationship Tools) Design tab. The Show Table dialog box appears. Select your new table and click the Add button.

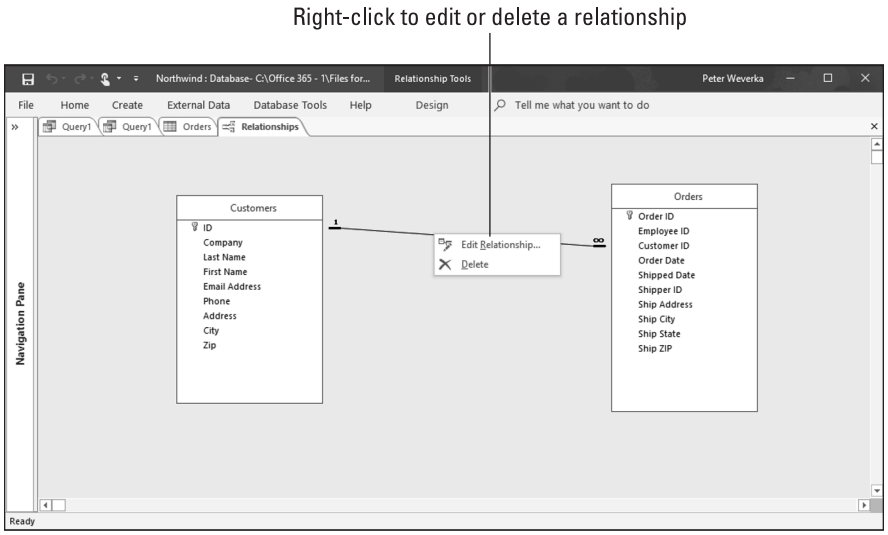


FIGURE 2-11: The Relationships window.

Apart from linking tables in the Relationships window (a subject I explain shortly), use these techniques on the (Relationship Tools) Design tab to handle tables:

- **Repositioning and resizing the tables:** Each table appears in its own window. Drag tables from place to place, drag a border to change a window's size, and scroll to see field names.
- **Removing a table from the window:** Select the table and click the Hide Table button.
- **Removing all tables from the window:** Click the Clear Layout button and choose Yes in the confirmation box.
- **Placing tables back on the window:** Click the Show Table button, and in the Show Table dialog box, select the tables and click the Add button.
- **Placing all tables back in the window:** To put all the tables with relationships back in the window, click the All Relationships button.
- **Studying a table's relationships:** Click the Clear Layout button to remove all tables from the window; then place the table back in the window, select it, and click the Direct Relationships button. All tables that are related to the selected table are added to the layout.

TIP

To generate and print an Access report that shows how tables in your database are linked, go to the (Relationship Tools) Design tab and click the Relationship Report button. Then save the report and print it. Chapter 5 of this minibook explains reports.

Forging relationships between tables

On the (Relationship Tools) Design tab (refer to Figure 2-11), make sure that both tables are on display and then follow these steps to forge a relationship between them:

1. **Click to select the field in one table; then hold down the mouse button, drag the pointer to the field in the other table where you want to forge the link, and release the mouse button.**

   You see the Edit Relationships dialog box, as shown in Figure 2-12. This dragging between table fields is probably the most awkward thing you undertake in Office 365! If you do it right, a bar appears where the pointer is while you move it over the second table, and the names of the two fields appear in the Edit Relationships dialog box.

Notice the Relationship Type at the bottom of the dialog box. If you accidentally create a link to the wrong field, choose the correct field from the drop-down list in the dialog box.

2. **Select the Enforce Referential Integrity check box.**

   If you don't select this box, the relationship between the tables is indeterminate, instead of being a one-to-many relationship. *Referential integrity* (another hideous database term!) has to do with whether values in the two different fields corroborate each other.

3. **Select Cascade options if you so choose.**

   One of these options is excellent; the other is dangerous:

   - **Cascade Update Related Fields:** If you change a value on the "one" side of the relationship, a matching value on the "many" side changes as well to preserve referential integrity. For example, if you create a multifield primary key of First Name and Last Name and then change the name of someone, the related fields in the other table change automatically to preserve referential integrity. This is a great way to make sure that information is up to date.
   - **Cascade Delete Related Records:** If you delete a record in the "one" table, all records in the "many" table to which the deleted record is linked are also deleted. For example, if you delete an employee from the "one" table, all records in the "many" table that include that employee are deleted! Access warns you before making the deletion, but still! This option is dangerous, and I don't recommend selecting it.

4. **Click the Create button to forge the relationship.**

   In the Relationships window (refer to Figure 2-11), a line is drawn between the table fields. The number 1 appears on the "one" side of the relationship and the infinity symbol (∞) appears on the "many" side.

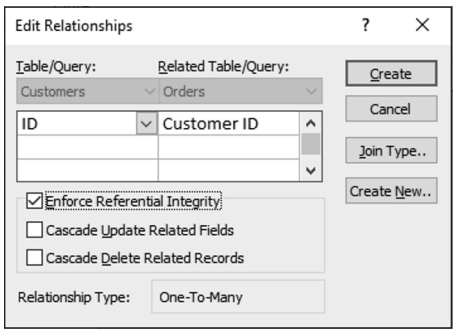


FIGURE 2-12: Creating a table relationship.

WARNING

After you create a one-to-many relationship between tables with the Enforce Referential Integrity check box selected, you can't enter a value in the "many" table unless it's already in the "one" table. For example, suppose that the "one" table includes a primary key field called Employee Number, and this field is linked to a field in the "many" table that is also called Employee Number. If you enter an Employee Number in the "many" table that isn't in the "one" table, Access warns you that it can't be done without violating referential integrity. The best way to solve this problem is to create a lookup data-entry list in the "many" table with values from the primary key field in the "one" table. See "Creating a lookup data-entry list," later in this chapter.

Editing table relationships

In the Relationships window (refer to Figure 2-11), select the line that represents the relationship between two database tables and follow these instructions to edit or remove the relationship:

- **Editing the relationship:** Click the Edit Relationships button or right-click and choose Edit Relationship. You see the Edit Relationships dialog box, where you can overhaul the relationship. (The previous topic in this chapter explains how.)
- **Deleting the relationship:** Press the Delete key or right-click and choose Delete. Then select Yes in the confirmation box.

IN THIS CHAPTER

- Entering data on a datasheet
- Changing the look of a datasheet
- Creating a form for entering data
- Finding and replacing your data

Chapter 3
Entering the Data

At last — you can start entering the data. If you set up your database tables, named the fields, and established relationships between the tables, you're ready to go. This short chapter explains how to enter the data in a database table. It shows you how to enter data on a datasheet or enter data by way of a form. This chapter also describes how to find missing records in case one goes astray.

There's no getting around it: Entering data is truly a tedious activity. But if you set up the fields well and take advantage of input masks and other field properties, it isn't so bad. It's better than stepping on a shovel blade, anyway.

The Two Ways to Enter Data

When it comes to entering data in a database table, you can take your pick between Datasheet view and a form. Figure 3-1 compares and contrasts the two. Here are the advantages of entering data in Datasheet view:

- Many records appear simultaneously.
- You can compare data easily between records.
- You can sort by column with the commands in the Sort and Filter group on the Home tab (as discussed in Chapter 4 of this minibook).
- You can scroll up or down to locate records.

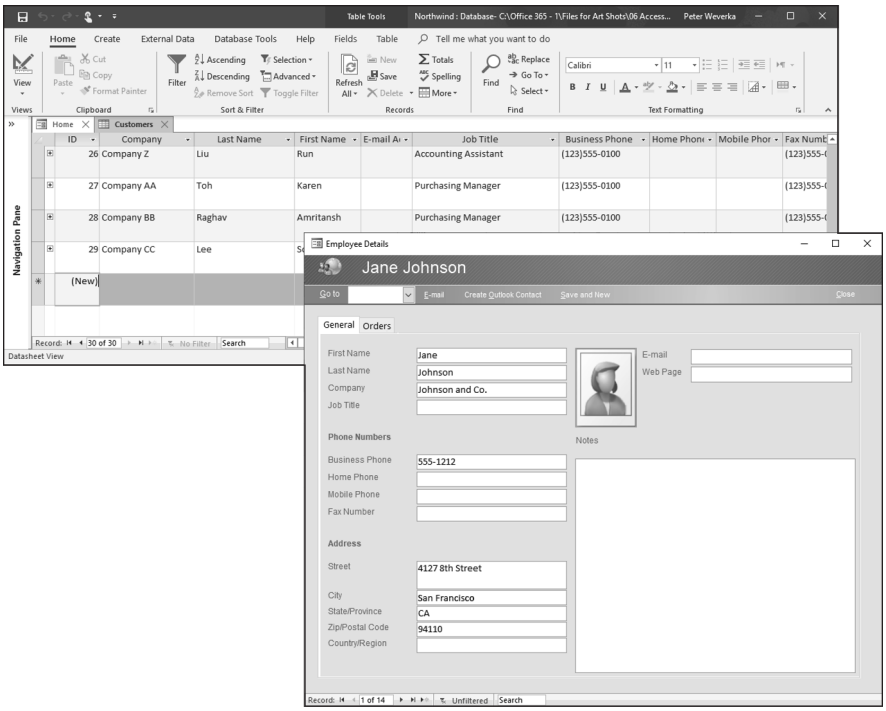


FIGURE 3-1: Entering records in Datasheet view (left) and in a form (right).

Here are the advantages of entering the data in a form:

- You don't have to scroll left or right to see all the fields.
- Getting from field to field is easier.
- Fields are clearly labeled so that you always know what to enter.

Entering the Data in Datasheet View

Entering data in Datasheet view is like entering data in a conventional table. As with a table, a datasheet has columns and rows. Records are entered in rows, and each column represents a field. Fans of Datasheet view like being able to look at a dozen records simultaneously. For fans of Datasheet view, these pages explain how to enter data in a datasheet and change a datasheet's appearance.

Database tables open in Datasheet view when you double-click their names in the Navigation pane. But if you happen to be gazing at a table in Design view, click the View command on the Home tab or the Datasheet View button on the status bar.

Entering data

In Datasheet view, the bottom of the window tells you how many records are entered in the database table and which record the cursor is in. To enter a new record, move to a new, empty row and start entering the data. To create a new row, do one of the following:

- On the Home tab, click the New button.
- Click the New (Blank) Record button in the Datasheet navigation buttons. These buttons are located in the bottom-left corner of the Datasheet view window.
- Scroll to the bottom of the Datasheet view window and begin typing in the row with an asterisk (*) next to it.
- Press Ctrl++ (the plus key).

A pencil icon appears on the row selector to let you know which record you're dealing with. To get from field to field, click in a field, press the Tab key, or press Enter. Table 3-1 lists keyboard shortcuts for getting around in a datasheet.

TABLE 3-1 Datasheet Shortcuts

Press. . .	To Move. . .
↑	To the previous record. You can also press the Previous button on the Navigation buttons.
↓	To the next record. You can also press the Next button.
Tab or Enter	To the next field in the record.
Shift+Tab	To the previous field in the record.
Home	To the first field in the record.
End	To the last field in the record.
Ctrl+Home	To the first field in the first record. You can also press the First button.
Ctrl+End	To the last field in the last record. You can also press the Last button.
Page Up	Up one screen.
Page Down	Down one screen.

To delete a record, click its row selector and press the Delete key or the Delete button (located on the Home tab). You can also click in a record, go to the (Table Tools) Fields tab, and click the Delete button there. After you delete a record, it is gone forever. You can't resuscitate it.

Two tricks for entering data quicker

In a database table with many fields, it's sometimes hard to tell what data to enter. When the pointer is in the sixth or seventh field, for example, you can lose sight of the first field, the one on the left side of the datasheet that usually identifies the person or item whose record you're entering.

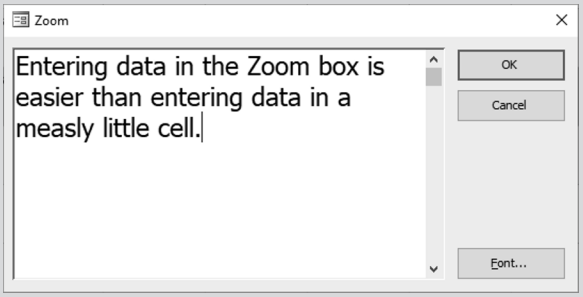
TIP

To freeze a field so that it appears onscreen no matter how far you travel toward the right side of the datasheet, right-click the field's column heading and choose Freeze Fields on the shortcut menu. To unfreeze the fields, right-click the column heading and choose Unfreeze All Fields on the shortcut menu. You can freeze more than one field by dragging across field names at the top of the datasheet before choosing to freeze the columns. Is it getting cold in here?

ENTERING DATA IN THE ZOOM BOX

To make putting a long entry in a field a little easier, Access offers the Zoom box. Instead of having to stay within the narrow confines of a datasheet field, you can press Shift+F2 to open the Zoom box and enter the data there. After you click OK, the data is entered in the field.

The Zoom box is especially convenient for entering data in a Memo field. As Chapter 2 in this minibook explains, Memo fields can hold a whopping 65,535 characters. Move the cursor into a field and press Shift+F2 to open the Zoom box and read all the text in the field.



Another way to handle the problem of not being able to identify where data is supposed to be entered is to hide columns in the datasheet. To perform this trick, select the columns you want to hide by dragging the pointer across their names; then right-click the column heading and choose Hide Fields on the shortcut menu. To see the columns again, right-click any column heading and choose Unhide Fields on the shortcut menu. You see the Unhide Columns dialog box. Select the fields that you want to see on the datasheet.

TIP

The fastest way to hide a column is to drag the border between it and the next column to the left until the column disappears.

Changing the appearance of the datasheet

To make the datasheet a little less cluttered and unwieldy, try experimenting with its appearance. Access offers a few handy shortcuts for doing just that:

- **Rearranging columns:** To move a column to a different location, click its name at the top of the datasheet and drag it to the left or right.
- **Resizing columns:** Move the pointer between column names at the top of the datasheet, and when you see the double-headed arrow, click and start dragging. To make a column just large enough to fit its widest entry, move the pointer between column names and double-click when you see the double-headed arrow.
- **Changing fonts:** The default font for a datasheet is Calibri 11-point, but the Home tab offers commands for changing fonts and font sizes. Look for these commands in the Text Formatting group.
- **Changing the look of gridlines:** On the Home tab, open the drop-down list on the Gridlines button and choose options to change the number and thickness of gridlines.
- **Alternate row colors:** On the Home tab, open the drop-down list on the Alternate Row Color button and choose a color for alternating rows on the datasheet.

TIP

To experiment all at one time with the many options for changing a datasheet's appearance, go to the Home tab and click the Text Formatting group button. You see the Datasheet Formatting dialog box, as shown in Figure 3-2. If you want a customized look for all the datasheets you work on, visit the File tab and select Options. Then go to the Datasheet category in the Options dialog box and go to town.

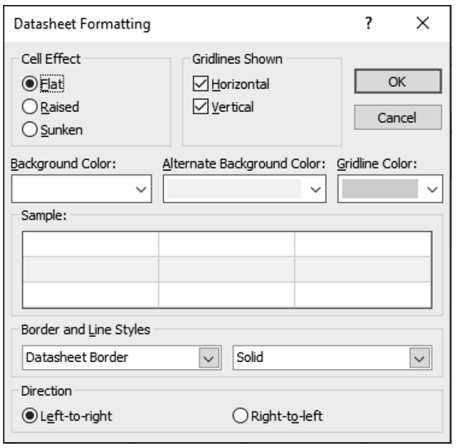


FIGURE 3-2: The Datasheet Formatting dialog box.

Entering the Data in a Form

Forms like the one shown in Figure 3-3 are very convenient for entering data. The labels tell you exactly what to enter. Personally, I prefer entering data in a form to entering data on a datasheet. On a form, you take it one step — make that one record — at a time. Not looking at a dozen records makes the task of entering data a little easier. These pages explain how to create a form for entering information in a database table. You also get advice for moving around with the Navigation buttons.

Creating a form

Fortunately, the Form Wizard makes it very simple to create a form for entering information in a database table. All you have to do is start the wizard, choose the table, and make a couple of design decisions. To create a form, go to the Create tab and click the Form Wizard button. You see the first of several Form Wizard dialog boxes. Answer these questions and keep clicking the Next button until the time comes to click Finish:

- **Tables/Queries:** From the drop-down list, choose the name of the database table you need to enter data in.
- **Selected Fields:** Click the >> button to enter all the field names in the Select Fields box.
- **Layout:** Select the Columnar option button. The other layouts aren't much good for entering data in a table. If you choose Tabular or Datasheet, you may as well enter data straight into the datasheet rather than rely on a form.
- **Title:** Name your form after the table you created it for so that you can identify the form easily in the Navigation pane.

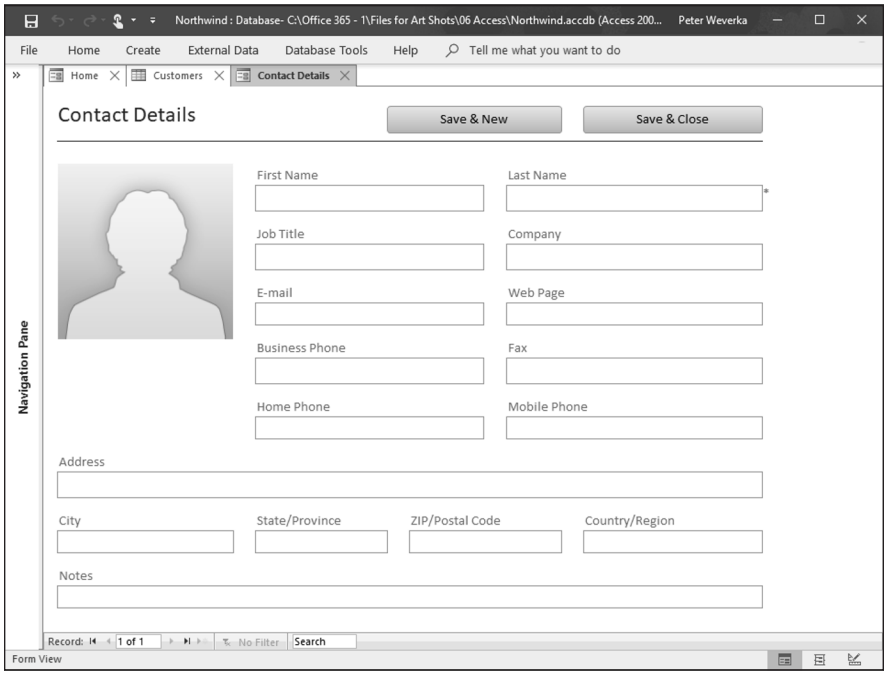


FIGURE 3-3: A form.

To delete a form, right-click its name in the Navigation pane and choose Delete on the shortcut menu.

Entering the data

To open a form and begin entering data in its database table, display the form's name in the Navigation pane and then double-click the form's name. You can also right-click the name of the form and choose Open.

REMEMBER

To enter data in a form, click the New (Blank) Record button. This button is located with the Navigation buttons at the bottom of the form window. A new, empty form appears. Start typing. Press the Tab key, press the Enter key, or click to move from field to field. You can move backward through the fields by pressing Shift+Tab. If you enter half a record and want to start over, press the Esc key to empty the current field. Press Esc again to empty all the fields.

The Navigation buttons at the bottom of the form window tell you how many records are in the database table and which record you're looking at. From left to right, the Navigation buttons take you to the first record, previous record, next record, and last record.

Finding a Missing Record

Sometimes data goes astray. You scroll through a datasheet but simply can't find the item or record you need so badly. For times like those, Access offers the Find command. Use the command to scour a database for errant information.

Open the database table with the data that needs finding. If you know in which field the data is located, click in the field. You can save a little time that way. Then, on the Home tab, click the Find button (or press Ctrl+F). You see the Find and Replace dialog box, as shown in Figure 3-4. Fill in the dialog box as follows:

- **Find What:** Enter the item you're looking for. If you're looking for a null value, enter **null** in this text box. Enter **""** (two double-quotation marks) to find zero-length strings. Table 3-2 describes the wildcard characters you can use in searches.
- **Look In:** If you clicked in a field before choosing the Find command, Current Field is selected in this box. To search the entire database table, choose Current Document on the drop-down list.
- **Match:** Choose the option that describes what you know about the item. Choosing the Any Part of Field option can make for a long search. For example, a search for the letters *chin* finds, among others, China, Ching, and itching — any word with the consecutive letters *chin.*
- **Search:** Choose an option — All, Up, or Down — that describes which direction to start searching.
- **Match Case:** If you know the combination of upper- and lowercase letters you're after and you enter the combination in the Find What text box, select this check box.
- **Search Fields As Formatted:** If you're searching for a field that has been formatted a certain way, select this check box and make sure that the text or numbers you enter in the Find What text box are formatted correctly. For example, if you're searching for a record with the date July 31, 1958, and you choose the *mm/dd/yyyy* format, enter the date as 07/31/1958.

FIGURE 3-4: Finding data.

TABLE 3-2 Wildcard Characters for Searches

Character	Description	Example
?	A single character	**b?t** finds *bat, bet, bit,* and *but.*
#	A single numeric digit	**9411#** finds *94111, 94112, 94113,* and so on.
*	Any group of consecutive characters	**t*o** finds *to, two,* and *tattoo.*
[xyz]	Any character in the brackets	**t[aio]pper** finds *tapper, tipper,* and *topper,* but not *tupper.*
[!xy]	Any character not in the brackets	**p[!io]t** finds *pat* and *pet,* but not *pit* and *pot.*
x–z	Any character in a range of characters	**[1–4]000** finds *1000, 2000, 3000,* and *4000,* but not *5000.* The range must be in ascending order.

Click the Find Next button to conduct the search. The item might be found in more than one location. Keep clicking Find Next (or pressing Alt+F) until you find the item or you die of thirst on the hot sands of the digital desert.

TIP

To quickly find the first value of a search term, start typing in the Search box in the form window or in Datasheet view. As soon as you start typing, the cursor moves to the first instance of the data you enter. The search box is located at the bottom of the screen.

Finding and Replacing Data

Finding and replacing data is remarkably similar to finding data. The difference is that you enter data in the Replace With text box as well as the familiar Find What text box and other option boxes. Figure 3-5 shows the Replace tab of the Find and Replace dialog box. Does it look familiar? If it doesn't, read the preceding topic in this chapter, "Finding a Missing Record."

FIGURE 3-5: Replacing data.

To find and replace data, go to the Home tab and click the Replace button (or press Ctrl+H). You see the Replace tab of the Find and Replace dialog box. After you enter the replacement data in the Replace With text box, make sure that Whole Field is selected in the Match drop-down list. Conducting a find-and-replace operation with Any Part of Field or Start of Field selected in the Match drop-down list can have unintended consequences. For example, a search for *Brook* also finds *Brooklyn*, *Middlebrook*, and other words that include *brook.* Blindly replacing the *brook* text string with *stream* produces, for example, *Streamlyn* and *Middlestream.*

WARNING

Unless you're as confident as a gambler with four aces, don't click the Replace All button to replace all instances of the text or numbers in the database table or field you're searching in. Instead, click the Replace button to find and replace text or numbers one instance at a time.

By the way, you can also find and replace data with an update query. Chapter 4 of this minibook covers update queries.

IN THIS CHAPTER

- Sorting, or rearranging, records in a database table
- Filtering records in a table to see only the records you need
- Querying to collect and examine information stored in a database
- Looking at different kinds of queries

Chapter 4

Sorting, Querying, and Filtering for Data

Now that you've laid the groundwork, you can put your database through its paces and make it do what databases are meant to do: provide information of one kind or another. This chapter explains how to pester an Access database for names, addresses, dates, statistical averages, and whatnot. It shows how to sort records and filter a database table to see records of a certain kind. You also find out how to query a database to get it to yield its dark secrets and invaluable information.

Sorting Records in a Database Table

Sorting rearranges records in a database table so that the records appear in alphabetical, numerical, or date order in one field. By sorting the records in a database, you can locate records faster. What's more, being able to sort data means that you don't have to bother about the order in which you enter records because you can always sort them later to put them in a particular order.

Ascending versus descending sorts

Records can be sorted in ascending or descending order:

- **Ascending order:** Arranges records in alphabetical order from A to Z, numbers from smallest to largest, and dates chronologically from earliest to latest.
- **Descending order:** Arranges text from Z to A, numbers from largest to smallest, and dates chronologically from latest to earliest.

Sorting records

Follow these steps to sort the records in a database table:

1. **In Datasheet view, click anywhere in the field by which you want to sort the records.**
2. **On the Home tab, click the Ascending or Descending button.**

   You can also right-click a field name at the top of a column and choose Sort A to Z or Sort Z to A on the shortcut menu. The menu choices change based on the type of data. For Number fields, you can sort smallest to largest and vice versa; for Date fields, choose to sort oldest to newest, or vice versa.


TIP

You can sort on more than one field by clicking a field and sorting it, and then clicking a second field and sorting it. Just make sure you sort the fields in reverse order. For example, to sort the database by the Employee, Customer, and Order ID fields, click in Order ID and sort it in ascending order; click in Customer and sort it in ascending order; click in Employee and sort it in ascending order. If you mess up and forget how the table is sorted, click the Remove Sort button. This button is located on the Home tab underneath the Ascending and Descending buttons.

Filtering to Find Information

Filtering isolates all the records in a database table that have the same field values or nearly the same field values. Instead of all the records in the table appearing on the datasheet, only records that meet the filtering criteria appear, as shown in Figure 4-1.

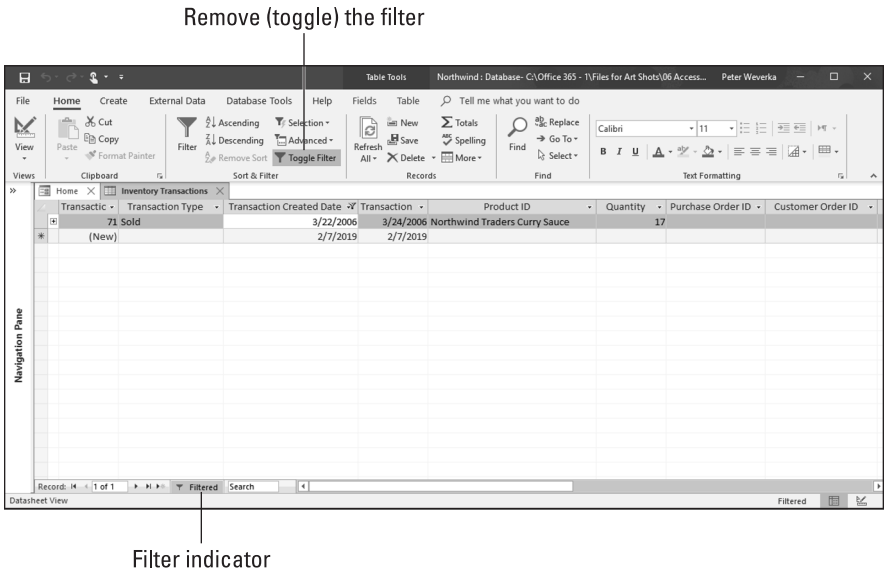


FIGURE 4-1: Results of a filtering operation.

THE DIFFERENCE BETWEEN A FILTER AND A QUERY

The biggest difference between filtering and querying is that you can save a query and call upon it more than once. Queries are kept at the ready in the Navigation pane. A filter, on the other hand, is as good as the first time you use it, although you can save and run it as a query. Filters apply to a single database table, whereas you can query to assemble information from more than one table. In the results of a query, you can include as many fields as you want, but the results of a filtering operation show all the fields in the database table, regardless of whether you want them.

When it comes to examining data, a query is more sophisticated than a filter. Although you can use standard comparison operators to find records by filtering, querying gives you the opportunity to use complex expressions as well as comparison operators. You can filter, for example, to find people whose income is greater than or less than a certain amount. However, because you can write expressions in queries, you can query to find people whose income falls within a certain range.

The basic idea behind filtering is to choose a field value in the database table and use it as the standard for finding or excluding records. For example, you can find all the orders for a particular customer, all orders taken in the month of April, or all the orders that a particular customer placed in April. For that matter, you can filter by exclusion and see the records of all the orders in a database table *not* taken in April and *not* for a particular customer. Filtering is useful when you need to find records with specific information in a single database table.

Different ways to filter a database table

For comparison purposes, here are shorthand descriptions of the four ways to filter a database table. All filtering operations begin in Datasheet view on the Home tab. These techniques are described in detail in the upcoming pages.

- **Filter by Selection:** Select all or part of a field in the database table, click the Selection button, and choose a filtering option. Access isolates all records with the data you select. This method works best when you can't quite decide what you're looking for. It's the only filtering method that permits you to look for data found in a whole field or part of a field. You can also filter data that doesn't match the selection.
- **Filter for Input:** Select the field you want to filter with and click the Filter button. A dialog box appears so that you can choose values in the field or enter comparison operators to describe the numeric or date values you are filtering for. With this technique, you can filter for data ranges.
- **Filter by Form:** Click the Advanced button and choose Filter by Form. You see a form with one drop-down list for each field in your table. From the drop-down lists, make choices to describe the records you're looking for and then click the Toggle Filter button. This method is more flexible than the others because you can conduct OR as well as AND filtering operations. For example, you can isolate the records of people named Smith who also live in California, or the people who live in California or New York.
- **Advanced Filter/Sort:** Click the Advanced button and choose Advanced Filter/Sort. The Filter window opens. Drag the name of the field you want to filter onto the grid. Then choose a Sort option and enter a search criterion. This filtering technique has more in common with queries than filters. Truth be told, the Advanced Filter/Sort command is merely a way to query a single table.

TIP

After you filter a database table, you can run a second (or third or fourth) filter operation to filter the data even more and further isolate the data you are looking for.

"Unfiltering" a database table

REMEMBER

You can tell when you're looking at a database table that has been filtered rather than a database table with all its records because the word *Filtered* appears at the bottom of the window next to the Navigation buttons (refer to Figure 4-1). Moreover, the filter icon appears in the field names of columns used in the filter operation and the Toggle Filter button on the Ribbon is highlighted.

When you finish filtering a database table, use one of these techniques to "unfilter" it and see all the records in the table again:

- Click the word *Filtered* at the bottom of the window. You can click this word again or click the Toggle Filter button to repeat the filter operation.
- On the Home tab, click the Toggle Filter button. You can click this button again to repeat the filter operation.
- On the Home tab, click the Advanced button and choose Clear All Filters on the drop-down list. Choosing this option kills the filter operation; you can't repeat it except by reconstructing it in the Datasheet window.

Filtering by selection

Filtering by selection is the fastest way to filter a database table. It's also the best way when you're not sure what you're looking for because you can search for partial words and phrases. Follow these steps to filter by selection:

1. **Display the database table that needs filtering in Datasheet view.**
2. **Tell Access how to filter the records.**

   To find all records with the same value or text in a particular field, simply click in a field with the value or text. If you aren't quite sure what to look for, select part of a field. For example, to find all names that start with the letters *St,* select St in one of the name fields.
3. **On the Home tab, click the Selection button and choose a filtering option.**

   The options you see are specific to the cell you clicked or the data you selected in Step 2. For example, if you click a Last Name field that contains the name *Smith,* your options include Equals "Smith" and Does Not Equal "Smith." Select an option to include or exclude records in the filter operation.

Filtering for input

Filtering for input gives you the advantage of being able to filter for data ranges. Use this technique to isolate records that fall within a numerical or date range. Follow these steps to filter for input:

1. **Display the database table that you want to filter in Datasheet view.**
2. **Select the field with the data you want to use for the filter operation.**

   To select a field, click its name along the top of the datasheet.
3. **On the Home tab, click the Filter button.**

   As shown in Figure 4-2, a dialog box appears so that you can describe records that you want to filter for. You can also open this dialog box by clicking the button to the right of a field name.
4. **Tell Access how to filter the database table.**

   You can choose values or describe a data range:

   - **Choose values in the field:** The dialog box lists all values in the field. Deselect the Select All check box and then click to select the values you want to filter with.
   - **Describe a numeric or date range:** Choose Number Filters or Date Filters and select a comparison operator on the submenu (refer to Figure 4-2). The Custom Filter dialog box appears. Enter a comparison value and click OK.

You can repeat Steps 2 through 4 to filter the database table even further.

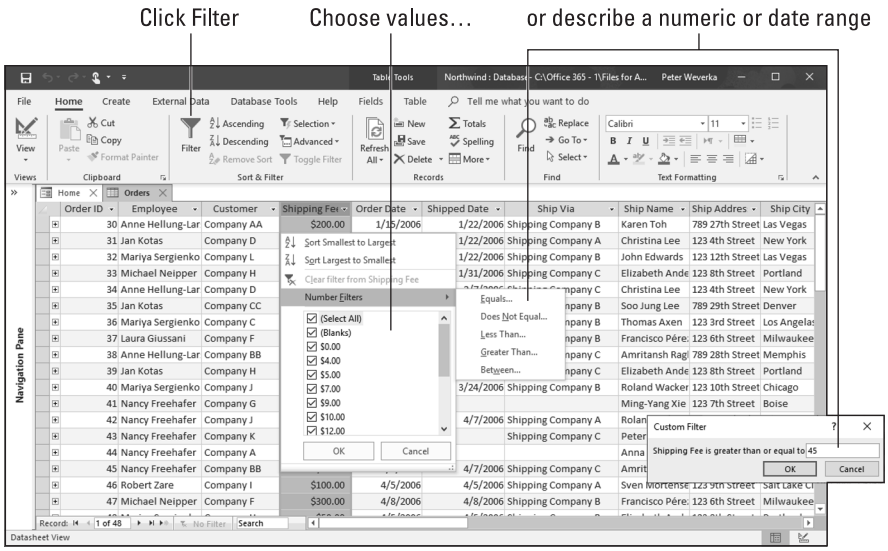


FIGURE 4-2: Filtering by input for numeric data values.

Filtering by form

Filtering by form is a sophisticated filtering method. It permits you to filter in more than one field using an *OR search.* For example, you can tell Access to look in the Last Name field for people named *Martinez*, as well as look in the City field for *Martinez*es who live in Los Angeles *or* San Francisco. Moreover, you can use comparison operators in the filter operation. Follow these steps to filter by form:

1. **In Datasheet view, go to the Home tab, click the Advanced button, and choose Filter by Form on the drop-down list.**

   Only field names appear on the datasheet, as shown in Figure 4-3.

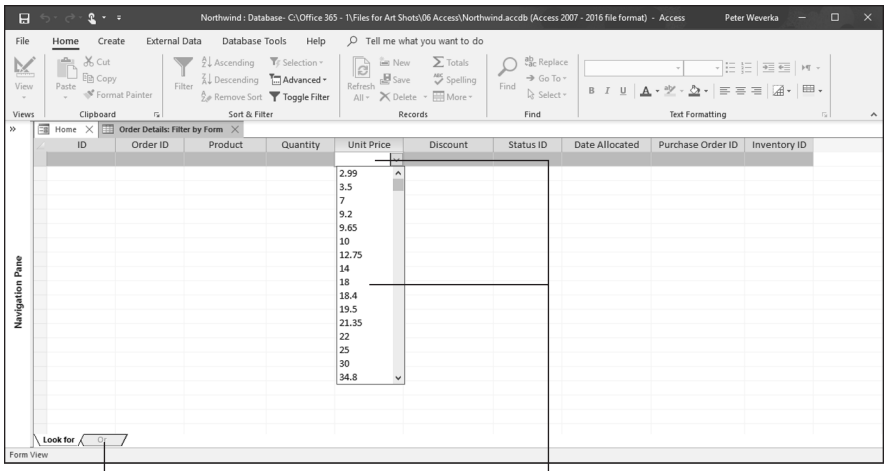


FIGURE 4-3: Filtering by form.

2. **Click in a field, open its drop-down list, and enter a comparison value or select a value on the drop-down list.**

   You can choose a value on the drop-down list or, in Number and Currency fields, enter a comparison operator and a value. Table 4-1 explains the comparison operators.

3. **If you want, enter more criteria for the filtering operation.**

   You can enter values in other fields as well as filter more than once in the same field.

   - **Enter values in other fields:** Open the drop-down list in a field and enter a comparison value or select a value on the drop-down list.
   - **Filter more than once in the same field:** Select a field in which you already entered a search criterion. Then click the Or tab and either enter a comparison value or choose a value from the drop-down list.

TABLE 4-1 **Comparison Operators for Filtering and Querying**

Operator	Name	Example
<	Less than	<10, any number smaller than ten
<=	Less than or equal to	<=10, ten as well as any number smaller than ten
>	Greater than	>10, any number larger than ten
>=	Greater than or equal to	>=10, ten as well as any number equal to or larger than ten
=	Equal to	=10, ten — not any other number
<>	Not equal to	<>10; all numbers except ten (instead of <>, you can enter the word *not*)
Between . . . And . . .	Between	Between 10 And 15, a number between 10 and 15 or equal to 10 or 15

When you click the Or tab, the search choices you made previously disappear from the screen. Don't worry — Access remembers them on the Look For tab. You can click the Or tab again if you want to enter more criteria for Or searching.

4. **Click the Toggle Filter button.**

The results of the filtering operation appear in the datasheet.

Querying: The Basics

Querying means to ask a question of a database and get an answer in the form of records that meet the query criteria. Query when you want to ask a detailed question of a database. "Who lives in Los Angeles and donated more than $500 last year?" is an example of a query. So is, "Which orders were purchased by people who live in California and therefore have to pay sales tax, and how much sales tax was charged with these orders?" A query can search for information in more than one database table. For that matter, you can query other queries for information. A query can be as sophisticated or as simple as you need it to be. In the results of the query, you can show all the fields in a database table or only a few necessary fields.

Access offers several different ways to query a database (the different techniques are described later in this chapter, in "Six Kinds of Queries"). Still, no matter which kind of query you're dealing with, the basics of creating and running a query are the same. You start on the Create tab to build new queries. To open a query

you already created, double-click its name on the Navigation pane. The following pages introduce you to queries, how to create them, and how to modify them.

Creating a new query

To create a new query, start on the Create tab and click the Query Design or Query Wizard button.

- **Create the query in Design view.** Click the Query Design button to see the Query Design window, as shown in Figure 4-4, as well as the Show Table dialog box for telling Access which database tables to query. Construct your query in the Design window (the following pages explain how).
- **Create the query with a wizard.** Click the Query Wizard button to display the New Query dialog box and then choose a wizard option (four possible Query Wizards are available) and answer the questions that the Query Wizard asks. You're asked which table or tables to query, which fields to include in the query, and which fields to include in the query results (the following pages explain these issues).

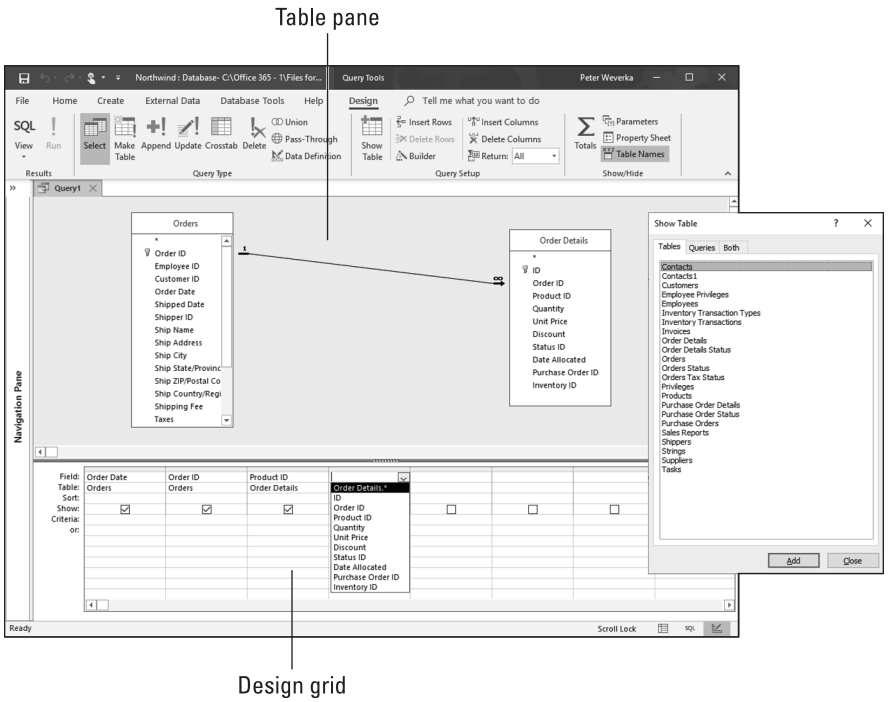


FIGURE 4-4: The Query Design window.

To run a query, open the query in the Query window, go to the (Query Tools) Design tab, and click the Run button. The results of the query appear in Datasheet view.

Viewing queries in Datasheet and Design views

Select a query on the Navigation pane and use these techniques to view it in Datasheet or Design view. Datasheet view shows the results of running a query. Create and modify queries in Design view.

- **Opening in Design view:** Right-click the query's name in the Navigation pane and choose Design View on the shortcut menu.
- **Opening in Datasheet view:** On the Navigation pane, double-click the query's name or right-click its name and choose Open on the shortcut menu.
- **Switching between views with the View button:** On the Home tab, open the drop-down list on the View button. Then choose Design View or Datasheet View on the drop-down list.
- **Switching between views on the status bar:** Click the Datasheet View or Design View button on the right side of the status bar.
- **Switching between views by right-clicking:** Right-click the query's title bar and choose Datasheet View or Design View.

Finding your way around the Query Design window

The Query Design window (refer to Figure 4-4) is where you construct a query or retool a query you constructed already. Switch to Design view to see the Query Design window. You see this window straightaway after you click the Query Design button to construct a new query. The Query Design window is divided into halves:

- **Table pane:** Lists the database tables you're querying as well as the fields in each table. You can drag the tables to new locations or drag a table border to change its size and view more fields.
- **Design grid:** Lists which fields to query from the tables, how to sort the query results, which fields to show in the query results, and criteria for locating records in fields.

Choosing which database tables to query

To choose which database tables (as well as queries) to get information from, go to the (Query Tools) Design tab and click the Show Table button. You see the Show Table dialog box (refer to Figure 4-4). The Tables tab lists all the database tables you created for your database. Ctrl+click to select the tables you want to query and then click the Add button. To query a query, go to the Queries tab and select the query. Query a query to refine the query and squeeze yet more detailed information out of a database.

The tables and queries you choose appear in the Table pane of the Query Design window (refer to Figure 4-4). To remove a table from a query, right-click it in the Table pane and choose Remove Table on the shortcut menu.


REMEMBER

To query more than one table, you need to establish relationships among tables. (Chapter 2 of this minibook has information about establishing relationships among database tables.) So-called *join lines* in the Query Design window show how the tables are related to one another.


TIP

If you haven't defined relationships between the tables, you can still join them together by dragging a field from one table onto a field in another table. This is the same method used to create relationships between tables. Joining tables in a query doesn't create an actual relationship; it's just a temporary join for the sake of the query.

Choosing which fields to query

After you choose which tables to query, the next step is to choose which fields to query from the tables you selected. The object is to list fields from the Table pane in the first row of the Design grid. Fields whose names you enter in the first row of the Design grid are the fields that produce query results, as demonstrated by Figure 4-5.

Access offers these techniques for listing field names in the first row of the Design grid:

- **Dragging a field name:** Drag a field name into a column on the Design grid. The field name appears on the grid, as does the name of the table that you drag the field name from.
- **Double-clicking a field name:** Double-click a field name to place it in the next available column in the Design grid.

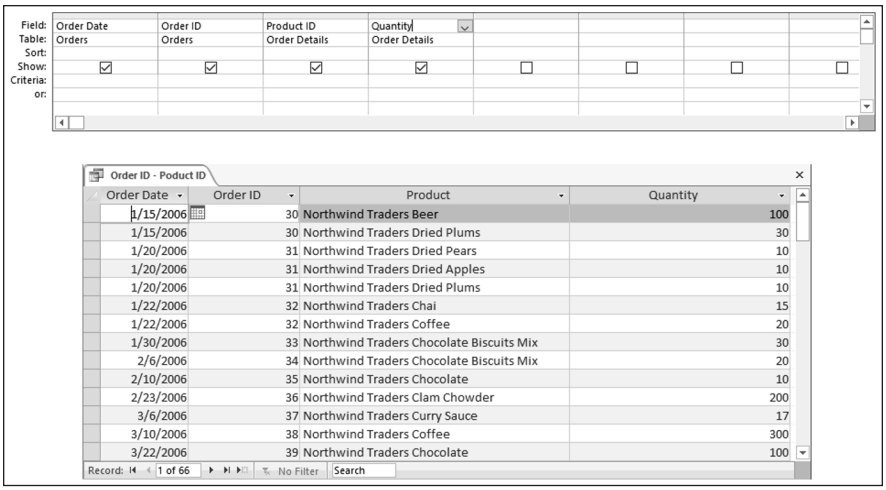


FIGURE 4-5: How query fields translate into query results.

- **Choosing a table and field name:** Click in the Table row, open the drop-down list, and choose the name of a table. Then, in the Field box directly above, open the drop-down list and choose a field name.
- **Selecting all the fields in a table:** In the unlikely event that you want all the fields from a table to appear in the query results, either double-click the asterisk (*) at the top of the list of field names or drag the asterisk into the Design grid. Access places the name of the table followed by an asterisk in the Field text box. The asterisk signifies that all the fields from the table are included in the query.

To remove a field name from the Design grid, select it and press the Delete key or go to the (Query Tools) Design tab and click the Delete Columns button.

Sorting the query results

At the start of this chapter, "Sorting Records in a Database Table" explains what sorting is. The Sort row of the Design grid — directly underneath the Table name — contains a drop-down list. To sort the query, click the drop-down list in a field and choose Ascending or Descending to sort the results of a query on a particular field. To sort the results on more than one field, make sure that the first field to be sorted appears to the left of the other fields. Access reads the sort order from left to right.

MOVING FIELD COLUMNS ON THE QUERY GRID

The order in which field names appear in the Query grid is also the order in which they appear in the query results (refer to Figure 4-5). Follow these steps to put field columns in the right order in the Query grid:

1. **Click a column's selector button to select a column.**

   This button is the narrow gray box directly above the field name. The pointer turns into a downward-pointing arrow when you move it over the selector button.

2. **Click the selector button again and drag the column to the left or right.**

Choosing which fields appear in query results

Although a field is part of a query and is listed in the Query grid, displaying information from the field in the query results isn't always necessary. Consider the Query grid shown in Figure 4-6. The object of this query is to get a list of customers by ZIP code that ordered products in the year 2018. To that end, the query criteria cell in the Order Date field is `Between #1/1/2018# And #12/31/2018#`. However, when the query results are generated, listing the precise dates when the orders shipped isn't necessary because the object of the query is to get a list of customers by ZIP code who ordered products in 2018.

REMEMBER

Whether a field's Show check box is selected in the Query grid determines whether its results are part of the query results. Deselect the Show box if a field is necessary for producing records in a query but not necessary in the query results. By the way, after you save and reopen a query, Access moves deselected Show fields to the right side of the Query grid, where you usually have to scroll to see them.

Entering criteria for a query

What separates a run-of-the-mill query from a supercharged query is a *criterion*, an expression or value you enter on the Criteria line under a field. Enter criteria on the Criteria line of the Query grid. By entering criteria, you can pinpoint records in the database with great accuracy. In Figure 4-7, the Query grid instructs Access to retrieve orders with invoices due before January 1, 2016 that charged more than $2,000 and were shipped to Massachusetts (MA), Connecticut (CT), or New York (NY).

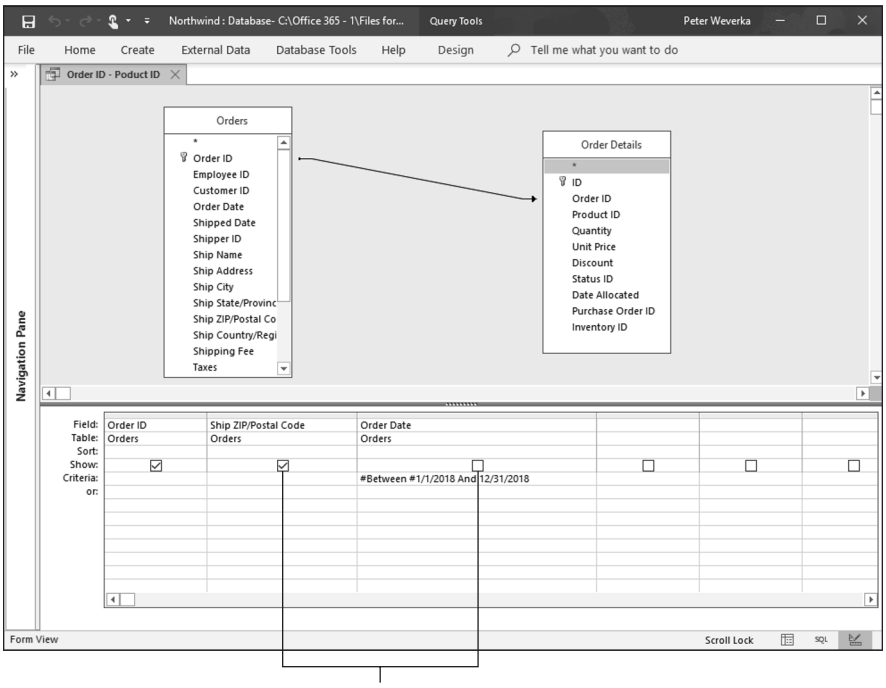


FIGURE 4-6: Choosing what appears in the query results.

REMEMBER

As Figure 4-7 shows, Access places double quotation marks ("") around text criteria and number signs (#) around date criteria. When you enter text or date criteria, don't enter the double quotation marks or number signs. Access enters them for you.

TIP

When you need help writing an expression for a query, try clicking the Builder button to construct your query in the Expression Builder dialog box. This button is located on the (Query Tools) Design tab.

Entering numeric criteria

Enter numeric criteria in Number and Currency fields when you want to isolate records with specific values. Earlier in this chapter, Table 4-1 describes comparison operators that you can use for querying and filtering. These operators are invaluable when it comes to mining a database for information. Use the greater than (>) and less than (<) operators to find values higher or lower than a target value. Use the Between operator to find values between two numbers. For example, *Between 62 And 55* in a Currency field isolates records with all items that sell for between $62.00 and $55.00.

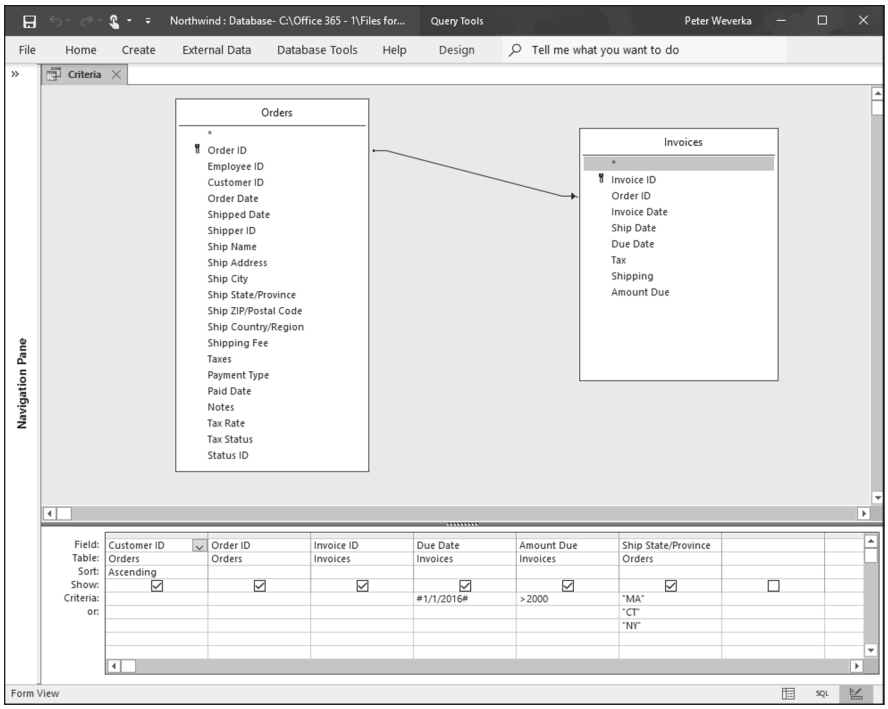


FIGURE 4-7: Including criteria in a query.

WARNING

Do not include commas in numbers when you enter them as criteria. For example, enter 3200, not 3,200. Enter a comma and you get a "The expression you entered contains invalid syntax . . ." error message.

Entering text criteria

To enter a text criterion, type it in the Criteria text box. For example, to find students who attended the Ohio State University, enter Ohio State in the Criteria text box of the University field. Access places double quotation marks ("") around the text you enter when you move the pointer out of the Criteria text box.

Wildcards and the Not operator can come in very handy when entering text criteria:

- **Wildcards:** Wildcards enable you to query for data whose spelling you aren't quite sure of. (In Chapter 3 of this minibook, Table 3-2 explains what the wildcard characters are and how to use them.) For example, entering Sm?th in the Criteria box of the Last Name field finds all Smiths and Smyths. Entering E* in the Company field finds all company names that begin with the letter *E.*
- **Not operator:** Use the Not operator to exclude records from query results. For example, to exclude records with Belgium in the Shipped To field, enter Not Belgium in the Criteria text box. This is a great way to strip unneeded records from a query.

Entering date criteria

All the operators that work for numeric data (see Table 4-1, earlier in this chapter) also work for data entered in a Date field. For example, you would enter **>7/31/1958** in a Birth Date field to find all people born after (greater than) July 31, 1958. You would enter **Between 1/1/1920 And 12/31/1929** to retrieve data about people born in the Roaring Twenties.

Access places number signs (#) around date criteria after you enter it. You can enter dates in the following formats:

- 11/22/19
- 11/22/2019
- 22-Nov-19
- November 22, 2019

REMEMBER

For the purpose of entering two-digit years in dates, the digits 30 through 99 belong to the twentieth century (1930–1999), but the digits 00 through 29 belong to the twenty-first century (2000–2029). For example, >4/1/24 refers to April 1, 2024, not April 1, 1924. To enter a date in 1929 or earlier, enter four digits instead of two to describe the year: **>4/1/1929**. To enter a date in 2030, or later, enter four digits instead of two: **>4/1/2038**. To avoid any confusion, enter four-digit years all the time.

TIP

The Date() function can come in very handy when you want to retrieve data relative to today's date, whatever it happens to be. For example, to retrieve purchase orders made between January 1, 2009 and today's date, enter this expression: **Between 1/1/2009 And Date()**.

At last — saving and running a query

To save a query and inscribe its name forever in the Navigation pane, click the Save button on the Quick Access toolbar and enter a descriptive name in the Save As dialog box. The name you enter appears in the Queries group in the Navigation pane.

After you laboriously construct your query, take it for a test drive. To run a query:

- **Starting from the Query Design window:** Click the Run button on the (Query Tools) Design tab.
- **Starting from the Navigation pane:** Double-click an existing query's name, or right-click its name and choose Open on the shortcut menu.

Six Kinds of Queries

For your pleasure and entertainment, the rest of this chapter describes six useful types of queries. Access offers a handful of other queries, but I won't go there. Those queries are pretty complicated. If you become adept at querying, however, you're invited to look into the Help system for advice about running the query types that aren't explained here.

Select query

A *select query* is the standard kind of query, which I explain earlier in this chapter. A select query gathers information from one or more database tables and displays the information in a datasheet. A select query is the most common query, the primal query, the starting point for most other queries.

Top-value query

A *top-value query* is an easy way to find out, in a Number or Currency field, the highest or lowest values. On the Query grid, enter the name of the Number or Currency field you want to know more about; then choose Ascending in the Sort drop-down list to rank values from lowest to highest or Descending in the Sort drop-down list to rank values from highest to lowest. Finally, on the (Query Tools) Design tab, enter a value in the Return text box or choose a value on the Return drop-down list:

- **Highest or lowest by percentage:** Enter or choose a percentage to find, for example, the highest or lowest 25 percent of the values. To enter a percentage, type a percent sign (%) after your entry and press the Enter key.
- **Highest or lowest by ranking number:** Enter or choose a number to find, for example, the top-ten or lowest-ten values. Press the Enter key after you enter a number.

REMEMBER

This may seem counterintuitive, but to see the top values, you have to sort the field you're ranking in descending order. For example, if you sort employees by number of sales in descending order, the employees with the top sales appear at the top. To see the bottom values, sort in ascending order.

Summary query

Similar to a top-value query, a *summary query* is a way of getting cumulative information about all the data in a field. In a field that stores data about sales in

Kentucky, for example, you can find the average amount of each sale, the total amount of all the sales, the total number of all the sales, and other data.

To run a summary query, go to the (Query Tools) Design tab and click the Totals button. A new row called Total appears on the Query grid. Open the Total drop-down list in the field whose contents you want to summarize and choose a function. Table 4-2 describes the functions.

TABLE 4-2 **Summary Query Functions**

Function	Returns
Sum	The total of all values in the field
Avg	The average of all values
Min	The lowest value
Max	The highest value
Count	The number of values
StDev	The standard deviation of the values
Var	The variance of the values
First	The first value
Last	The last value

The Group By, Expression, and Where choices in the Totals drop-down list are for including fields you're not performing a function on:

- **Group By:** For choosing which fields to show totals for
- **Expression:** For creating a calculated field
- **Where:** For setting criteria (you can't include the field in the query)

Calculation query

A *calculation query* is one in which calculations are performed as part of the query. For example, you can calculate the sales tax on items sold or total the numbers in two fields in the same record. The beauty of a calculation query is that the data is recomputed each time you run the query. If the data used to make a calculation changes, so does the result of the calculation. If you were to include the calculation

in a database table, you would have to recalculate the data yourself each time one of the values changed. With a calculation query, Access does the math for you.

To construct a calculation query, you create a new field in the Query grid for storing the results of the calculation; then enter a name for the field and a formula for the calculation. Follow these steps to create a calculation query:

1. **Create a query as you normally would and be sure to include the fields you want to use for calculation purposes in the Query grid.**
2. **In the Field box of a blank field, enter a name for the Calculation field and follow it with a colon.**

   In Figure 4-8, I entered **Subtotal:**. The purpose of the new Subtotal field is to multiply the Unit Price by the Quantity.
3. **After the colon, in square brackets ([]), enter the name of a field whose data you use for the calculation.**

   In Figure 4-8, data from the Unit Price and Quantity fields are used in the calculation, so their names appear in square brackets: [Unit Price] and [Quantity]. Be sure to spell field names correctly so that Access can recognize them.
4. **Complete the calculation.**

   How you do this depends on what kind of calculation you're making. In Figure 4-8, I entered an asterisk (*) to multiply one field by another. The equation multiplies the values in the Unit Price and Quantity fields. You can add the data from two different fields — including calculated fields — by putting their names in brackets and joining them with a plus sign, like so: [SubTotal]+[Shipping Cost].


TIP

Sometimes the results of the query aren't formatted correctly on the datasheet. To assign a new format to a field that you create for the purposes of making a calculation query, right-click the field on the Query grid and choose Properties. The Property Sheet appears. On the General tab, click the Format drop-down list and choose the correct format for your new, hand-crafted field.

Delete query


WARNING

Be careful about running delete queries. A *delete query* deletes records and doesn't give you the opportunity to get the records back if you change your mind about deleting them. If used skillfully, however, a delete query is a great way to purge records from more than one database table at one time. Back up your database file before running a delete query.

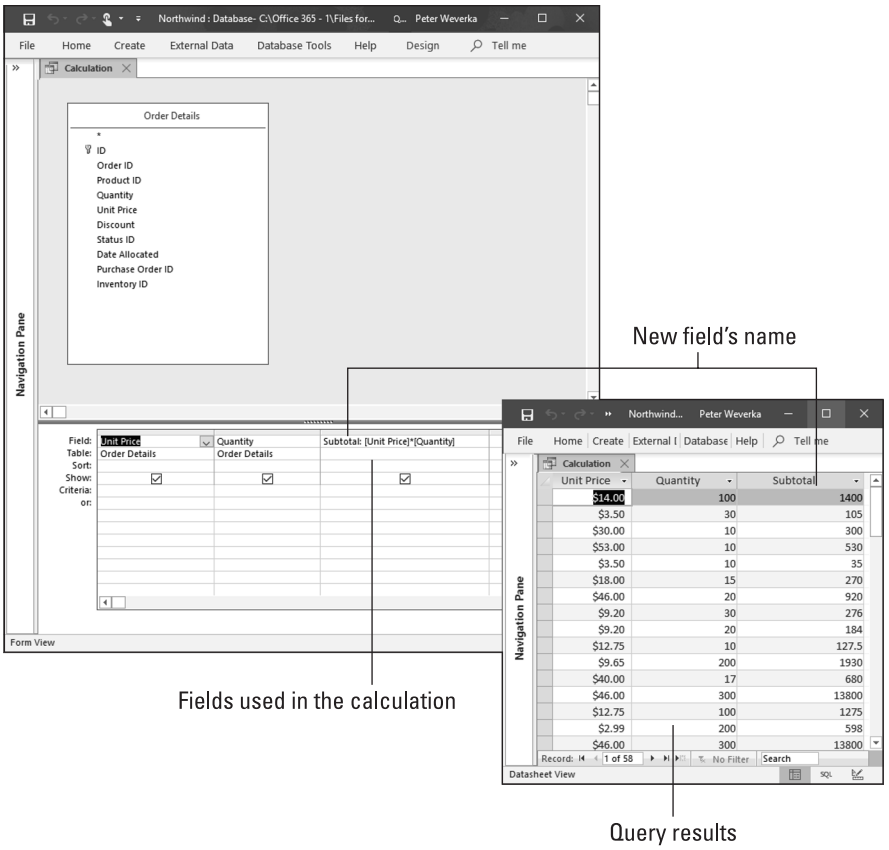


FIGURE 4-8: A calculation query.

To run a delete query, start a new query, and on the (Query Tools) Design tab, click the Delete button. Then make as though you were running a select query but target the records you want to delete. Finally, click the Run button to run the query.

You can delete records from more than one table as long as the tables are related and you chose the Cascade Delete Related Records option in the Edit Relationships dialog box when you linked the tables. (See Chapter 2 of this minibook for advice about forging relationships between tables.)

TIP

To preview the records that will be deleted before you run the delete query, switch to Datasheet view (click the View button). Those records you see? The delete query will delete them if you click the Run button.

Update query

An *update query* is a way to reach into a database and update records in several different tables all at one time. Update queries can be invaluable, but as with delete queries, they can have untoward consequences. Back up your database before you run an update query; then follow these steps to run it:

1. **Starting in Design view, go to the (Query Tools) Design tab and click the Update button.**
2. **In the field with the data that needs updating, enter text or a value in the Update To line. You can even enter another field name in square brackets ([]).**

   What you enter in the Update To line replaces what's in the field of the records you collect.
3. **Click the Run button.**

To update records in more than one table, you must have chosen the Cascade Update Related Fields option in the Edit Relationships dialog box when you linked the tables. (See the section in Chapter 2 of this minibook about forging relationships between tables.)

IN THIS CHAPTER

- Creating a new report
- Opening a report
- Changing the look of a report

Chapter 5

Presenting Data in a Report

The prettiest way to present data in a database table or query is to present it in a report. Even people who are allergic to databases can put up with database material in a report. Reports are easy to read and understand. They succinctly present the data so that you and others can interpret it. This brief chapter explains how to create reports, open them, and edit them.

Creating a Report

Access comes with all kinds of complicated tools for fashioning your own report — for laying out the pages in different ways and making data fields show up in different parts of the page. If ever a task called for relying on a wizard, creating a report is it. You can save yourself a lot of trouble, and fashion sophisticated-looking reports as well, by dispensing with the fancy report-making tools and letting the wizard do the job.

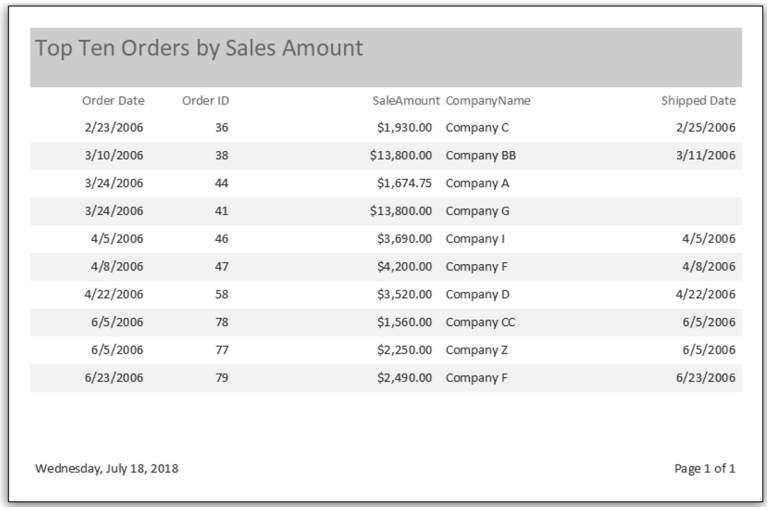
TIP

What's more, the easiest and best way to make a report is to base your report on a query. As part of fashioning a report with a wizard, you can tell Access which database tables and which fields to get the data from. In other words, you can query your database from inside the Report Wizard. However, doing that requires turning somersaults and cartwheels. Far easier is to run a query to produce the results you want in your report, save your query, and then fashion a report from the query results. Chapter 4 in this minibook explains how to create a query.

Figure 5-1 shows a report created with the Report Wizard. To create a report with the Report Wizard, go to the Create tab and click the Report Wizard button. You see the first of several Report Wizard dialog boxes. Negotiate the dialog boxes as follows, clicking the Next button as you go along:

- **Tables/Queries:** Open the Table/Queries drop-down list and choose the query where the information in the report will come from. A list of fields in the query appears in the Available Fields box.
- **Available Fields and Selected Fields:** Select the fields whose data you want in the report by selecting the fields one at a time and clicking the > button. Doing so moves field names from the Available Fields box to the Selected Fields box. Add all the fields by clicking the >> button.
- **Do You Want to Add Any Grouping Levels?:** Include subheadings in your report by selecting a field name and clicking the > button to make it a subheading. If you're building your report on a query that includes related tables, the Report Wizard automatically adds subheadings.
- **What Sort Order Do You Want?:** Select up to four fields to sort the data in your report. Even if you sort the fields in a query, the report handles sorting on its own. If you include grouping levels, the report already sorts on these fields.
- **How Would You Like to Lay Out Your Report?:** Experiment with the options, and watch the Preview box, to choose a layout for your report. If your report has a lot of fields, you may want to print it in Landscape view.
- **What Title Do You Want for Your Report?:** Enter a descriptive title. The name you choose appears in the Reports group in the Navigation pane. From there, you double-click the name when you want to see the report.
- **Preview the Report:** Select this option button and click Finish.

The report appears in the Preview window. How do you like it? Later in this chapter, "Tweaking a Report" offers some tips for making a report look spiffier.



Top Ten Orders by Sales Amount

Order Date	Order ID	SaleAmount	CompanyName	Shipped Date
2/23/2006	36	$1,930.00	Company C	2/25/2006
3/10/2006	38	$13,800.00	Company BB	3/11/2006
3/24/2006	44	$1,674.75	Company A	
3/24/2006	41	$13,800.00	Company G	
4/5/2006	46	$3,690.00	Company I	4/5/2006
4/8/2006	47	$4,200.00	Company F	4/8/2006
4/22/2006	58	$3,520.00	Company D	4/22/2006
6/5/2006	78	$1,560.00	Company CC	6/5/2006
6/5/2006	77	$2,250.00	Company Z	6/5/2006
6/23/2006	79	$2,490.00	Company F	6/23/2006

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FIGURE 5-1: An example of a report.

Opening and Viewing Reports

If you've spent any time whatsoever in Access, you know the drill for opening a so-called object. Follow these steps to open a report:

1. **In the Navigation pane, select the Reports group.**

   You see the names of reports you created.

2. **Double-click a report name or right-click a name and choose Open from the shortcut menu.**

   The report appears in Report view.

TIP

To update a report so that it includes recently added data, go to the Home tab and click the Refresh All button.

Tweaking a Report

As I mention at the start of this chapter, Access offers a bunch of complex tools for changing the layout and appearance of a report. If you're courageous and have lots of time on your hands, you're invited to take these tools in hand and go to

it. In the Reports group of the Navigation pane, right-click a report and choose Layout View on the shortcut menu. Your report appears in Layout view, as shown in Figure 5-2. In this view, using tools on the Report Layout Tools tabs, you can tweak your report's appearance.

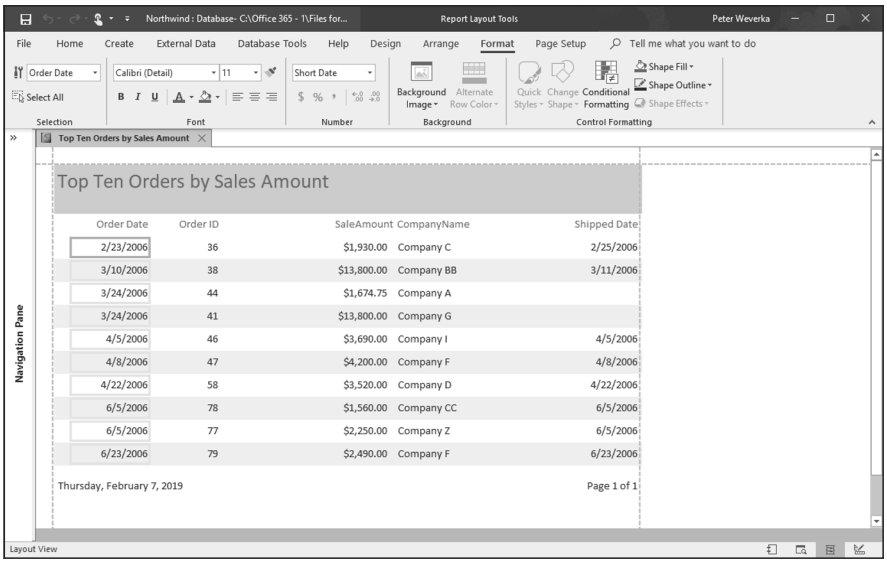

FIGURE 5-2: The report in Figure 5-1 in Layout view.

I tell you how to create a report with the Report Wizard in order to avoid your having to visit this imposing window. However, you can change a report's appearance in Layout view without going to very much trouble if you follow these instructions:

- **Choosing a new layout:** On the (Report Layout Tools) Arrange tab, click the Stacked or Tabular button, or click the Gridlines button and choose an option on the drop-down list, to change your report's layout.
- **Including page numbers:** To include page numbers on the report, go the (Report Layout Tools) Design tab and click the Page Numbers button. You see the Page Numbers dialog box shown in Figure 5-3. Choose the Page N option button to display a page number only, or select the Page N of M option button to display a page number as well as the total number of pages in the report (as in "Page 2 of 4"). Choose Position and Alignment options to describe where on the page to put the page number.
- **Changing the margins:** On the (Report Layout Tools) Page Setup tab, click the Margins button and select Normal, Wide, or Narrow on the drop-down list.

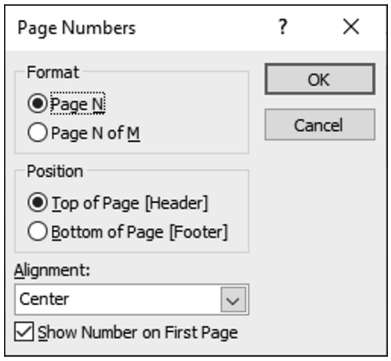

FIGURE 5-3: Putting on the page numbers.

AN EASIER WAY TO TWEAK A REPORT — IN WORD

An easier way to tweak a report is to transfer your report to Microsoft Word and edit it there. Follow these steps to turn an Access report into a Word document:

1. **On the External Data tab, click the More button in the Export group and choose Word on the drop-down list.**

   You see the Export - RTF File dialog box.

2. **Click the Browse button, and in the File Save dialog box, choose a folder for storing the Word document; then click the Save button.**

3. **In the Export - RTF File dialog box, choose Open the Destination File After the Export Operation Is Complete.**

4. **Click the OK button.**

In a moment, your Access report appears in Word. The file is an RTF (rich text format) file. To save it as a Word file, go to the File tab, choose Save As, click the Browse button, and in the Save As dialog box, open the Save As Type drop-down list and choose Word Document. Books 1 and 2 describe how to work with files in Word.