

ACCESS 2013

Designing a Database and Creating Tables



LESSON OUTLINE

Designing a Relational Database

Normalizing Databases

Linking Tables with Primary and Foreign Keys

Creating Access Tables in a New Database

Retrieving Data

Concepts Review

Reinforce Your Skills

Apply Your Skills

Extend Your Skills

Transfer Your Skills

LEARNING OBJECTIVES

After studying this lesson, you will be able to:

- Plan, design, and create a relational database and associated tables
- Define and implement database normalization
- Define data relationships and primary and foreign keys
- Define and create an Entity Relationship Diagram
- Sort and filter records

Whether you are creating a new database to organize a soccer team or run a small business, it is essential to begin with careful planning. Successful projects often begin by examining existing business procedures and compiling a list of tasks to accomplish, designing an outline of how to accomplish those tasks, and making preparations to develop the final product. In short—analyze, design, and develop.

In this lesson, you will plan and design a database. You will gather information as needed to make a complete list of the required tables, records, and fields. You will define the data type for each field and assign ID fields so you can create relationships to link your tables. You will create several tables and enter records. Then, you will apply record sorts and filters.

CASE STUDY

Creating a Database

Winchester Web Design is a small website development company. The company specializes in websites for small businesses. The main deliverables are homepages (site navigation, overall website design, and cascading styles), secondary pages, blogs, and small business shopping carts.

Website designers must analyze a client’s needs and desires before creating a website that includes the site homepage layout, navigation structure, and site styles. Once the homepage layout is determined, secondary pages can be developed. You have been asked to build a database for Winchester Web Design. As you begin your work, notice how the web design and development process has many similarities to designing a useful and efficient database: analyze, design, and develop.



CustID	Last Name	First Name	Street Address	City	ST	ZIP	Telephone	Email
JeffriesD	Jeffries	Daniel	102 South Fern St	Bradenton	FL	34209	(941) 555-6939	DannyJ@email.com
SantosE	Santos	Emily	33 Fairview Lane	Bradenton	FL	34210	(941) 555-1029	SantosE@email.com
SmithW	Smith	William	879 Fifteenth Ave	Bradenton	FL	34210	(941) 555-0793	SmithBilly@email.com
RobertsJ	Roberts	John	103 Pine Terrace	Sarasota	FL	34232	(941) 555-7820	JRoberts@email.com
DavisP	Davis							
AndersM	Anders							

Winchester Web Design Invoice Report									
Inv #	Emp ID	First Name	Last Name	Prod ID	Description	Price	Qty	Total	
1	JFW	William	Smith	01HP	Home Page, Nav, CSS, Design	\$400.00	4	\$1,600.00	
				02SP	Secondary Page	\$200.00	1	\$200.00	
				05IM	Image, Custom Designed	\$40.00	2	\$80.00	
							Invoice Total		\$1,880.00

Winchester Web Design Invoices									
Invoice Num	<input type="text" value="1"/>	Invoice Date	<input type="text" value="12/15/2013"/>						
Customer ID	<input type="text" value="SmithW"/>	Employee ID	<input type="text" value="JFW"/>						
Last Name	<input type="text" value="Smith"/>	EmployeeLast Name	<input type="text" value="Winchester"/>	\$400.00	1	\$400.00			
First Name	<input type="text" value="William"/>	Employee First Name	<input type="text" value="Jay"/>	\$200.00	3	\$600.00			
Street Address	<input type="text" value="879 Fifteenth Ave"/>								
City	<input type="text" value="Bradenton"/>								
State	<input type="text" value="FL"/>	ZIP	<input type="text" value="34210"/>	\$300.00	1	\$300.00			
Telephone	<input type="text" value="(941) 555-0793"/>								
Email	<input type="text" value="SmithBilly@email.com"/>								
				Invoice Total		\$3,580.00			
				Grand Total		\$3,580.00			

Product ID	Description	Price	Quantity	Line Total
01HP	Home Page, Nav, CSS, Design	\$400.00	4	\$1,600.00
02SP	Secondary Page	\$200.00	1	\$200.00

The Winchester Web Design database will contain tables from which forms, reports, and queries will be created.

Designing a Relational Database

Video Library <http://labyrinthelab.com/videos> Video Number: AC13-V0201

Early database programs stored data in one large, **flat file** similar to a spreadsheet. If a company sold merchandise and the same product was sold many times, these databases required a person to enter and store the same product description and product price for each transaction. Such repetitive data entry is time consuming and requires voluminous storage space.

Flat files also increase the chance of typos and are prone to inconsistent data. For example, just think of how many ways one might enter William into various tables: Will, Bill, Willy, Billy, or William. If you searched for all sales records for *William Smith*, you probably would not find the listing for *Bill Smith*.

InvNum	InvDate	EmpID	CustID	First Name	Last Name	ProdID	ProdDescription	Qty	Price	InvTotal
1	12/15/2013	JMM	SmithW	William	Smith	HP	Home Page	1	\$400.00	\$400.00
1	12/15/2013	JFW	SmithW	William	Smith	SC	Shopping Cart	2	\$400.00	\$800.00
1	12/15/2013	JFW	SmithW	William	Smith	BL	Blog	1	\$300.00	\$300.00
2	1/7/2014	MJW	SantosE	Emily	Santos	HP	Home Page	1	\$400.00	\$400.00

Flat file databases repeat data for each record. *Smith* is physically entered and stored three times in this table; the description and price are manually entered for each record.

The Employees table is related to the Invoices table via the EmpID field.

The Customers table is related to the Invoices table via the CustID field.

EmpID	Last Name	First Name	Street Address	City	ST	ZIP	Telephone	Email	Hire Date	Web Cert
JFW	Winchester	Jay	9972 2nd Ave.	Bradenton	FL	34210	(941) 555-9382	mail.com	12/1/2010	<input checked="" type="checkbox"/>
JMM	Mansfield	Julie	400 South Lily Lane	Bradenton	FL	34210	(941) 555-5218	mail.com	12/9/2010	<input checked="" type="checkbox"/>
MJW	Waters	Mike	124 26th St.	Bradenton	FL	34210	(941) 555-3981	mail.com	4/18/2011	<input type="checkbox"/>

Inv Num	Invoice Date	Emp ID	Cust ID
1	12/15/2013	JFW	SmithW
2	12/2/2013	MJW	SantosE
3	1/1/2013	JMM	SantosE
4	11/30/2013	JMM	SmithW

CustID	Last Name	First Name	Street Address	City	ST	ZIP	Telephone	Email
JeffriesD	Jeffries	Daniel	102 South Fern St	Bradenton	FL	34209	(941) 555-6939	DannyJ@email.com
SantosE	Santos	Emily	33 Fairview Lane	Bradenton	FL	34210	(941) 555-1029	SantosE@email.com
SmithW	Smith	William	879 Fifteenth Ave	Bradenton	FL	34210	(941) 555-0793	SmithBilly@email.com

Well-designed relational databases separate data into linked tables to reduce storage space, data repetition, and potential errors.

What Is a Relational Database?

A **relational database** contains two or more tables that are linked (related) to each other by unique and identifying **key fields**, such as ProductID or Invoice Number. For instance, if you are adding a record to the Invoice table, you could select the ProductID from the linked Products table and also display the product description and product price. The product information is only stored once in the Products table, but it is available to all the tables, queries, forms, and reports that are linked in the database.

The Invoice Details table includes a drop-down list of product information.

The Invoice Details table is linked to the Products table by the key field ProdID.

InvNum	ProdID	Qty
1	01HP	4
1	02SP	1
1	05IM	2
2	01HP	1
3	02SP	1
3	03BL	3
4	04SC	1
*	05IM	0
	06HR	

The drop-down menu lists the linked data stored in the Products table.

You can select the key field ProdID to access the Product Description and Product Price from the Products table, without storing those two fields in the Invoice Details table.

Gathering Data

Before you create a database, you must analyze the needs of the business and the requirements of the database. You will need sample copies of employee records, customer records, product or service records, and any other pertinent documents or forms. You will need copies of every existing report, ranging from individual invoices to yearly sales summaries. You will also need a sketch, or mockup, of the complete layout for any new forms and reports that the business desires to add.

Samples of forms and reports collected at the start of a project. There may be handwritten forms as well.

This data gathering process must take place before you begin to design the objects in a database.

DEVELOP YOUR SKILLS AC02-D01

Collect Information for a New Database

In this exercise, you will use Microsoft Excel to create a list of the reports and forms needed to fully analyze the needs of your database. Of course, as a student, you will not have real documents; this is a brainstorming exercise. With this in mind, you will create a worksheet that represents the typical design process.

1. Start **Microsoft Excel 2013** and click **Blank workbook** in the Backstage view.
If you do not have Excel 2013, you can use an older version of Excel.
2. Follow these steps to create a list of Winchester Web Design reports, records, forms, and relevant documents:

C List the tables, reports, records, and forms shown in **column A**, under **DOCUMENTS**.

	A	B
1	DOCUMENTS	FIELDS
2	Product List	ProdID
3		ProdDescription
4		Price
5	Printed Invoice	InvNum
6		InvDate
7		CustID
8		CustName
9		CustAddress
10		CustPhone
11		ProdID
12		ProdDescription
13		Price
14		Qty
15		LineTotal
16		InvTotal
17	Customer List	CustID
18		CustName
19		CustAddress
20		CustCity
21		CustState
22		CustZIP
23		CustPhone
24		CustEmail
25		Notes

A Type **DOCUMENTS** in **cell A1** (increase the column width, if necessary).

B Type **FIELDS** in **cell B1**.

D List the individual fields to be included in each document in **column B**, under **FIELDS**.

This figure shows only part of the data gathering process. Some fields may be included on more than one document, such as ProdID, ProdDescription, and Price.

3. Following the template above, after the last field in the Customer List, add a table named **Employees** that contains **Name** and **Address**, **Telephone**, **Email**, and **Hire Date** fields, and a **Yes/No Web Certification** field.

4. Click **Save** , navigate to your **AC2013 Lesson 02** folder, and save the workbook as **AC02-D01-WinWebDesign- [FirstInitialLastName]**.
Replace the bracketed text with your first initial and last name. For example, if your name is Bethany Smith, your filename would look like this: AC02-D01-WinWebDesign-BSmith.
5. Keep the workbook open for the next exercise.
Unless directed otherwise, always keep your working file open at the end of each exercise.

Importance of Good Database Design

Video Library <http://labyrinthlab.com/videos> Video Number: AC13-V0202

There are a few basic principles to guide you through the database design process. Follow the steps outlined here to create a database that will perform efficiently.

PRINCIPLES FOR GOOD DATABASE DESIGN	
Objective	Description
Separate Tables	Organize and separate data fields into tables with specific subjects (e.g., person, place, or product) so you can easily locate records and reduce redundant data and inconsistencies. Example: A small business may have an Employees table, a Products table, and an Invoices table.
Assign Keys	Set a unique key field for each main table to link to data in other tables. This is done so data are only entered and stored one time, saving time and disk space, and reducing data entry errors. Example: If the ProductID key field is entered into the Invoices table, the ProductDescription and ProductPrice can be linked from the Products table and displayed in an invoice.
Atomize Fields	Break fields into the smallest single values, called atomization. Example: Instead of a Name field that contains the value of Jay Winchester, create two fields—FirstName (Jay) and LastName (Winchester). This allows you to sort/search by LastName and, if desired, print a report without including FirstName.

Normalizing Databases

Video Library <http://labyrinthlab.com/videos> Video Number: AC13-V0203

Organizing tables and fields into their smallest distinct parts, and then efficiently linking the data together through the relationships of key fields, is called **normalization**. Normalization eliminates data duplication, decreases data entry errors and inconsistencies, reduces file size, and streamlines the search for necessary information.

As you add table fields, be aware that Access has **reserved words**, which have special meanings and cannot be used as field names. Examples of reserved words are *Name* and *Date*. If you need to use such fields, name them *FirstName*, *LastName* and *BirthDate* or *HireDate*, which are more descriptive.

When assigning field names, it is common practice to avoid using spaces, which you have no doubt noticed already. This is especially helpful when performing calculations on a field. For instance, a field named Hours Worked, almost looks like two fields (one named Hours and one named Worked). Consequently, most professionals would use the field name HoursWorked or Hours_Worked. Space can be easily added for readability when designing your forms and reports.

As you work through the activities in this lesson, you will begin to shape the relationships among database objects toward normalization.

DEVELOP YOUR SKILLS AC02-D02

Separate Data into Tables and Assign Key Fields

In this exercise, you will divide your gathered document data into tables, each of which describes a single category. You will break down each field into its smallest components, then name each field and assign them to the most appropriate table. Finally, you will add a unique identifying key field to each table.

1. In the **WinWebDesign** workbook, click the **New Sheet**  button.
2. Follow these steps to create a list of database tables and the fields that each table will contain:

A Type **TABLES** in cell **A1**.

B Type **FIELDS** in cell **B1**.

C Type the name of each table in **column A**, as shown.

D Type each field name in **column B**, as shown.

	A	B
1	TABLES	FIELDS
2	Products	ProdID
3		ProdDescription
4		Price
5	Invoices	InvNum
6		InvDate
7		CustID
8	Invoice Details	InvNum
9		ProdID
10		Qty
11		LineTotal
12	Customers	CustID
13		CustLastName
14		CustFirstName
15		CustStreetAddress
16		CustCity
17		CustState
18		CustZIP
19		CustPhone
20		CustEmail
21		Notes

This figure shows only part of the normalization and data assigning process. With the exception of key ID fields, no field is listed more than once.

3. Enter the following fields for the **Employees** table:

- EmpID
- EmpLastName
- EmpFirstName
- EmpAddr
- EmpCity
- EmpST
- EmpZIP
- EmpPhone
- EmpEmail
- EmpHireDate
- EmpWebCert

4. Save  the workbook.

Planning Related Tables

Video Library <http://labyrinthlab.com/videos> Video Number: AC13-V0204

In most cases, determining the tables required for a database and identifying the data or fields each table should contain is relatively simple. After analyzing the business reports and forms for Winchester Web Design, you have determined that you will need an Employees table and a Customers table, in addition to a Products and an Invoices table. You have also identified which fields are required for each table. At this point you should examine each table and confirm that any unassociated data has been moved into a different but appropriate table.

Now you will link the tables with key ID fields so you don't have to enter the same names and products over and over. By establishing relationships between database tables, you prevent repeated data and redundant fields (except those key identifying fields that establish relationships between tables).

Linking Tables with Primary and Foreign Keys

Almost every database table should have a **primary key** field with a unique ID that will not be the same for any two database records. Your social security number and a student ID are examples of unique primary keys.

Primary Keys

Not everyone has a spouse or an email address, so some fields may remain null or empty. However, if a table contains a primary key, then a value must be entered for that key field every time a new record is added. Without a value, that record cannot be linked to any other table in the database. All taxpayers have a social security number; all students have a student ID.

Each time you create a new table in Datasheet View, Access automatically creates an ID field and marks it as the primary key field. When you manually create a table in Design View and do not assign a primary key field, Access asks if you want to create one before you save the table. By default, this primary key is the first field listed in a table and is assigned the **AutoNumber** data type. AutoNumber values start at 1 and are automatically increased by 1 for each subsequent record. You can also rename this field, change its data type, remove the primary key designation

from the field, or assign the key to another field. The primary key field must contain data; the field cannot be empty.

Foreign Keys

As you review your Excel workbook, notice that most key fields (ProdID, EmpID, and CustID) are used in more than one table. In the Customers table, the CustID field is its unique primary key. However, individual customers will also need to be displayed in the Invoice table to show their purchases. A **foreign key** is a field in a secondary table that corresponds and links to the primary key field in the main table, where the specific information for a particular item is stored. The foreign key must be the same data type as the primary key, except in the case of AutoNumber. If the primary key is set to AutoNumber then the foreign key should be set to a Number data type with its Field Size **property** set to Long Integer.

Here, the CustID field in the Invoices table is a foreign key that links to the primary key in the Customers table to obtain the customer name, address, and customer contact information stored in the main table.

Inv Num	Invoice Date	Emp ID	Cust ID
1	12/15/2013	JMM	SmithW
2	12/2/2013	MJW	SantosE
3	1/1/2013	JMM	SantosE
4	11/30/2013	JMM	SmithW

CustID	Last Name	First Name	Street Address	City	ST	ZIP
JeffriesD	Jeffries	Daniel	102 South Fern St	Bradenton	FL	34209
SantosE	Santos	Emily	33 Fairview Lane	Bradenton	FL	34210
SmithW	Smith	William	879 Fifteenth Ave	Bradenton	FL	34210

If the primary key is a number, then the foreign key must also be a number; if the primary key is text, then the foreign key must also be text.

DEVELOP YOUR SKILLS AC02-D03

Assign Key Types to Key Fields

In this exercise, you will assign primary and foreign keys in the Winchester Web Design workbook.

- Follow these steps to label the keys as primary or foreign:

	A	B	C
1	TABLES	FIELDS	KEY
2	Products	ProdID	Primary
3		ProdDescription	
4		Price	
5	Invoices	InvNum	Primary
6		InvDate	
7		CustID	Foreign
8	Invoice Details	InvNum	Foreign
9		ProdID	Foreign
10		Qty	
11		LineTotal	
12	Customers	CustID	Primary
13		CustLastName	
14		CustFirstName	
15		CustStreetAddress	
16		CustCity	
17		CustState	
18		CustZIP	
19		CustPhone	
20		CustEmail	
21		Notes	

A Type **KEY** in cell C1.

B Type **Primary** in cell C2 to identify the primary key.

C Type **Primary** and **Foreign** as shown to identify keys in each table.

2. Assign the primary key designation to the **EmpID** field in the **Employees** table.
3. Save  the workbook.

Identifying Relationship Types

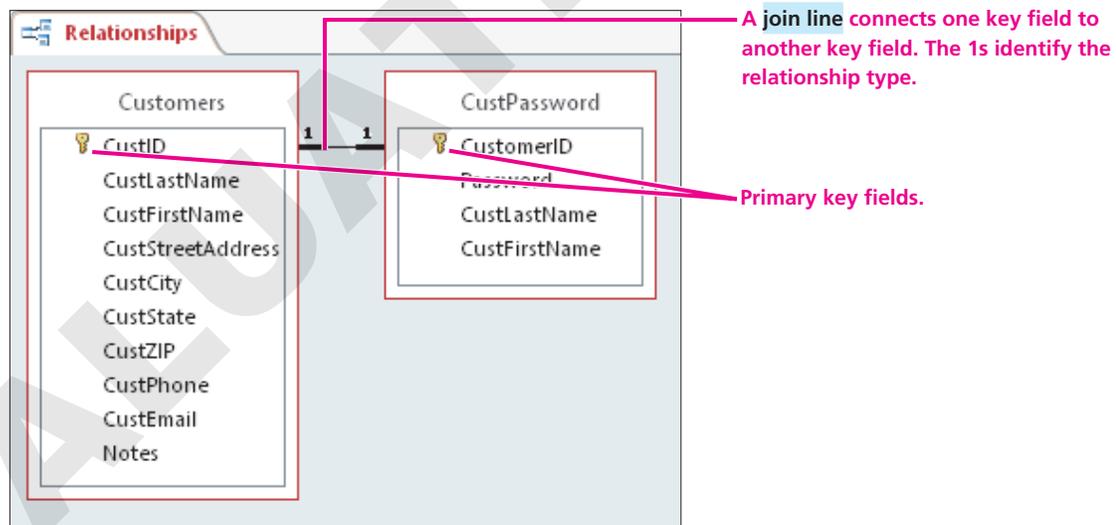
Video Library <http://labyrinthlab.com/videos> Video Number: AC13-V0205

Individuals and teams within organizations establish **relationships** to effectively interact and cooperate with other teams. The same is true of tables within an Access database—relationships must exist. Relationships in databases connect data in one table to data stored in other tables. Access supports three different types of relationships:

- One-to-one
- One-to-many
- Many-to-many

One-to-One Relationships

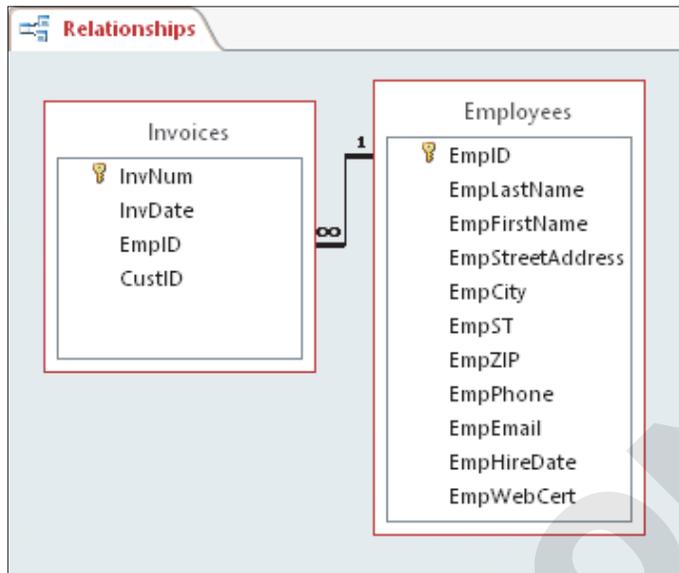
A **one-to-one relationship** means that each record in Table A can have only one matching record in Table B, and each record in Table B can have only one matching record in Table A. This is the least frequently used relationship. A one-to-one relationship requires both of the related fields to be primary keys. This relationship is generally used for storing information that applies only to one small portion of the main table, such as to isolate part of the table for security purposes. A good example of this is a main Customers table linked to a CustPassword table.



In this one-to-one relationship, each employee customer is only linked to one password.

One-to-Many Relationships

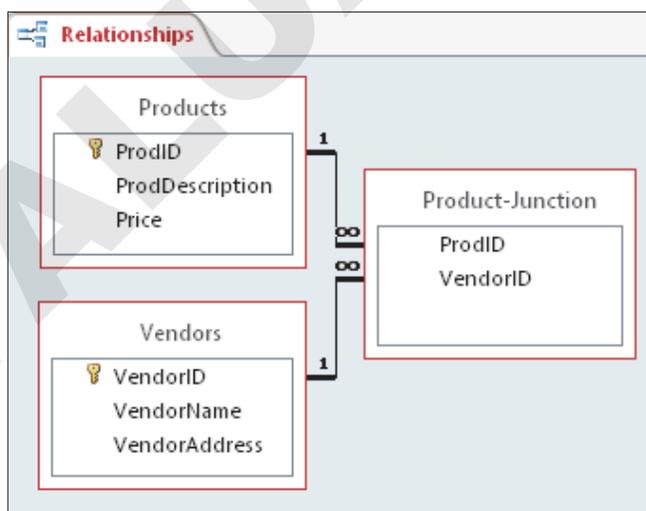
A **one-to-many relationship** means that each record in Table A can have multiple matching records in Table B, but a record in Table B can have only one matching record in Table A. For instance, one employee will have many sales, and a product will be sold many times. This is the most common type of relationship.



One employee may have many sales or invoices. The 1 on the join line for EmpID indicates one employee; the infinity (∞) symbol indicates many sales.

Many-to-Many Relationships

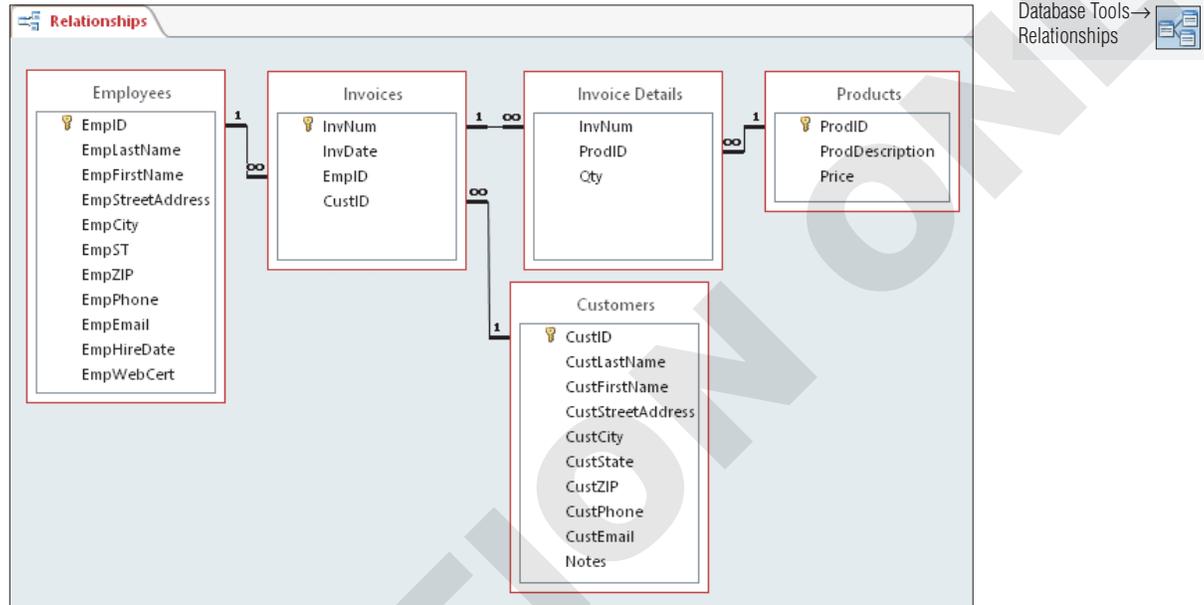
A **many-to-many relationship** occurs when two tables each have many matching records in the other table, but they do not share key fields, so they use a third *junction table* to tie other tables and complete the relationship. The junction table generally has a one-to-many relationship to each table. An example is a vendors table and a products table, where one vendor provides many different products and one product is available from many vendors.



In this many-to-many relationship, items in the Products and Vendors tables each have a one-to-many relationship with the Product-Junction table. As a result, the business could buy the same products from multiple suppliers.

Developing an Entity Relationship Diagram

An **Entity Relationship Diagram (ERD)** helps to model and display relationships between entities, specifically the relationship between tables and fields, as established by key fields. There are a variety of tools that can be used to develop this diagram, ranging from Microsoft's Visio to the open source and free MySQLTM Workbench. And there are different techniques that may be used to display this relationship diagram. Microsoft Access's Relationships tool provides an excellent way to both set and view these relationships.



A relationship diagram generated by Microsoft Access displays each table, each field, and how the tables are linked by their key fields.

Defining Data Types

Video Library <http://labyrinthlab.com/videos> Video Number: AC13-V0206

If you have ever filled out an online form, you might have seen instant formatting of some fields. When typing in currency values, the dollar sign and decimal point may appear automatically, and when entering a date, the slashes between month, day, and year spontaneously appear. This can be accomplished by assigning a data type to the field. A **data type** sets the characteristics of a particular field, identifying the type of values it may hold, such as alphanumeric text, or numbers, or dates, yes/no values, or even a hyperlink.

Identifying Field Data Types

You have identified and named your fields and assigned them to a table. You also made sure you did not assign any field to more than one table—with the exception of a foreign key. Now you will assign each field a data type. As you define each field in a new table datasheet, Access displays a drop-down list from which you can choose the type of data you plan to enter in the field.

By defining the type of data each field will contain, you can reduce both the time and the amount of formatting you must apply as you enter the data. Defining a data type also reduces the potential for errors. For example, if you set a field's data type to a number, a user will not be able to enter values such as the letter l for the number 1 (one) or the letter O for the number 0 (zero). Defining data types can also decrease the storage space needed. A description of data types available in Access 2013 databases is shown in the following table.

ACCESS DATA TYPES	
Data Type	Description
Short Text	Default data type that contains up to 255 characters (any combination of alphabetic and numeric characters, such as names, addresses, and phone numbers); text fields may contain numbers but are not used in calculations
Long Text	Text entries that contain between 1 and 63,999 characters
Number	Numeric data to be used in mathematical calculations
Date & Time	Fields that hold date and time values
Currency	Numeric values representing dollars and cents or fields in which you want to prevent rounding off during calculations
AutoNumber	A field for which Access automatically assigns a unique identifying number to records as they are added to a table; cannot be modified; cannot be reused in a table, so deleted records result in gaps
Yes/No	Single-character entries in a Yes/No checkbox format used to enter data that can be only one of two possible values (true/false, yes/no, or on/off) Use the Yes/No data type for a checkbox that indicates whether an employee has web certification or a college degree
OLE Object	Embedded or linked objects (e.g., Excel spreadsheets, Word documents, images, audio, video, etc.) with a storage limit of 1 gigabyte
Hyperlink	Links to web pages or other files when clicked
Attachment	Data type that identifies a file, such as a document or an image, that will be included in the database as an attachment
Calculated	Field created by doing math on values in other fields within the table
Lookup Wizard	Field that displays a drop-down list of values from another table or from a list of values you type; a common lookup field is a drop-down list of State abbreviations

DEVELOP YOUR SKILLS AC02-D04

Define Data Types

In this exercise, you will assign data types and sizes to the fields in your Winchester Web Design workbook.

1. In your workbook, enter the data type of each field in **column D** as shown. Then, specify field sizes in **column E** (on the right).

	A	B	C	D	E
1	TABLES	FIELDS	KEY	DATA TYPE	SIZE
2	Products	ProdID	Primary	Short Text	4
3		ProdDescription		Short Text	25
4		Price		Currency	10
5	Invoices	InvNum	Primary	AutoNumber	6
6		InvDate		Date	8
7		CustID	Foreign	Lookup>Customers	15
8	Invoice Details	InvNum	Foreign	Integer	6
9		ProdID	Foreign	Lookup>Products	4
10		Qty		Decimal	auto
11		LineTotal		Calculated (Price*Qty)	10
12	Customers	CustID	Primary	Short Text	15
13		CustLastName		Short Text	25
14		CustFirstName		Short Text	25
15		CustStreetAddress		Short Text	25
16		CustCity		Short Text	25
17		CustState		Lookup>States	2
18		CustZIP		Short Text	5
19		CustPhone		Short Text	15
20		CustEmail		Hyperlink	40
21		Notes		Long Text	

The Notes field is a Long Text memo/comment field and has no entered size limit.

2. Assign the **Short Text** data type to these fields in the **Employees** table: EmpID, EmpLastName, EmpFirstName, EmpAddr, EmpCity, EmpST, EmpZIP, and EmpPhone.
3. Assign the **Hyperlink** data type to EmpEmail.
4. Assign the **Date & Time** data type to EmpHireDate.
5. Assign the **Yes/No** data type to EmpWebCert.



When in Datasheet View, tap to check or uncheck a checkbox.

6. Assign the same field sizes you assigned to similar fields in the Customers table.
7. Save the workbook.

Creating Access Tables in a New Database

Video Library <http://labyrinthlab.com/videos> Video Number: AC13-V0207

Now that you have analyzed the needs of your new database and designed the structure for the tables, fields, and primary keys, you are now ready to create your database in Microsoft Access.

Creating a New Database

An Access database serves as a container that holds all the tools, data, and various database objects that help users enter and organize data and obtain meaningful information from that data. As a result, you must name and save the database when you create it. After you create a new database, Access automatically creates and opens an empty table, named Table1, in Datasheet View. When a table is created in Datasheet View, the first field, by default, is the AutoNumber data type.

DEVELOP YOUR SKILLS AC02-D05

Create a New Table in Datasheet View

In this exercise, you will create a new blank database and add an Invoices table in Datasheet View.

1. Start **Access 2013**.
2. Follow these steps to create and name the new database:

A Click **Blank Desktop Database**.

B Click the **Browse Folders** button and navigate to your **AC2013 Lesson 02** folder.

C Type **AC02-D05-WinWebDesign-[FirstInitialLastName]** for the **File Name**.

D Click **Create**.

In step c, remember to replace the bracketed text with your first initial and last name.

Access creates the new database, shows the database name in the application title bar, and creates a new table named Table1 in the Access window.

3. Follow these steps to add field names and set data type:

A Double-click the **ID** field column heading and type **InvNum** as the key field for column one.

B Tap **[Tab]** to go to the second column and choose **Date & Time** from the data type list.

Once the data type is selected, the heading *Click to Add a new field* is automatically named **Field1**.

4. Type **InvDate** as the new name for **Field1** in the second column and tap **[Tab]** to complete the name and move to a new field in the third column.

5. Choose the data type **Short Text** for the third field and change the field name to **EmpID**.

6. Tap **[Tab]**, choose **Short Text** for the fourth field and change the field name to **CustID**.
Full field names/column headings may not appear if the columns are narrower than the field name. Drag the right edge of the column heading to adjust column size.

7. Follow these steps to enter data in your new table:

- A** Click in the first row under **InvDate** and type **12/15/2013**.
- B** Tap **[Tab]** and type **JFW**.

InvNum	InvDate	EmpID	CustID
1	12/15/2013	JFW	SmithW
2	12/2/2013	MJW	SantosE
3	1/1/2013	JMM	SantosE
4	11/30/2013	JMM	SmithW

C Tap **[Tab]** and type **SmithW** under the **CustID** heading.

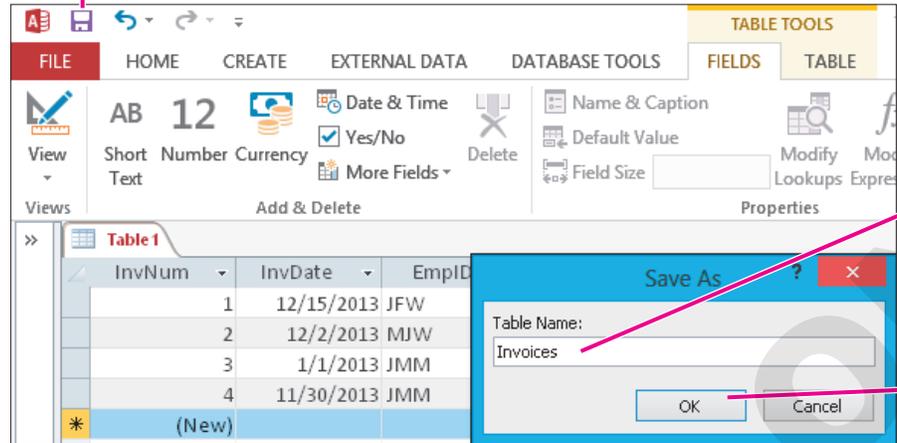
- D** Use **[Tab]** (forward) or **[Shift] + [Tab]** (backward) to navigate among cells and enter the remaining data.



When you create a table in Datasheet View, Access sets the first field as the Primary Key with an AutoNumber data type. Because **InvNum** uses the AutoNumber data type, Access fills in consecutive numbers automatically.

8. Follow these steps to save the table using a new table name:

A Click **Save**.



B Type **Invoices** in the **Table Name** box.

C Click **OK**.

InvNum	InvDate	EmpID
1	12/15/2013	JFW
2	12/2/2013	MJW
3	1/1/2013	JMM
4	11/30/2013	JMM
*	(New)	

The name in the object tab changes from **Table1** to **Invoices**.

9. Click **Close** to close the table. Leave the database open.

Creating Tables in Design View

Video Library <http://labyrinthlab.com/videos> Video Number: AC13-V0208

Many people believe that it's easier to create a new table in Design View because it offers a straightforward layout and provides intuitive options for entering field descriptions, setting field properties, and easily setting or removing primary keys.

Entering Optional Descriptions

In Design View, **descriptions** may be added to each field in a table to help identify special information about a field. For example, in the Customers table, the customer ID consists of the customer last name plus the customer first initial. So you might enter the following description for the CustID field: ID = Last name and customer first initial.

Setting Field Properties

Once you assign a data type, you can modify the field's properties further. As you define each field in a database table, Access sets properties for the field that control the number of characters the field can contain as well as the format of the data and the type of characters that are valid for the field. You can accept Access default properties or modify the properties. Properties available depend on the data type selected for the field.

Requiring Data in Key Fields

The field identified as the primary key field must contain data—it cannot be empty. When Access creates the primary key field, by default it sets the key field to automatically number the records. This ensures that each record has a unique number. Businesses often create their own coding system to identify customers and accounts, and use this identifying code for the key field.

If a column in the table is too long or too short for the data it contains, you can adjust its width. Access provides some useful tools for changing column width.

- **Drag a column border:** Dragging a column border enables you to make the column on the left of the border wider or narrower.
- **Double-click a column heading border:** Double-clicking the right border of a column changes the width of the column on the left to fit the longest data entry in the column or column heading, whichever is wider.
- **Right-click a field heading and choose Field Width:** Selecting the Field Width command in the context menu opens the Column Width dialog box so you can type the desired column width, reset the standard column width, or select Best Fit to automatically size the field width to the longest entry.

DEVELOP YOUR SKILLS AC02-D06

Create a New Table in Design View

In this exercise, you will create a new table using Table Design View. Then, you will adjust the width of the columns in the table.

1. Choose **Create**→**Table Design**.
Access opens an empty table in Design View.
2. Follow these steps to create the first table field, which will be the primary key:

A Type **CustID** in the first row of the **Field Name** column and tap [Tab].



B Note that Short Text is selected as the default Data Type.

Field Name	Data Type	Description (Optional)
CustID	Short Text	Customer Last Name and First Initial

D Click **Primary Key**.

C Tap [Tab] and type **Customer Last Name and First Initial**.

3. Tap  and repeat **step 2** to add the additional fields and field information shown here.

Table 1		
Field Name	Data Type	Description (Optional)
 CustID	Short Text	Customer Last Name and First Initial
CustLastName	Short Text	
CustFirstName	Short Text	
CustStreetAddress	Short Text	
CustCity	Short Text	
CustState	Short Text	2 character state abbreviation
CustZIP	Short Text	5 digit ZIP code
CustPhone	Short Text	Area code and number
CustEmail	Hyperlink	
Notes	Long Text	Special comments

4. Click the CustLastName field and enter the values shown:

Field Name	Data Type
 CustID	Short Text
CustLastName	Short Text
CustFirstName	Short Text
CustStreetAddress	Short Text
CustCity	Short Text

Field Properties	
General	Lookup
Field Size	25
Format	
Input Mask	
Caption	Last Name
Default Value	

A Change the **Field Size** value in the **Field Properties** section to **25** characters.

B In the **Caption** text box type **Last Name**.

5. Repeat the procedure shown in **step 4** to change the caption properties of the following fields:

Field	Size	Caption
CustLastName	25	Last Name
CustFirstName	25	First Name
CustStreetAddress	25	Street Address
CustCity	15	City
CustState	2	ST
CustZIP	5	ZIP Code
CustPhone	15	Telephone
CustEmail		Email

6. Save  the table as **Customers**.

If you forget to save, Access will prompt you to save when you close the table.

7. Click the **View** drop-down arrow and choose **Datasheet View**.
8. Enter these records:

	CustID	Last Name	First Name	Street Address	City	ST	ZIP	Telephone	Email
+	AndersM	Anders	Mark	205 Montana St	Bradenton	FL	34211	(941) 555-2309	AndersM@email.com
+	DavisP	Davis	Peter	65 Terracotta Way	Sarasota	FL	34228	(941) 555-1792	DavisAngie@email.com
+	JeffriesD	Jeffries	Daniel	102 South Fern St	Bradenton	FL	34209	(941) 555-6939	DannyJ@email.com

Notice that the street address for DavisP is slightly cut off (the "y" in "Way" is difficult to make out). You will adjust column width next.

Change the Column Width

9. Follow these steps to change the width of two columns:
 - A Double-click the column header between **Street Address** and **City** to auto size it.

	CustID	Last Name	First Name	Street Address	City	ST	ZIP	Telephone	Email
+	AndersM	Anders	Mark	205 Montana St	Bradenton	FL	34211	(941) 555-2309	AndersM@email.com
+	DavisP	Davis	Peter	65 Terracotta Way	Sarasota	FL	34228	(941) 555-1792	DavisAngie@email.com
+	JeffriesD	Jeffries	Daniel	102 South Fern St	Bradenton	FL	34209	(941) 555-6939	DannyJ@email.com

- B Click between the **ST** and **ZIP** header. The mouse pointer changes into a double-headed arrow. Drag the **ST** column header to the left to manually resize it.

10. Close the **Access** table and database. **Save**  and close the **Excel** workbook.

Retrieving Data

Video Library <http://labyrinthlab.com/videos> Video Number: AC13-V0209

Whether you're processing an order, announcing statistics, or updating records, the primary purpose of any database is to be able to locate and retrieve data quickly and efficiently. Access provides three main tools and features for helping to locate and retrieve data.

- Sorting features
- Filtering tools
- Find and Replace commands

Sorting Records

Access automatically **sorts** records according to the primary key field identified when a table is created and fields are set up. You can also automatically sort tables by an AutoNumber as you

enter records. The database sort feature enables you to rearrange table records based on data found in other table columns as well. Two main sort orders are available in Access.

- **Sort Ascending:** Arranges data in alphabetical order from A to Z, in numeric order from lowest to highest, or in chronological order from first to last.
- **Sort Descending:** Arranges data in reverse alphabetical order from Z to A, in numeric order from highest to lowest, or in reverse chronological order from last to first.

Sorting Records Using Tables and Forms

Regardless of whether you are working with a table or a form, the primary procedures for sorting records are the same.

Because the Winchester Web Design company is a small business with only a few employees, customers, and products, in the remainder of this lesson we will use the Raritan Clinic East database to get a better feel for the power of databases.



For the rest of this exercise, you will work with a Raritan Clinic East database.

DEVELOP YOUR SKILLS AC02-D07

Sort Records in a Table

In this exercise, you will sort records in the Raritan Clinic East database.

1. Open **AC02-D07-RCE** from the **AC2013 Lesson 02** folder and save it as **AC02-D07-RCE-[FirstInitialLastName]**.
2. Double-click the **Patients** table in the Navigation Pane to open it in Datasheet View.
3. Follow these steps to sort records alphabetically by last name:

B Choose **Home**→**Sort & Filter**→**Ascending**.

A Position the insertion point and click any record in the **Last Name** field.

Patient ID	Last Name	First Name	Street Address	City	ST	Zip	Phone	Doctor
0027	Ford	Barry	Persimmon Rd.	Tampa	FL	33213	(941) 555-0027	602
1416	Cook	Dale	Ash Lane	Tampa	FL	33599	(941) 555-1416	155
3565	Bush	Julie	Cypress Bend	Sarasota	FL	34032	(941) 555-3565	725
6136	Craft	Jason	Red Oak Lane	Sarasota	FL	34037	(941) 555-6136	223
6521	Bey	Mary	Camelia Row	Tampa	FL	33422	(619) 555-6521	710
7682	Brent	Barry	Fir Boulevard	Tampa	FL	33686	(619) 555-7682	114
8080	Cook	Ashlee	Asbury Lane	Sarasota	FL	34042	(619) 555-8080	209
8189	Hardy	Brenda	Oak Street	Tampa	FL	33120	(941) 555-8189	724
8617	Floyd	Marjorie	Pine Ave.	Tampa	FL	33188	(941) 555-8617	318
9728	Frost	Sheryl	Maple Street	Ruskin	FL	33574	(941) 555-9728	142
9982	Frost	Mary	Sassafrass Circle	Palmetto	FL	34332	(619) 555-9982	223

4. Follow these steps to set a descending sort order and then remove the sort:

A Click any record in the **Doctor** column.

Patient ID	Last Name	First Name	Street Address	City	ST	Zip	Phone	Doctor
6521	Bey	Mary	Camelia Row	Tampa	FL	33422	(619) 555-6521	710
7682	Brent	Barry	Fir Boulevard	Tampa	FL	33686	(619) 555-7682	114
3565	Ruch	Julie	Cypress Bend	Sarasota	FL	34032	(941) 555-3565	725
8080	Cook	Ashlee	Asbury Lane	Sarasota	FL	34042	(619) 555-8080	209
1416	Cook	Dale	Ash Lane	Tampa	FL	33599	(941) 555-1416	155
6136	Craft	Jason	Red Oak Lane	Sarasota	FL	34037	(941) 555-6136	223
8617	Floyd	Marjorie	Pine Ave.	Tampa	FL	33188	(941) 555-8617	318
0027	Ford	Barry	Persimmon Rd.	Tampa	FL	33213	(941) 555-0027	602
9982	Frost	Mary	Sassafrass Circle	Palmetto	FL	34332	(619) 555-9982	223
9728	Frost	Sheryl	Maple Street	Ruskin	FL	33574	(941) 555-9728	142
8189	Hardy	Brenda	Oak Street	Tampa	FL	33120	(941) 555-8189	724

B Choose **Home** → **Sort & Filter** → **Descending**.

C Click **Remove Sort**.

Records are rearranged in Patient ID order again—the default sort order.

Sorting Records Using Multiple Fields

Video Library <http://labyrinthlab.com/videos> Video Number: AC13-V0210

Data can be sorted in more than one table field at the same time. This can be useful, say, when more than one person in a family visits the same medical clinic. When this happens, selecting the first name field as a second sort field within a last name sort is appropriate. The last name field is the **primary sort field** and the first name field is the **secondary sort field**. The secondary sort field is only considered when multiple records contain the same data in the primary sort field.

How Multiple Column Sorts Work

Access sorts data in multiple fields from left to right. Consequently, the left column must be the one you want sorted first (primary sort field). Access then considers the second column (secondary sort field) only when it finds identical values in the primary sort field. You can perform more complex sorts on multiple fields using the Advanced Filter/Sort options, or sort multiple columns by rearranging them in the datasheet so that they appear side by side.

QUICK REFERENCE		SORTING RECORDS	
Task	Procedure		
Sort ascending	Click in the desired field and choose Home→Sort & Filter→Ascending.		
Sort descending	Click in the desired field and choose Home→Sort & Filter→Descending.		
Clear sorts	Choose Home→Sort & Filter→Remove Sort.		
Sort in multiple fields	Arrange the desired fields with the primary field left of the secondary field then select both field column headings and click the desired sort button.		

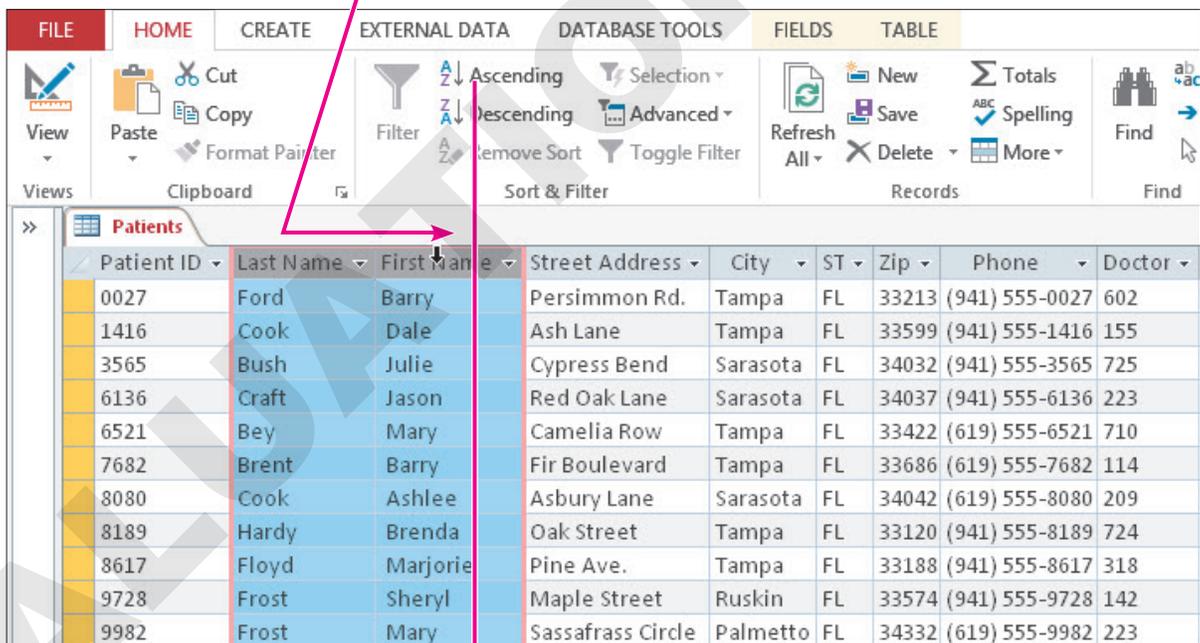
DEVELOP YOUR SKILLS AC02-D08

Sort Records Using Multiple Fields

In this exercise, you will sort data in a table based on the values found in two columns.

- Follow these steps to sort table records based on the values in multiple fields:

A Click the **Last Name** column heading and drag the mouse to select the **First Name** column heading. Notice the downward pointing arrow as you drag the mouse.



B Choose **Home→Sort & Filter→Ascending**.

- Review the record sort results to see the effect of sorting on two columns.

Patient ID	Last Name	First Name	Street Address	City	ST	Zip	Phone	Doctor
6521	Bey	Mary	Camelia Row	Tampa	FL	33422	(619) 555-6521	710
7682	Brent	Barry	Fir Boulevard	Tampa	FL	33686	(619) 555-7682	114
3565	Bush	Julie	Cypress Bend	Sarasota	FL	34032	(941) 555-3565	725
8080	Cook	Ashlee	Asbury Lane	Sarasota	FL	34042	(619) 555-8080	209
1416	Cook	Dale	Ash Lane	Tampa	FL	33599	(941) 555-1416	155
6136	Craft	Jason	Red Oak Lane	Sarasota	FL	34037	(941) 555-6136	223
8617	Floyd	Marjorie	Pine Ave.	Tampa	FL	33188	(941) 555-8617	318
0027	Ford	Barry	Persimmon Rd.	Tampa	FL	33213	(941) 555-0027	602
9982	Frost	Mary	Sassafrass Circle	Palmetto	FL	34332	(619) 555-9982	223
9728	Frost	Sheryl	Maple Street	Ruskin	FL	33574	(941) 555-9728	142
8189	Hardy	Brenda	Oak Street	Tampa	FL	33120	(941) 555-8189	724

There are two patients named Cook and two named Frost. The patients with the same last names are also sorted alphabetically by first name.

- Choose **Home**→**Sort & Filter**→**Remove Sort**. Click any value in the **Street Address** column to deselect both name columns.
- Follow these steps to sort on the same two columns and obtain different results:

- Click the **First Name** column heading to select the column; then click and drag the column. left so that it appears to the left of the **Last Name** column. Click any other field to clear the selected column.

Patient ID	Last Name	First Name	Street Address	City	ST	Zip	Phone	Doctor
0027	Ford	Barry	Persimmon Rd.	Tampa	FL	33213	(941) 555-0027	602
1416	Cook	Dale	Ash Lane	Tampa	FL	33599	(941) 555-1416	155
3565	Bush	Julie	Cypress Bend	Sarasota	FL	34032	(941) 555-3565	725
6136	Craft	Jason	Red Oak Lane	Sarasota	FL	34037	(941) 555-6136	223
6521	Bey	Mary	Camelia Row	Tampa	FL	33422	(619) 555-6521	710
7682	Brent	Barry	Fir Boulevard	Tampa	FL	33686	(619) 555-7682	114
8080	Cook	Ashlee	Asbury Lane	Sarasota	FL	34042	(619) 555-8080	209
8189	Hardy	Brenda	Oak Street	Tampa	FL	33120	(941) 555-8189	724
8617	Floyd	Marjorie	Pine Ave.	Tampa	FL	33188	(941) 555-8617	318
9728	Frost	Sheryl	Maple Street	Ruskin	FL	33574	(941) 555-9728	142
9982	Frost	Mary	Sassafrass Circle	Palmetto	FL	34332	(619) 555-9982	223

- Select both name columns and choose **Home**→**Sort & Filter**→**Ascending**.

The records appear in alphabetical order by first name—the Barrys are together and the Marys are together.

5. Click **Close** to close the Patients table.

Because you have changed the sort order a couple of times and then cleared the sorts, Access recognizes that you have changed the layout of the table and prompts you to save. If you click Yes, the changes will become part of the table design. You want to discard the changes.

6. Choose **No** in response to the prompt to save changes.

Filtering Records

Video Library <http://labyrinthlab.com/videos> Video Number: AC13-V0211

So far, you have sorted all the records contained in a table. When you work with large volumes of table data, there will be times when you want to locate a group of records that contain specific values in specific fields. Filtering enables you to select and work with a subset of records contained in a table.

Using the Filter Tools

The Filter tool lets you identify a value in a table field and tell Access to select only those records in the datasheet that contain the same value in the selected field. This process applies a **filter** to the table that hides (filters out) records whose active field contains data that does not match. For example, if you work with a database that contains thousands of records for consumers across the country, you could apply a filter to identify people who live in a specific state.

Access provides two types of methods for filtering records: Filter by Selection and Filter by Form.

- **Filter by Selection**: Selects records based on the value contained in the active field in the table.
- **Filter by Form**: Selects records based on values or conditions (criteria) you type into form fields. Access searches only the fields you specify.

Filtering Records by Selection

There are two basic ways to filter by selection. You can tell Access to select all records containing data that matches the value or selected text in the active field of the selected record. Or you can select all records containing any value *other than* the one selected. Access searches only the selected field to find matches.

Removing a Filter

If you close the table after you have applied a filter, Access prompts you to save changes to the table. You will often want to save changes, especially in cases where you widen or hide columns. However, filtering data in a table is typically a temporary view while you work with the data, so you do not want to save a filtered table. To remove a filter, choose Home, and in the Sort & Filter section, click the Advanced menu drop-down, then choose Clear All Filters.

Using the Toggle Filter Tool

The Toggle Filter tool in the Sort & Filter section of the Ribbon serves two purposes:

- After you apply a filter, clicking the Toggle Filter button removes the filter and displays all records.
- After removing a filter, clicking the Toggle Filter button reapplies the last filter applied.

In addition, when you point to the Toggle Filter button, a ToolTip displays to let you know what action you are performing. For example, when you point to the Toggle Filter button after applying a filter, the ToolTip displays *Remove Filter*. When you point to the Toggle Filter button after removing a filter, the ToolTip displays *Apply Filter*.

DEVELOP YOUR SKILLS AC02-D09

Filter Records by Selection

Two records in the Raritan Clinic East Doctors table contain an invalid zip code. In this exercise, you will filter table records, correct the zip code, and then remove the filter.

1. Open the **Raritan Clinic East Doctors** table.
2. Follow these steps to set a filter:

A Locate a record with a **Zip** field value equal to **34205** and double-click to highlight the Zip value.

B Choose **Home** → **Sort & Filter** → **Selection**.

C Select **Equals "34205"** from the Selection menu.

D Two records contain the invalid **Zip** code.

E Click **Toggle Filter** to switch between the filtered records and the entire table.

DocID	Last Name	First Name	Street Address	City	ST	Zip	Telephone
114	Storm	Judith	234 McIntosh Dr.	Sarasota	FL	34032	(941) 555-2309
130	Ottome	John	49 Osprey Ave.	Sarasota	FL	34034	(941) 555-1304
142	Nealle	David	100 Bee Ridge Rd.	Sarasota	FL	34032	(941) 555-1230
155	Good	Ruthann	55 Lutz St.	Tampa	FL	33172	(941) 555-2091
209	Lawrence	Robert	32 Magellan Dr.	Sarasota	FL	34033	(941) 555-5926
223	Bonifay	Madeline	9932 Southern Pkwy.	Bradenton	FL	34205	(941) 555-1902
318	Hutchins	Chris	232 Orange Ave.	Sarasota	FL	34042	(941) 555-3809
521	Jones	Jacob	502 Greenville Rd.	Bradenton	FL	34212	(941) 555-4613
602	Howard	Alana	1802 Beneva Rd.	Sarasota	FL	34032	(941) 555-9910
617	Francis	Michael	718 El Conquistador	Bradenton	FL	34210	(941) 555-2133
710	Billings	Edward	382 Cortez Rd.	Bradenton	FL	34205	(941) 555-2237
724	Manford	Ryan	45 Rogers Ave.	Bradenton	FL	34212	(941) 555-8422
725	ly	Earl	2002 on Ave.	Sarasota	FL	34022	(941) 555-5632

Access applies the filter immediately and displays two records that contain the value. The navigation bar indicates that the results are filtered.

3. Click the **Zip** field for each of the errant records and type **34207**.
4. Choose **Home**→**Sort & Filter**→**Advanced**→**Clear All Filters**  to remove the filter and display all table records.

Filtering Records by Form

Video Library <http://labyrinthlab.com/videos> Video Number: AC13-V0212

Filter by Form allows you to select records based on values in multiple fields without rearranging the layout of table fields. When you filter by form, Access remembers the sort criteria. As a result, it is important to clear all filters after you apply this filter.

Identifying Comparison Operators

When you use the Filter by Form feature, you will often apply comparison operators so Access can locate the exact records or the range of records that contain the data you want to find.

COMPARISON INDICATORS AND SYMBOLS	
Comparison Symbol	Description
=	<i>Equal</i> : Records in the table must contain a value that equals the value you set for the field.
<	<i>Less than</i> : Records in the table must contain a value less than the value you set for the field.
>	<i>Greater than</i> : Records in the table must contain a value greater than the value you set for the field.
<>	<i>Unequal</i> : Records in the table must contain a value different from the value you set for the field.
<=	<i>Less than or equal</i> : Records in the table must contain a value less than or equal to the value you set for the field.
>=	<i>Greater than or equal</i> : Records in the table must contain a value greater than or equal to the value you set for the field.

The format of the Filter by Form entry palette depends on whether you are filtering from a table or from a form. If you are filtering from a table, a datasheet palette opens. If you are filtering from a form, a blank form opens.

Using Wildcards

Database users often want to locate records that contain data in a specific field which may contain additional text or data. To accommodate this, Access accepts the use of **wildcards**, such as the asterisk (*), which can be used to represent multiple characters, or the question mark (?), where each question mark represents a single character.

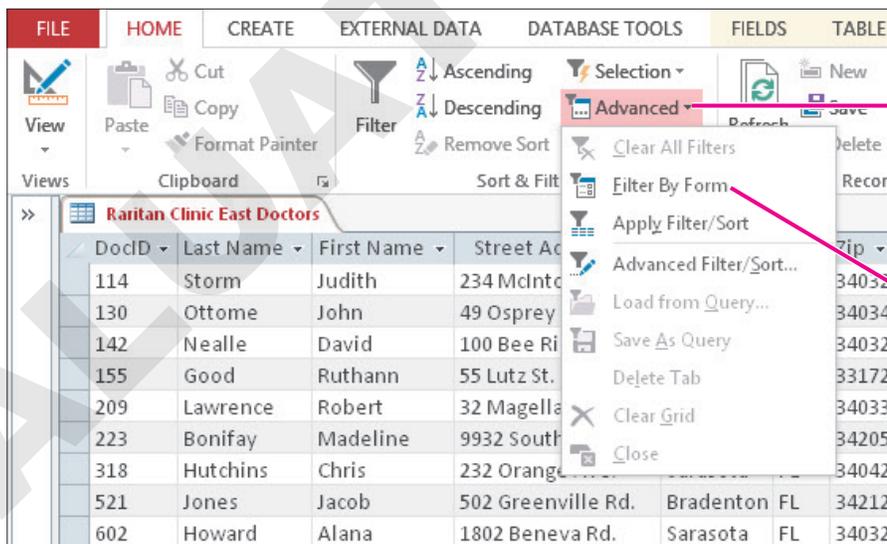
USING WILDCARDS TO LOCATE DATA	
Example	Description
Will*	Finds all records with the search string text <i>will</i> at the beginning of the field value regardless of how many other characters follow it. This search string will find Will, Willy, and William.
*ill	Finds all records with the search string text <i>ill</i> at the end of the field value regardless of how many characters precede it. This search string will find Will, Bill, and Jill, but not Willy or William.
ill	Finds all records with the search string text <i>ill</i> anywhere in the field value, whether or not other characters appear before or after the search text. This search string will find Bill, Jill, Will, Willy, and William.
Will?	Finds all records with the search string text <i>will</i> at the beginning of the field value and with only one character after. This search string will find Willy but not Willie.
Will??	Finds all records with the search string text <i>will</i> at the beginning of the field value followed by exactly two additional characters. This search string will find Willie but not Willy or William.

DEVELOP YOUR SKILLS AC02-D10

Filter Records by Form

In this exercise, you will use a table to filter records by form.

1. If necessary, open the **Raritan Clinic East Doctors** table in Datasheet View.
2. Follow these steps to open the Filter by Form tool:



A Choose **Home** → **Sort & Filter** → **Advanced**.

B Choose **Filter by Form**.

A blank record opens.

3. Follow these steps to filter and select records in which the City value is Sarasota:

A Click in the **City** field.

B Click the **menu** button at the right side of the **City** field and choose **Sarasota**.

C Click **Toggle Filter** to filter the records.

Access finds the records that meet the criteria and places a filter icon beside the field name.

DocID	Last Name	First Name	Street Address	City	ST	Zip	Telephone	Date Hired	Specialty
114	Storm	Judith	234 McIntosh Dr.	Sarasota	FL	34032	(941) 555-2309	4/14/2012	Neonatal
130	Ottome	John	49 Osprey Ave.	Sarasota	FL	34034	(941) 555-1304	8/30/2010	General Med
142	Nealle	David	100 Bee Ridge Rd.	Sarasota	FL	34032	(941) 555-1230	9/1/2010	Emergency
209	Lawrence	Robert	32 Magellan Dr.	Sarasota	FL	34033	(941) 555-5926	2/9/2011	General Med
318	Hutchins	Chris	232 Orange Ave.	Sarasota	FL	34042	(941) 555-3809	3/18/2012	General Med
602	Howard	Alana	1802 Beneva Rd.	Sarasota	FL	34032	(941) 555-9910	6/2/2011	Neonatal
725	Kelly	Earl	2002 Lemon Ave.	Sarasota	FL	34022	(941) 555-5632	7/25/2011	Emergency
829	Holland	Elizabeth	1802 Beneva Rd.	Sarasota	FL	34032	(941) 555-4144	8/29/2010	Emergency
914	Mansee	Mikayla	19 Fruitville Rd.	Sarasota	FL	34201	(941) 555-6767	9/14/2011	Emergency

Only records with the City field value of Sarasota are displayed. Notice the Filter icon in the City heading to indicate that it is a filtered field.

4. Review the results then choose **Home**→**Sort & Filter**→**Advanced**→**Clear All Filters**



Warning: Toggling the filter off does not remove the filter from the table; it just toggles between showing all the records and the filtered records. To remove a filter, choose Clear All Filters from the Advanced menu.

5. Click **Close** to close the table. Choose **No** when prompted to save.

Update Records with Find and Replace

Access' Find and Replace tool improves the efficiency of maintaining a database that constantly changes. Using this tool, you can easily locate, delete, and edit records.

When you have specific edits to make to individual records, finding the records and making the edits works well. There are also times when you need to update the data in one field for multiple records with the identical replacement data. For example, if the area code for a city changed, multiple records would need to be updated with the same value. The Replace command allows you to update these records by replacing existing data with new data. Use the Replace command to:

- **Replace:** Replace text for each occurrence of the search text, one at a time.
- **Replace All:** Replace all occurrences of the search text with the new text, all at the same time.



Use Replace All with caution to avoid unexpected results. For example, if you wanted to replace the area code 813 with 941, Replace All would also change the phone number 555-6813 to 555-6941.

The Find and Replace dialog box is probably already familiar to you. However, because data stored in a database is somewhat different from the text stored in other files, you will find some fields that are unique to the Access application.

FROM THE KEYBOARD

Ctrl+F to open the Find command page of Find and Replace

Ctrl+H to open the Find and Replace dialog box

The screenshot shows the 'Find and Replace' dialog box with the 'Find' tab selected. The 'Find What:' field contains the text 'Bonifay'. The 'Look In:' dropdown menu is set to 'Current field'. The 'Match:' dropdown menu is set to 'Whole Field'. The 'Search:' dropdown menu is set to 'All'. There are two checkboxes at the bottom: 'Match Case' (unchecked) and 'Search Fields As Formatted' (checked). The 'Find Next' and 'Cancel' buttons are visible on the right side of the dialog.

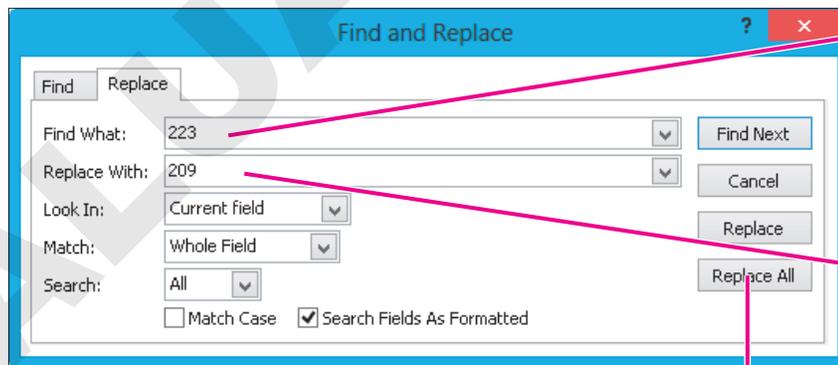
FIND AND REPLACE COMMANDS	
Feature	Description
Find What	Enter the text, numbers, dates, and other values to locate.
Replace With	Finds a value and replaces it with a value you specify.
Look In	Search only in the active field or in the entire document.
Match	Search for only data matching the whole field, any part of the field, or at the start of the field.
Search	Search up or down from the active cursor (to the end of the table or to the beginning of the table) or the whole table.
Match Case	Matches the exact capitalization pattern you type.
Search Fields As Formatted	Search for data as it is displayed in the datasheet rather than as you type it. If you uncheck the box, you would find March 5, 2013, even if it is formatted in the datasheet as 3/5/2013.

DEVELOP YOUR SKILLS AC02-D11

Update Records Using Find and Replace

After a long career, Dr. Bonifay (DocID 223) is retiring. In this exercise, you will use Find and Replace to transfer her patients to Dr. Lawrence (DocID 209).

1. Open the **Patients** table.
2. Click the **Doctor** column heading to select the field to search.
You must select the field to search first.
3. Choose **Home** → **Find** →  **Replace**
4. Follow these steps to locate and replace text with new values:



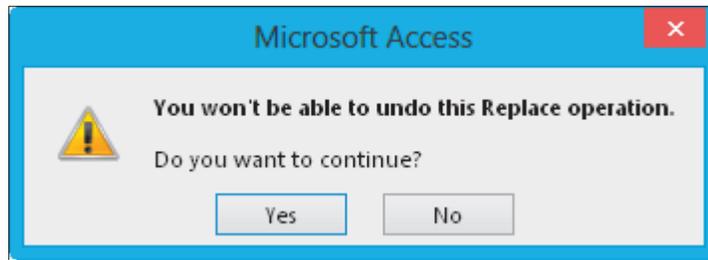
A Type **223** in the **Find What** box.

B Type **209** in the **Replace With** box.

C Click **Replace All**.

Access 2013

Access' warning states that you will not be able to undo this action.



5. Choose **Yes** to replace all the values.
6. Click **Cancel** to close the Find and Replace dialog box then scroll to confirm that the 223 doctors values have indeed changed to 209.
7. Close the table, saving if prompted.
8. Press **[Alt] + [F4]** to exit **Access**.

Concepts Review

To check your knowledge of the key concepts introduced in this lesson, complete the Concepts Review quiz by choosing the appropriate access option below.

If you are...	Then access the quiz by...
Using the Labyrinth Video Library	Going to http://labyrinthelab.com/videos
Using eLab	Logging in, choosing Content, and navigating to the Concepts Review quiz for this lesson
Not using the Labyrinth Video Library or eLab	Going to the student resource center for this book

Reinforce Your Skills



REINFORCE YOUR SKILLS AC02-R01

Design a New Database

Kids for Change is a non-profit organization that helps young adults organize social/community service. They recently received an influx of funds to invest in computerizing the organization. In this exercise, you will gather and organize the information to determine the tables and fields needed for the new Kids for Change database.

Design a Database

1. Think about what pieces of information should be included in the database. Consider the kinds of forms and reports they might want to generate.
2. Start **Excel** and add the following headings for the columns in the first row:
 - Column A: **Table**
 - Column B: **Field**
 - Column C: **Key**
 - Column D: **Table**
 - Column E: **Field**
 - Column F: **Key**
3. Type a list of data that should be included in the database. Resize the columns as necessary.

Normalize the Database

4. As you examine the data, break down each piece of information into its basic parts.
5. Divide the data into tables based on the following categories: **Activities**, **Staff**, **Sites**, **Volunteers**, and **Children**. List the table names in **columns A and D**.
6. With the exception of key fields used to link tables, make sure no field appears in more than one table. List the corresponding fields for each table in **columns B and E**.

Relate Tables with Keys

7. Enter a key ID field for each table to show the relationships that should exist between tables. Indicate which fields are primary or foreign keys in **column C**.
8. Save the Excel spreadsheet to your **AC2013 Lesson 02** folder as **AC02-R01-K4C-[FirstInitialLastName]**.
9. Submit your final file based on the guidelines provided by your instructor.

To view examples of how your file or files should look at the end of this exercise, go to the student resource center.

REINFORCE YOUR SKILLS AC02-R02

Create a New Database and Add Tables

In this exercise, you will create a new database and add tables.

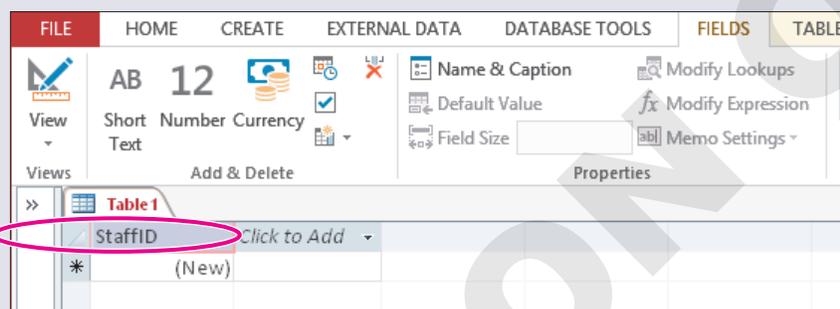
Before You Begin: You must complete Reinforce Your Skills AC02-R01 before beginning this exercise. If necessary, open your AC02-R01-K4C-[FirstInitialLastName] file in Excel.

Create a Database and a Table in Datasheet View

1. Start **Access**. Start a **Blank Desktop Database**, saving it as **AC02-R02-K4C-[FirstInitialLastName]** in your **AC2013 Lesson 02** folder.

The new database opens and a new empty table named Table1 is open in Datasheet View.

2. Double-click **ID** in the first field heading of Table1 and type **StaffID**.



3. Press **[Tab]**, keep the default data type **Short Text** in the next field and change the **Field1** heading to **StaffLastName**.
4. Press **[Tab]** and repeat the above steps to enter the remaining fields from the Staff table you created in your **AC02-R01-K4C** spreadsheet. (Possible field names that you might choose are shown below in step 6.)

All the remaining fields in this table are the Short Text data type.



TIP

Remember to tap **[Tab]** after each field entry.

5. Save  the table as **Staff**.
6. Add the following records to the Staff table:

StaffID	StaffLastName	StaffFirstName	StaffAddress	StaffCity	StaffST	StaffZIP	StaffPhone	StaffAvail
1	Bryant	Matthew	12 E. MacIntosh	Sarasota	FL	34022	941-555-7523	Thursday
2	Earle	Kevin	77 Kingfisher	Sarasota	FL	34024	941-555-1368	Monday
3	Jacoby	Jane	4323 NW 63rd	Venice	FL	34222	941-555-5050	Tuesday
4	Pauly	Gerry	891 Waylon Lane	Bradenton	FL	34205	941-555-1988	Sunday

Because StaffID is an AutoNumber data type, Access fills in consecutive numbers automatically. The StaffPhone field has not been formatted, so you must add the hyphens.

7. If necessary, double-click the line between the column headings to automatically resize the columns to display all the data.
8. Save and close  the **Staff** table.

Create a Table in Design View

- Choose **Create**→**Table Design**.
- Enter **ChildID** in the first row of the Field Name column.
- Tap **[Tab]** and leave the Data Type for ChildID as **Short Text**.
- Tap **[Tab]** and in the Description field, type **ID = Last Name and First Initial**.
- Click **Primary Key** to designate **ChildID** as the primary key field.
- Enter the remaining fields, data types, and descriptions shown, choosing the **Date/Time** data type for **ChildBirthday**.

Field Name	Data Type	
ChildID	Short Text	Last Name and First Initial
ChildLastName	Short Text	
ChildFirstName	Short Text	
ChildAddress	Short Text	
ChildCity	Short Text	
ChildST	Short Text	2-char abbreviation
ChildZIP	Short Text	5-digit ZIP code
ChildPhone	Short Text	Area code & number
ChildBirthday	Short Text	
	Short Text	
	Long Text	
	Number	
	Date/Time	
	Currency	
	AutoNumber	
	Yes/No	
	OLE Object	
	Hyperlink	
	Attachment	
	Calculated	
	Lookup Wizard..	

- Click **Save**  and name the table **Children**.
- Open the **Children** table in Datasheet View.
- Enter these field values.

ChildID	ChildLastName	ChildFirstName	ChildAddress	ChildCity	ChildST	ChildZIP	ChildPhone	ChildBirthday
CregerK	Creger	Kurt	503 Hillview	Sarasota	FL	34022	941-555-0245	10/12/2001
JonesP	Jones	Paul	892 Southern Pkwy	Sarasota	FL	34024	941-555-8929	09/03/1998
LangfordJ	Langford	James	43 Wisteria Way	Bradenton	FL	34209	941-555-1098	08/13/2000
PrestonW	Preston	Willy	162 Hamlet Lane	Sarasota	FL	34021	941-555-9372	03/11/2003

The *ChildPhone* and *ChildBirthday* fields have not been formatted, so you must add the hyphens and slashes.

- Click **Close**  to close the **Children** table. Exit both **Excel** and **Access**.
- Submit your final file based on the guidelines provided by your instructor.

To view examples of how your file or files should look at the end of this exercise, go to the student resource center.

REINFORCE YOUR SKILLS AC02-R03

Create New Tables and Enter Data

The staff director of Kids for Change would like you to add two new tables to the database, one that stores various community activities and one that stores parent volunteers. In this exercise, you will collect and organize the data needed for the lists, break down the data to its basic fields, and divide the fields into related tables. Then, you will create the tables.

Design and Normalize Database Tables

1. Start **Excel**. In a new blank worksheet, type a list of information to be included in a new **Volunteers** and a new **Activities** table. Break each piece of information into its smallest parts.
2. Type the **Volunteers** and **Activities** table names in **column A**.
3. Enter fields for each of the tables in **column B**. With the exception of key fields used to link tables, make sure no field appears in more than one table.

Relate Tables with Keys

4. Enter a key ID field for each table to show the relationships that should exist between tables. Indicate which fields are primary or foreign keys in **column C**.
5. Save the spreadsheet to your **AC2013 Lesson 02** folder as **AC02-R03-K4C-Excel-[FirstInitialLastName]**.

	A	B	C
1	Table	Field	Key
2	Volunteers	Vol ID	Primary
3		Vol Last name	
4		Vol First Name	
5		Vol Address	
6		Vol City	
7		Vol ST	
8		Vol ZIP	
9		Vol Phone	
10		Vol Avail	Foreign
11	Activities	Act ID	Primary
12		Act Name	
13		Act Day	Foreign
14		Act Time	
15		Act Address	
16		Act City	
17		Act Contact	

Your Excel worksheet should look similar to the figure above, though you may have different names.

Create a Table in Datasheet View

- Start **Access**. Open **AC02-R03-K4C** from your **AC2013 Lesson 02** folder and save it as **AC02-R03-K4C-[FirstInitialLastName]**.
- Choose **Create**→**Tables**→**Table** to create a new table in Datasheet View.
- Double-click **ID** in the first field heading and type **VolID**.

Table 1	
VolID	Click to Add
*	(New)

- Press **[Tab]**, choose the **Short Text** data type, and change the **Field1** heading to **VolLastName**.
- Press **[Tab]** and repeat enter the remaining fields from the **Volunteers** table that you entered in **Excel**.
- Save the table as **Volunteers**.
- Add these records to the Volunteers table.

VolID	VolLastName	VolFirstName	VolStreet	VolCity	VolST	VolZIP	VolPhone
1	Jones	Stan	892 Southern Pkwy.	Sarasota	FL	34024	941-555-8929
2	Langford	Kerry	43 Wisteria Way	Bradenton	FL	34209	941-555-1098
3	Creger	Cindy	503 Hillview	Sarasota	FL	34022	941-555-0245

The VolPhone field has not been formatted, so you must add the hyphens.

- Close the **Volunteers** table.

Create a Table in Design View

- Choose **Create**→**Tables**→**Table Design** to create a new table in Design View.
- Enter **ActivityID** in the first row of the **Field Name** column.
- Tap **[Tab]** and leave the Data Type as **Short Text**.
- Tap **[Tab]**. In the **Description** field, type **Activity Initials + Activity Day**.
- Set **ActID** as the primary key.

19. Enter the remaining **Short Text** fields from your **Excel** worksheet.

Table 1		
Field Name	Data Type	
ActID	Short Text	Activity Initials + Activity Day
ActName	Short Text	Name of Activity
ActLocation	Short Text	Where activity takes place
ActAddress	Short Text	Street Address
ActCity	Short Text	
ActDay	Short Text	Day of Week
ActTime	Date/Time	

20. Choose **Date/Time** from the drop-down menu for **ActTime**.

21. Save the table as **Activities**.

22. Open the table in **Datasheet View** and enter these records.

Activities						
ActID	ActName	ActLocation	ActAddress	ActCity	ActDay	ActTime
BCSat	Beach Cleanup	Coquina Beach	Gulf Drive	Bradenton	Saturday	9:00:00 AM
CCThu	Can Collection	Seabreeze School	72nd Street	Bradenton	Thursday	6:00:00 PM
ESSun	Eco-Bake Sale	DownTown Flea Market	Main Street	Sarasota	Sunday	8:00:00 AM
GWWed	Garden Work	All Angels Church	MacIntosh	Sarasota	Wednesday	5:00:00 PM

23. Close the table, saving changes if prompted. Then, exit **Excel** and **Access**.

24. Submit your final file based on the guidelines provided by your instructor.

Apply Your Skills



APPLY YOUR SKILLS AC02-A01

Plan and Design a Database

Universal Corporate Events is a corporate meeting and event planning service.

They have hired you to build a new database to automate the company. In this exercise, you will create a new database and add a table that organizes the types of events that Universal Corporate Events plans.

Design and Normalize a Database

1. In **Excel**, create a list of all fields and information that you want to include in the database, such as event types, locations, a calendar or schedule, menu plans, and other relevant subjects.
2. Divide the data into four tables: **Staff**, **Events**, **Scheduling**, and **Menus**.
3. Determine the common key ID fields you will use to relate the tables to each other.
4. Assign a data type to each field.
5. Save the spreadsheet to your **AC2013 Lesson 02** folder as **AC02-A01-UniversalCorp-[FirstInitialLastName]**.
6. Exit **Excel**.
7. Submit your final file based on the guidelines provided by your instructor.

To view examples of how your file or files should look at the end of this exercise, go to the student resource center.

APPLY YOUR SKILLS AC02-A02

Add Tables to a New Database

Now that you have collected and organized the data fields, you can create the database for Universal Corporate Events. In this exercise, you will create the new database, add an EventStaff table in Datasheet View, and then add a Menus table in Design View.

Before You Begin: You must complete Apply Your Skills AC02-A01 before beginning this exercise. If necessary, open your AC02-A01-UniversalCorp-[FirstInitialLastName] file in Excel.

Create a Database and a Table in Datasheet View

1. Start **Access**. Open a **Blank Desktop Database** and save it as **AC02-A02-UniversalCorp-[FirstInitialLastName]** in your **AC2013 Lesson 02** folder.
2. Referring to your **AC02-A01-UniversalCorp** Excel workbook, enter the **Staff** table field names.
3. Save the table as **EventStaff**.

4. Enter these records in the **EventStaff** table.

StaffID	StaffLastName	StaffFirstName	StaffAddress	StaffCity	StaffST	StaffZIP	StaffPhone	StaffDay
1	Parker	Wesley	894 Second Ave	Ellenton	FL	34213	941-555-3009	Monday
2	Swenson	Tommy	10 Beacon Place	Palmetto	FL	34091	941-555-0915	Tuesday
3	Faulkner	Karen	458 Western Run	Bradenton	FL	34207	941-555-9723	Saturday
4	Trilman	Peter	72 Davison Way	Sarasota	FL	34222	941-555-1396	Wednesday
5	Dauntin	Rahim	442 Beneva Rd	Sarasota	FL	34901	941-555-9992	Tuesday
6	Blare	Trina	2921 Fruitville	Sarasota	FL	33218	941-555-4263	Monday

5. Close the **EventStaff** table, saving if prompted.

Create a Table in Design View

- Choose **Create**→**Tables**→**Table Design**.
- Enter the fields and data types for the **Menus** table from your **AC02-A01-UniversalCorp** workbook.
- Designate **MenuCode** as the primary key field.
- Save the table as **Menus**.
- Open the table in **Datasheet View** and enter this data.

MenuCode	MenuPlan	Chg/PP
BRKBUF	Buffet Breakfast	17.00
DESSERT	Dessert Selections	14.00
DINBUF	Dinner-Buffer	45.00
LUNSIT	Luncheon w/Servers	34.00

- Close the **Menus** table, saving it if prompted. Then, Exit **Excel** and **Access**.
- Submit your final file based on the guidelines provided by your instructor.
To view examples of how your file or files should look at the end of this exercise, go to the student resource center.

APPLY YOUR SKILLS AC02-A03

Create a New Database and Add Related Tables

Every university and school has a giant database that stores data for students, faculty, classes, grades, and so forth. In this exercise, you will identify fields needed to store student data for such a database and group these fields into appropriate tables.

Design and Normalize a Database

- Start **Excel**. In a new workbook, list the reports commonly generated by schools and universities, such as course schedules, grades, prerequisites, degree requirements, student aid, etc.
- List data fields that would be required to generate the reports.
- Determine the common key ID fields that can be used to relate the tables to each other.
- Assign a data type to each field.

Create a Database and a Table in Datasheet View

- Start **Access**. Create a new database named **A02 - A03 - SunStateU-[FirstInitialLastName]** and save it to your **AC2013 Lesson 02** folder.
Access creates the new database, and opens a new table in Datasheet View.
- In the new table, enter these fields and data types for university classes.

Field	Data Type
Department	Short Text
Class Number	Short Text
Section Number	Short Text
Building	Short Text
Room Number	Short Text
Start Time	Date/Time
End Time	Date/Time
Credit Hours	Number

- Set **Department** as the primary key field.
- Brainstorm and add at least four new records to the table.
- Save the table as **Classes**.
- Create a table in **Design View** containing these fields and data types, adding your own descriptions.

Field Name	Data Type	Description
ProfID	Short Text	
ProfLastName	Short Text	
ProfFirstName	Short Text	
ProfDept	Short Text	
ProfRank	Short Text	

- Set **ProfID** as the primary key.
- Save the table as **Professors**.
- Close the **Classes** and **Professors** tables. Then, exit **Excel** and **Access**.
- Submit your final file based on the guidelines provided by your instructor.

Extend Your Skills



In the course of working through the Extend Your Skills exercises, you will think critically as you use the skills taught in the lesson to complete the assigned projects. To evaluate your mastery and completion of the exercises, your instructor may use a rubric, with which more points are allotted according to performance characteristics. (The more you do, the more you earn!) Ask your instructor how your work will be evaluated.

AC02-E01 That's the Way I See It

Winchester Website Design is exploring expanding the number of items they currently recycle (cans, bottles, Styrofoam, paper, old electronics). To determine if there are additional ways to recycle, the company president has asked you to do some research. Go online and locate information about recycling in your state (recycling locations, contact persons, etc.). Plan the fields to include in a recycling information database. In Excel, create a spreadsheet that organizes your data into tables, along with key fields and data types. Save the spreadsheet as **AC02-E01-ExcelRecycle- [FirstInitialLastName]** in your **AC2013 Lesson 02** folder.

In Access, create a new database named **A02-E01-Recycling- [FirstInitialLastName]**. Create a table that includes fields for recycling locations throughout the state and a contact name for the person in charge of the recycling facility. Enter data for at least three sites/companies. Finally, add a record containing your school as a site/company and your name as the contact.

You will be evaluated based on the inclusion of all elements, your ability to follow directions, your ability to apply newly learned skills to a real-world situation, your creativity, and your accuracy in creating objects and/or entering data. Submit your final files based on the guidelines provided by your instructor.

AC02-E02 Be Your Own Boss

You are the owner of Blue Jean Landscaping and have decided to sponsor the Sarasota Service Guild, a nonprofit organization created to raise money to help adults with disabilities. The guild has successfully raised more than \$60,000 annually through sponsoring an historic home tour. They would like a database that will enable them to track memberships, donations from businesses, ticket sales, etc. You can help them plan their database by identifying fields, such as donor names and tour schedules, and tables, such as Members and Tour Home Addresses. Using Excel, identify sample tables that need to be included in the database and the fields that you would place in each table, assign primary and foreign keys to relate the tables, and select data types for each field. Save the Excel spreadsheet as **AC02-E02-BJLandscaping- [FirstInitialLastName]** in your **AC2013 Lesson 02** folder. Once you have designed the database in Excel, start Access and create a new database named **AC02-E02-BJLandscaping- [FirstInitialLastName]**. Add the tables that you included in your Excel spreadsheet.

You will be evaluated based on the inclusion of all elements, your ability to follow directions, your ability to apply newly learned skills to a real-world situation, your creativity, and your accuracy in creating objects and/or entering data. Submit your final files based on the guidelines provided by your instructor.

Transfer Your Skills



In the course of working through the Transfer Your Skills exercises, you will use critical-thinking and creativity skills to complete the assigned projects using skills taught in the lesson. To evaluate your mastery and completion of the exercises, your instructor may use a rubric, with which more points are allotted according to performance characteristics. (The more you do, the more you earn!) Ask your instructor how your work will be evaluated.

AC02-T01 Use the Web as a Learning Tool

Throughout this book, you will be provided with an opportunity to use the Internet as a learning tool by completing WebQuests. According to the original creators of WebQuests, as described on their website (WebQuest.org), a WebQuest is “an inquiry-oriented activity in which most or all of the information used by learners is drawn from the web.” To complete the WebQuest projects in this book, navigate to the student resource center and choose the WebQuest for the lesson on which you are currently working. The subject of each WebQuest will be relevant to the material found in the lesson.

WebQuest Subject: Design elements of a high-quality Access database.

Submit your final file(s) based on the guidelines provided by your instructor.

AC02-T02 Demonstrate Proficiency

Stormy BBQ wants to modernize its business. They have hired you to design and create a database for their BBQ restaurant. Using Excel, plan the new database. Then, in Access, create three tables: one for staff/employees, one for the menu, and one for customer information. Brainstorm and add at least six records to each table (make it up). Relate the menu and customer tables using a customer favorite ID.

Save the database to your **AC2013 Lesson 02** folder as **AC02 - T02 - StormyBBQ - [FirstInitialLastName]**. Submit your final file based on the guidelines provided by your instructor.

EVALUATION ONLY