10

Tables

In this chapter you will learn:

- How to Add, change, and delete records
- How to Add a picture with an OLE field
- How to Change the structure of a database
- How to Change field data types, row heights, and column widths
- How to Create field validation rules
- How to Create field default values
- How to Create field formats
- How to Specify referential integrity
- How to Document a database

Case: **What SUP, Inc.**

Nathan and Meagan are impressed with the features of Access as a database program. Kyle cautions them that there is a lot more to Access than what they have seen so far. He explains that the tables they have created can be structured in different ways and that each field can be set up with specific formats, default values, validation rules, and so on.

"Wait just a minute," exclaims Nathan. "This sounds more complicated than what we might need!"

"On the contrary," responds Kyle. "These table features—and the ones I'll explain later for queries, forms, and reports—are important to the validity of the data included in your database and helpful in making your database useful."

"Let's just take it one step at a time," says Meagan.

Kyle then enlightens them both on the importance of data validity and integrity. He explains that information in your database is of little use if it is incorrect, incomplete, or in an inconsistent format. Over the next few days he plans on explaining tables in more detail. Let's begin by reviewing the basic procedures for adding, changing, or deleting records from a table.

Add, Change, and Delete Records

In this section, you will learn how to add, change, and delete records from tables. This process can also be done via forms, which will be discussed in Chapter 12.

232

Add Records

You have already added records to the inventory database in Chapter 8 but decide to practice it again. Kyle observes your input of adding one more record to the Product table.

To add a new record to a table:

1 Start Access.

2 Click the **File** tab button and then click **Open**.

3 Navigate the Open window to the location of this text's student files. (The location would be the CD provided with the text or from your computer lab's server.)

4 Double-click **ch10-01**, which should be located in a Ch 10 folder. (This is the completed What SUP Inventory file from Chapter 9 with a few modifications.)

5 Click the **Enable Content** button.

6 Click the **File** tab and then click **Save Database As**.

7 Navigate the Save As window to the location you wish to save this file and type **Ch10-01_student_name** in the File Name: text box (replacing "student_name" with your name).

8 Click **Save**.

9 Double-click **Product Table**.

10 Type **116** as the new product's Product ID and **Zoomer** as the new product's Product Name.

11 Press the [**Tab**] key and type **9.5** as the Length.

12 Press the [**Tab**] key and type **4** as the Supplier ID.

13 Press the [**Tab**] key and type **E** as the Category ID.

14 Press the [**Tab**] key and type **Z23111** as the Product Number.

15 Press the [**Tab**] key and type **2000** as the Unit Cost.

16 Press the [**Tab**] key and type **3** as the Reorder Level.

17 Press the [**Tab**] key and type **10** as the Lead Time.

18 Press the [**Tab**] key and type **605** as the Buyer ID.

19 Press the [**Tab**] key again and note that a new record (product) has been added to the table, as shown in Figure 10.1.

20 Do not close this file.

Figure 10.1

Partial View of Updated Product Table

Change Records

Changing records in the table is equally as easy. Kyle suggests you change the supplier for the product you just entered from **3** to **2** and change the buyer from **1** to **3**.

To change a record in a table:

1 Double-click the **Supplier ID** field for the Product ID 116 you just entered. Type **2** to replace the 4 currently listed in this field.

2 Double-click the **Buyer ID** field for the Diamond Pendant you just entered. Type **603** to replace the 605 currently listed in this field. You may have to use the horizontal scroll bars at the bottom of the table to view this field.

3 Press the [**Tab**] key to move to a new record.

Changing fields for a particular record in a table is easy. So is the procedure for deleting a record.

Delete Records

Kyle warns you that deleting records in a table is a permanent act. It is important to be sure you want to delete a record before proceeding. Access will warn you of this and give you an opportunity to undo your deletion.

To delete a record from a table:

1 Click on the far left side of the table next to the row containing information on Product ID 107.

2 With the Product ID 107 record selected, right-click anywhere in that record to bring up a shortcut menu.

3 Point your mouse to the text Delete Record as shown in Figure 10.2.

Product ID	Product Name	Length	Supplier ID	Category ID	Product Number	Unit Cost	Reorder Level	Lead Time	BuyerID	Clic
101	Veneer Raven	11.5	1	A	136305	$700.00	5	10	603	
102	Nalu	12.5	2	A	NA321	$800.00	2	11	603	
103	Shubu X	10	1	B	137814	$500.00	2	14	602	
104	Nalu Air	10	2	B	NA841	$625.00	2	10	601	
105	Candice Appleby	12.5	3	C	CA392	$1,150.00	3	15	602	
106	Glide GS	12.5	2	C	GS233	$810.00	1	30	603	
107	Slater Trout	10			ST23141	$690.00	2	30	601	
108	Sleeping One	12			234	$1,500.00	2	10	605	
109	Joy Ride	11			514102	$626.00	2	18	603	
110	Badfish	7			BD741	$410.00	2	10	602	
111	Badfish 2	9			BD241	$685.00	3	7	602	
112	Clear Wood	12.5			CW94355	$975.00	1	12	601	
113	Makani	8			NA112	$135.00	10	3	601	
114	BW Hybrid	9			415333	$110.00	20	2	603	
115	Blaster	10	5	A	254	$550.00	2	14	601	
116	Zoomer	9.5	2	E	Z23111	$2,000.00	3	10	603	

Shortcut menu: New Record, Delete Record, Cut, Copy, Paste, Row Height...

Record: 7 of 16   No Filter   Search

Figure 10.2

Deleting a Record from a Table

4 Click **Delete Record**.

5 An Access dialog warning box appears asking if you are sure you want to delete this record. See Figure 10.3.

Microsoft Access

⚠ You are about to delete 1 record(s).

If you click Yes, you won't be able to undo this Delete operation. Are you sure you want to delete these records?

[Yes]   [No]

Figure 10.3

Delete Warning

6 Click **Yes**, and the record is deleted.

"That was easy," you comment. "Let's continue."

Add a Picture with an OLE Field

In this section, you will add a special field to the table and insert pictures to enhance the database. The process requires two steps. Step 1 is adding a new field to the table; step 2 is adding a picture to each record.

Add an OLE Field to a Table

Kyle decides to add a picture field to the Product table. The picture—in this case, pictures of the stand-up paddle boards and products that What SUP sells—is created either by taking a digital picture of each product or by scanning a picture of each product. Nathan has taken digital pictures of each product and saved them as bitmaps (.bmp) files. Because these objects were created with another application, they need to be inserted as objects into the database. OLE (Object Linking/Embedding) is the integration of objects from other applications.

To add an OLE field to the Product table:

1 Click **View** and then click **Design View**.

2 Scroll down the Design view and click in the **blank field name** under Buyer ID.

3 Type **Picture** as the new field name.

4 Press [**Tab**] to move the cursor to the Data Type column.

5 Select **OLE Object** from the drop-down list of data types as shown in Figure 10.4.

Figure 10.4

Adding a New OLE Field
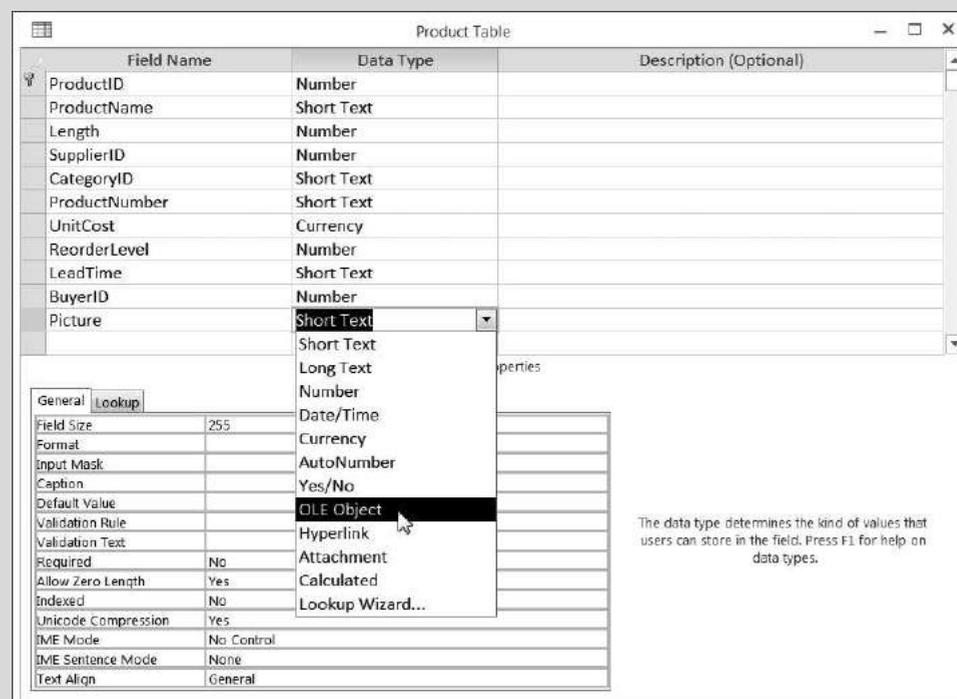
6 Save the modified table by clicking the **Save** tool on the Quick Access toolbar.

The table is now ready for additional data. You will need to switch from the design view of the table back to the datasheet view in order to add pictures of each product.

Add Pictures to the Table

To add pictures to the table you will need your student disk, which contains all the bitmap files that you'll need to insert into the Product table.

To add a picture to the Product table:

1 Click **View** and then click **Datasheet View**.

2 Scroll to the right of the table to view the Picture field.

3 Right-click the **Picture** field on the first record to reveal the Shortcut menu; then click **Insert Object**, as shown in Figure 10.5.
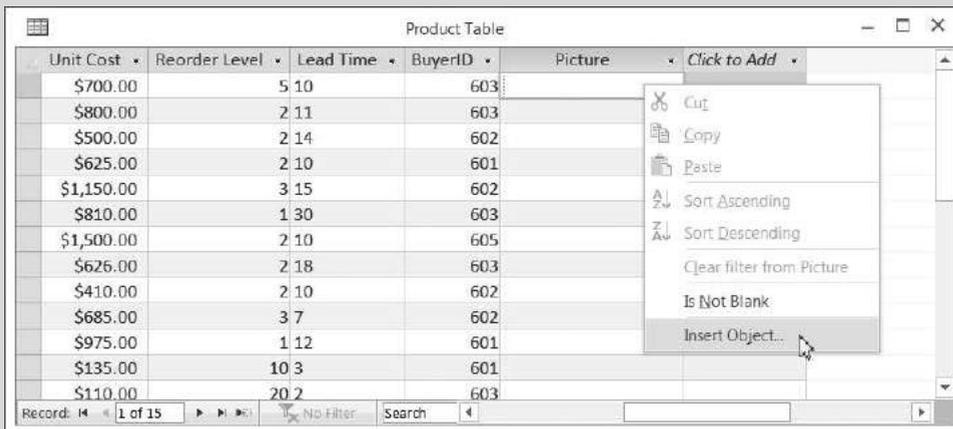
Figure 10.5

Inserting an Object

4 Click the **Create from File** option.

5 Click **Browse**.

6 Navigate the Browse window to the location of this text's Images folder. (The location would be the CD provided with the text or from your computer lab's server.)

7 Several images should be available, as shown in Figure 10.6.

8 Double-click on **101** to insert that picture into the Product ID 101 record.

9 Click **OK** in the Insert Object window. This window should then close, and the table should now contain the words Paintbrush Picture in the Picture field of the Product ID 101 record. (*Note:* Instead, the words Bitmap Image, Package, or some other words may appear here. It all depends on what program your computer uses to manage images.)

10 Follow the same procedures to add pictures to the next *three* products.

11 Close the Product table. If asked click **Yes** to save the layout of the Product Table.
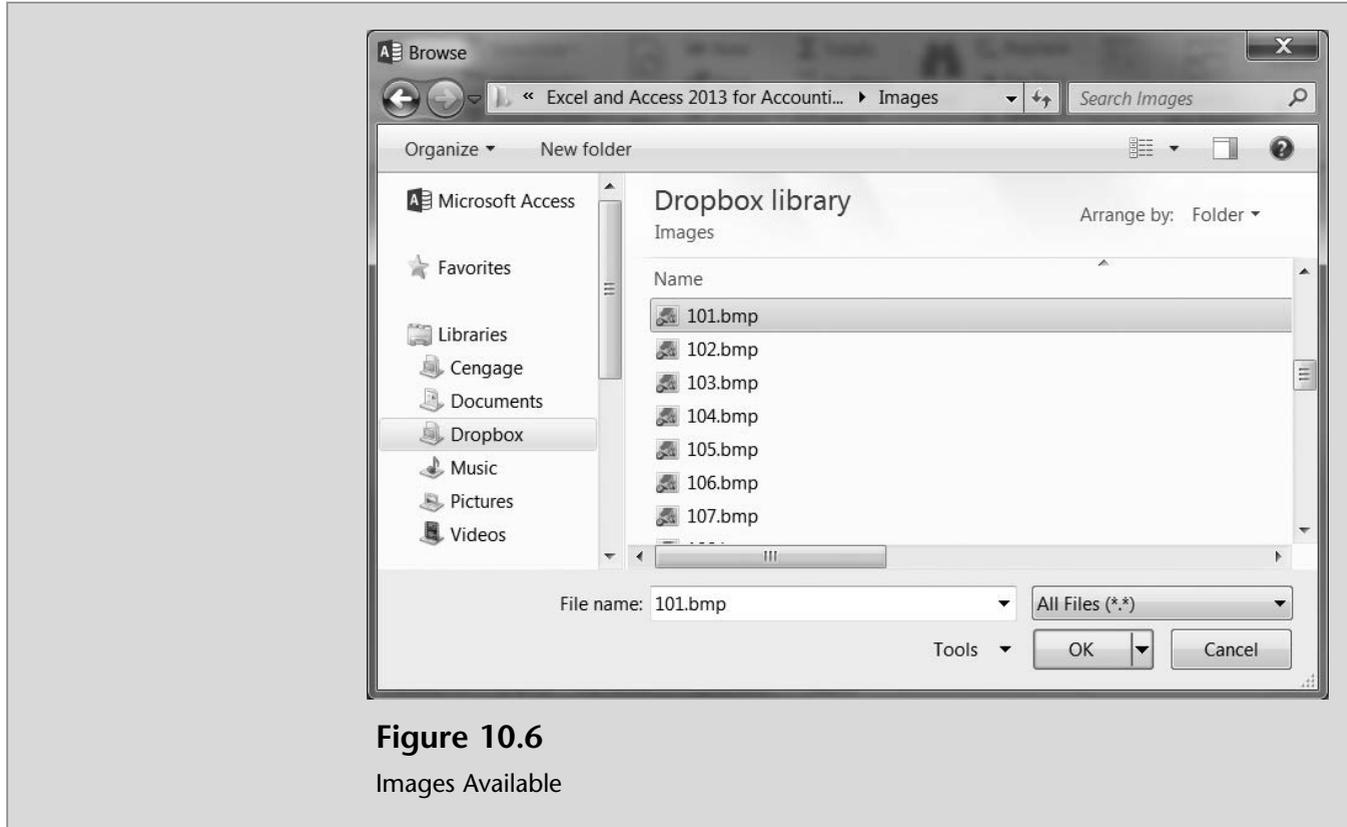
Figure 10.6

Images Available

You have now added both a placeholder and some data for the picture field. You will enter more pictures later.

"Why don't I see the pictures in the table?" Meagan asks.

"The pictures are there, they are just not shown." Kyle responds. "Instead, all you'll see in the table under the Picture field are the words Bitmap Image."

"You'll need to add the picture field to a form to view each picture. We can do that next week when we spend time modifying and creating new forms."

Change the Structure of a Database

When you initially created the Inventory database, you defined its structure by specifying the names, data type, and sizes of all the fields in each table. Often, as when you added a picture field, you will need to change the structure of the database. In addition to adding fields, you may also need to change the field size, resize the field rows or columns, or change the data type. Additional changes that affect the validity of the data entered include the creation or modification of field validation rules, default values, and field formats.

"That is an important issue for us," says Nathan. "We can't use this database if the information isn't accurate and reliable. We also need to make it easier for our employees to enter data into the database."

"Exactly the reason for validation rules, default value, and field formats!" Kyle replies.

Change a Field Size, Row Height, Column Width, and Data Type

Recall that, when you first created the Inventory tables, every field you created with a Data Type = Text set the initial field size to 50. That means that a maximum of 50 characters could be entered into that field. In some cases, limiting the field size helps prevent errors. For instance, the supplier table has a field for State or Province. If you wanted only a two-character designation for each State or Province, you could set the field size to 2.

To change a field size:

1 Double-click the **Supplier Table**.

2 Click **View** and then click **Design View**.

3 Click the **State Or Province** field name.

4 Under Field Size for the StateOrProvince field, type **2** (replacing 50). See Figure 10.7.
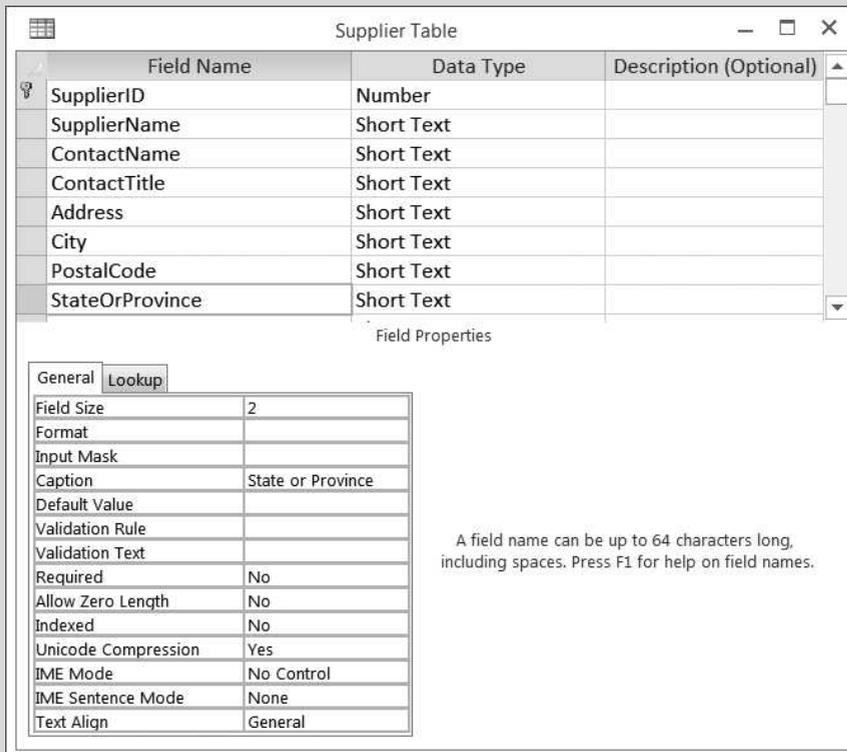
Figure 10.7

Changing a Fields Field Size Property

5 Click the **Save**.

6 A warning should appear. Click **Yes** to continue.

7 Click **View** and then click **Datasheet View**.

8 Scroll across Ron House under the StateOrProvince field. Try to type **New Jersey**. Note that you are restricted to two characters.

9 Type **NJ** into the StateOrProvince field for Supplier ID 5.

10 Close the Supplier table.

Viewing data in table format is a quick way to look at all the information available in the table without generating a query or report. Sometimes, however, the information in a table is not very readable. Take, for instance, the Supplier table. Only part of the address is viewable. That is easily fixed by modifying the column width of each record.

"There is also a lot of wasted space in those tables where the columns are too wide as well," remarks Meagan.

"Sometimes the problem is the number of characters in the field and sometimes it's the column title," says Kyle. "I'll show you how to fix both."

Kyle then explains that it's very important to keep field names the same in tables as you may have referred to this field name in a relationship or in a query, form, or report. Thus to resize a column that is too large due to its title, you'll first need to change the field's caption.

To modify the Supplier table's row height and column width:

1 Double-click **Supplier table**.

2 Place the cursor between the Address field and City columns. Double-click the vertical line separating the Address and City column titles. The Address column should expand so that each supplier's address is visible in the column.

3 Now place the cursor between the Supplier Name column title and the Contact Name column title. Once again, double-click the vertical line separating the two columns. The Supplier Name column should contract so that the extra space in the column is eliminated, as shown in Figure 10.8. Notice how the cursor changed its appearance once it was over the line separating each column.

Figure 10.8

Partial View of Supplier Table after Resizing a Field's Column Width

Supplier ID	Supplier Name	Contact Name	Contact Title	Address	City
1	Boardworks	Ben Nimitz	VP Sales	100 8th Ave.	New York
2	Naish	Sara Munoz	Sales director	909 S. Washington	Pilot Pt.
3	Bark	Nancy Bearfoot	Western sales	111 Macarthur Blvd.	Mahwah
4	Infinity	Paul Moo	Salesman	24382 Del Prado	Dana Point
5	Ron House	Kelly O'Leary	Regional sales	571 Mount Pleasant	Dover
0					

Record: 1 of 5   No Filter   Search

4 Note in Figure 10.8 the first column (Supplier ID) only has one charac-
ter in the date but is rather wide due to the number of characters in the
column title (otherwise known as the field caption). In the design view,
type **ID** in the Caption field property, which will change the column
title of the SupplierID field to ID.

5 Repeat the same process to change the caption of the SupplierName field
to Supplier, the ContactName field to Contact, the ContactTitle field to
Title, the PostalCode field to Zip, the StateOrProvince field to ST, the
PhoneNumber field to Phone, and finally the FaxNumber field to FAX.

6 Return to the Datasheet View and be sure to save the table.

7 Resize all columns using the double-click process described above.
The newly resized and titled Supplier Table is shown in its entirety in
Figure 10.9.

ID	Supplier	Contact	Title	Address	City	Zip	ST	Country	Phone	Fax
1	Boardworks	Ben Nimitz	VP Sales	100 8th Ave.	New York	10035	NY	USA	212-555-1354	212-555-6874
2	Naish	Sara Munoz	Sales director	909 S. Washington	Pilot Pt.	76258	TX	USA	940-555-0817	940-555-1187
3	Bark	Nancy Bearfoot	Western sales	111 Macarthur Blvd.	Mahwah	07430	NJ	USA	201-555-5730	201-555-3872
4	Infinity	Paul Moo	Salesman	24382 Del Prado	Dana Point	92629	CA	USA	949-555-4166	949-555-9718
5	Ron House	Kelly O'Leary	Regional sales	571 Mount Pleasant	Dover	07801	NJ	USA	201-555-3215	201-555-8741
0										

Record: 1 of 5   No Filter   Search

Figure 10.9

Supplier Table after Changing the Caption of Some Fields

8 Close and save the Supplier Table.

Kyle notes that while you have changed the caption of many fields, you did
not change the field names, which is very important.

"I have a question," says Meagan. "When I was watching you create the
Product table, I noticed you set up the LeadTime field as a data-type text. Why
isn't it considered a number?"

"Good question," Kyle responds. "If we plan to use the lead time informa-
tion as just information for each product, then it doesn't matter whether we set
it up as a Number data type or as a Text data type. However, if we later on
want to use this field in a calculation, the Text data type wouldn't work. I'll
show you how easy it is to change a field's data type."

To change a field's data type:

1 Open the Product Table in Design View.

2 Scroll down the fields listed and click in the Data Type column next to
the field name LeadTime.

3 Select **Number** from the drop-down arrow as the new data type for this
field, as shown in Figure 10.10.

Figure 10.10

Changing a Field's
Data Type
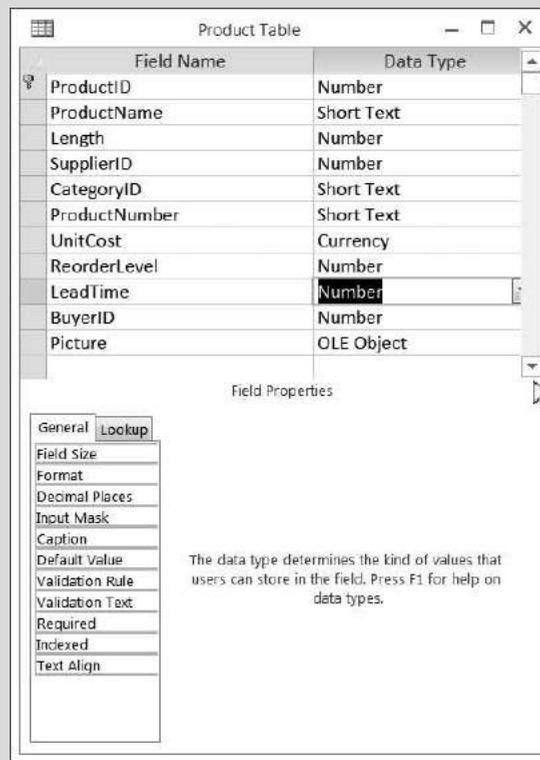
4 Close and save the changed Product table. Click **Yes** in the warning
window presented.

By changing a table's row height and column width or by editing a field's
data type and field size, you change the basic structure of a database. We next
address additional changes that can be made to a table: establishing validation
rules, default values, and formats.

Create Validation Rules

Kyle explains that validation rules improve data integrity and validity. Valida-
tion rules check information entered into the database (e.g., into a field) and test
the entry to see if it meets certain criteria. If the information entered passes the
test, the entry is allowed. If the entry fails the test, a warning appears and the
entry is rejected.

"For example, in the Product table, every product should have a unit price
entered and every price should be reasonable. You wouldn't want to have a unit
price of $0.00 or something greater than $5,000.00," says Kyle.

"This would then prevent someone from entering an unreasonable price but
it wouldn't prevent entering an incorrect price, right?" asks Nathan.

"Right," Kyle responds. "Validation rules can test for limits like greater than
0 and less than 1,000, or just greater than 100." Kyle explains that, in addition
to validating a user's entry into a database, the validation rule can also provide
specific feedback to a user concerning why the validation test failed. He sug-
gests that you help Meagan and Nathan establish the unit cost restriction for the
Product table and ensure that a price is entered for every product.

To create a validation rule:

1 Double-click **Product table**.

2 Click **View** and then click **Design View**.

3 Select the **UnitCost** field.

4 With the UnitCost field selected, click in the Validation Rule text box and type >**0 and** <**5000**.

5 With the UnitCost field still selected, click in the Validation Text text box and type **Unit Cost must be** > **$0 and** < **$5,000**, as shown in Figure 10.11.
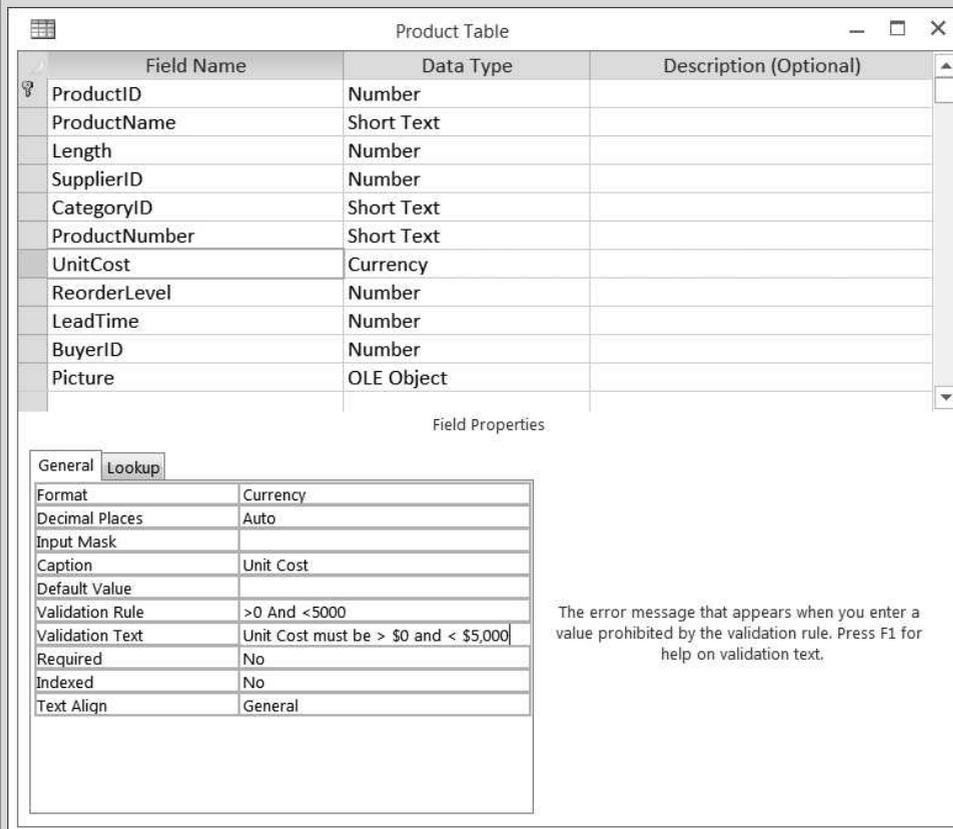
Figure 10.11

Validation Rules and Text

Field Name	Data Type	Description (Optional)
ProductID	Number	
ProductName	Short Text	
Length	Number	
SupplierID	Number	
CategoryID	Short Text	
ProductNumber	Short Text	
UnitCost	Currency	
ReorderLevel	Number	
LeadTime	Number	
BuyerID	Number	
Picture	OLE Object	

Field Properties

General | Lookup

Format	Currency
Decimal Places	Auto
Input Mask	
Caption	Unit Cost
Default Value	
Validation Rule	>0 And <5000
Validation Text	Unit Cost must be > $0 and < $5,000
Required	No
Indexed	No
Text Align	General

The error message that appears when you enter a value prohibited by the validation rule. Press F1 for help on validation text.

6 Save your changes to the table by clicking on the **Save** tool on the Quick Access toolbar.

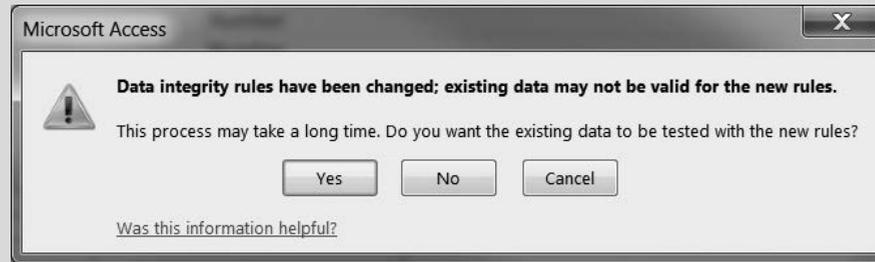**7** Before Access will allow you to save the changes in validation rules, it will first ask if you want to test the existing data in the table (specifically, the UnitCost field) to see if it meets the new rule. See Figure 10.12.

Figure 10.12

Warning Window

8 Click **Yes** to check the validity of existing information.

9 With the UnitCost field still selected, select **Yes** from the drop-down list in the Required text box. (This will require that all new records in the Product table have a unit cost entered.)

10 Click **View** and then click **Datasheet View**.

11 Click **Yes** in the dialog box provided to save the revised table design.

12 Click **Yes** in the next dialog box provided to once again test whether existing data meets the new rules.

13 Type **5500** as the new unit cost of Product ID 101 and then press [**Tab**].

14 The dialog box shown in Figure 10.13 should appear.

Figure 10.13

Validation Rule Dialog Box
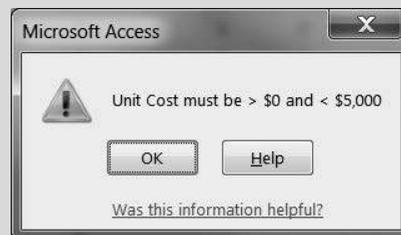
15 Click **OK**.

16 Type **700** as the unit cost of Product ID 101 and then press [**Tab**].

17 Select the unit cost of Product ID 102; then press [**Backspace**] and to remove the existing $800 unit cost then [**Tab**]. The dialog box shown in Figure 10.14 should appear, stating that an entry is required in this field.

Figure 10.14

Required Value Dialog Box
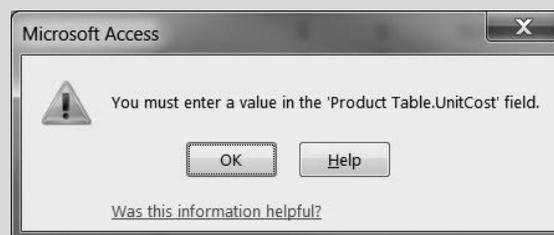
18 Click **OK**.

19 Type **800** as the unit cost of Product ID 102 and then press [**Tab**].

20 Close the Product Table.

You've now established validation rules, text, and field requirement rules, which will help you maintain data integrity. Another way to ensure that valid information is entered into the database is to create default values.

Create Default Values

Default values, as the name implies, provides the person entering data into a database with pre-existing information for certain fields. This helps ensure the validity of entered data and also speeds up the process of entering information into a database.

"Repetitive information or information that is present in many or most records is ideal for Access's Default Value option," Kyle explains.

"For example, if most of your suppliers are located in New York, then you could set the default value for the state field of the supplier table to 'NY'."

"But what if a supplier is not actually located in New York?" you ask.

"Then you simply type over the default value," Kyle answers. "However, since most of your suppliers are in the state of New York, that won't happen very often."

"Could we also set the default value for country, given that most of our suppliers are also located in the United States?"

"Now you're catching on!" Kyle responds.

Kyle instructs you to add a new supplier after you establish NY as the default value for the state field and USA as the default value for the country field of the Supplier table.

To create default values:

1 Double-click **Supplier Table**.

2 Click **View** and then click **Design View**.

3 Click the **State Or Province** field.

4 Click in the **Default Value** text box, type **NY**, and then press **[Tab]**. Note that Access automatically adds the quotes around NY. The Field Properties section of your screen should look like Figure 10.15.

General	Lookup
Field Size	2
Format	
Input Mask	
Caption	ST
Default Value	"NY"
Validation Rule	...
Validation Text	
Required	No
Allow Zero Length	No
Indexed	No
Unicode Compression	Yes
IME Mode	No Control
IME Sentence Mode	None
Text Align	General
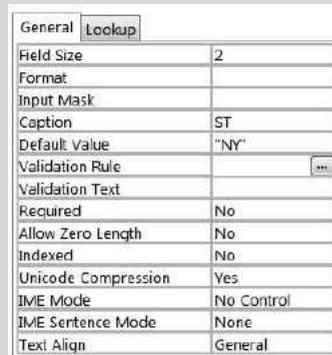
Figure 10.15

Entering a Default Value for a Field

5 Select the **Country** field.

6 With the Country field selected, click the **Default Value** text box and type **USA**.

7 Close the Supplier table and click **Yes** to save your changes.

"Now that should save us some time as we enter more suppliers," you comment.

Kyle remarks that formats and input masks also help ensure valid data entry while making information more meaningful.

Create Formats and Input Masks

Kyle explains that format properties in tables vary depending on the data type assigned to each field. For example, a Number data type can be pre-formatted as currency ($1,234.56), fixed decimal (1234.56), standard decimal (1,234.56), percent (123%), or other formats. A Date/Time data type can be pre-formatted as a short date (1/23/15), a long date (Sunday, January 25, 2015), et cetera. On the other hand, a Text data type is not usually subject to a particular format.

"I'd like to add a date to our supplier table so that I know how long I've been doing business with each supplier," Nathan comments. "Can that date be formatted like you mentioned?"

"Certainly," Kyle responds.

"How about formatting phone numbers?" Meagan asks. "Can we format phone numbers so that the area code, prefix, and number are always displayed the same?"

"The best way to solve that issue is by using another Access feature called *input masks*," Kyle answers.

He explains that input masks are used to control how data is entered. This is quite different from the format property referred to previously, which affects only how a value is displayed, not how it is stored in the table. A display format is not applied until the data entered is saved—nothing is displayed in the field to suggest or control the format in which data is entered. If you need to control how data is entered, Kyle suggests you use an input mask in addition to (or instead of) a data display format in those cases.

An input mask ensures that the data will fit in the format you define, and only the kind of values specified can be entered in each blank. In Meagan's example, an input mask would require that all entries contain exactly enough digits to make up a U.S. area code and telephone number and also that only digits (not alphabetic characters) be entered in each blank.

Kyle instructs you to work with Nathan and Meagan by adding a "first purchase date" field to the Supplier table and have it displayed in a short date format. In addition, he suggests you modify the Supplier table: phone number field using a phone number mask.

To utilize the format and input mask capabilities of Access:

1 Double-click **Supplier table**.

2 Click **View** and then click **Design View**.

3 Create a new field by clicking in the field name text box located under the last field titled FaxNumber.

4 Type **Firstpurchasedate** as the new field name and then press [**Tab**].

5 Select **Date/Time** as the data type for the new field.

6 Select **Short Date** as the format for the new field.

7 Type **First Purchase** as the caption for the new field. Your screen should look like Figure 10.16.

Click here to modify input mask
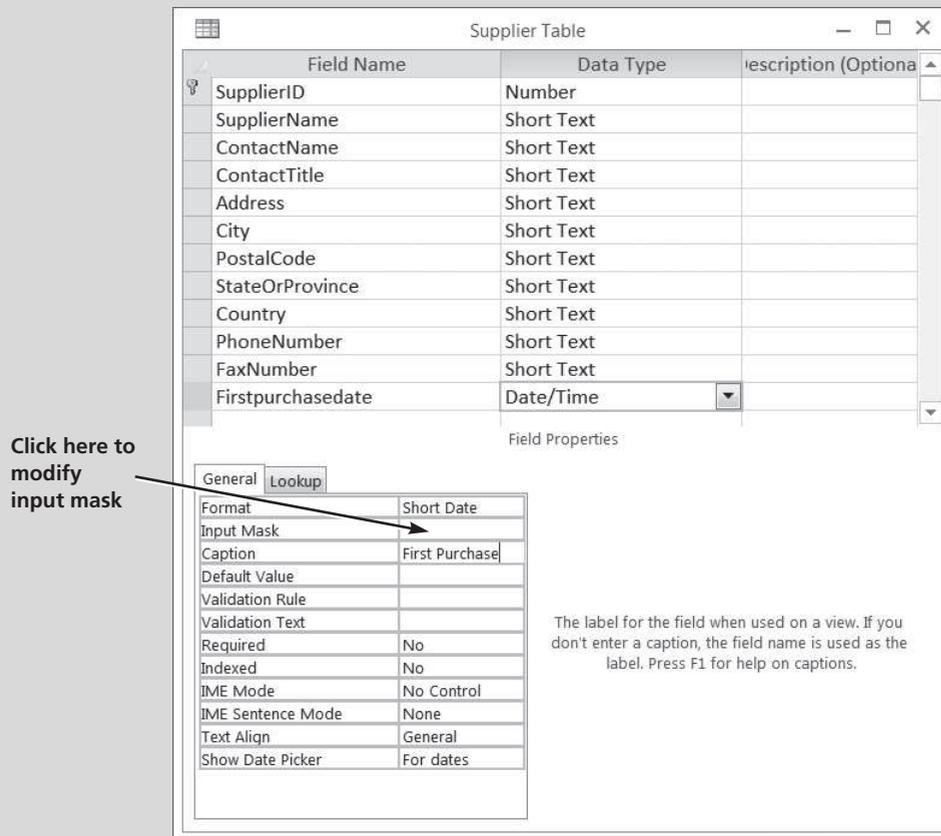
8 Click **Save** from the Quick Access toolbar.

9 Click the **PhoneNumber** field.

10 With the PhoneNumber field selected, click in the Input Mask text box and select the button on the far right to activate the Input Mask Wizard. If a security warning appears, click **Open**.

Trouble? The input mask feature may not be installed on your version of Access. If not installed, a message may pop up asking if you want to install it now. If you are in a lab environment, please check with your lab administrator before proceeding. If you are at your own computer, have your installation disk handy and follow the instructions to install this feature.

11   Click **Phone Number** input mask, as shown in Figure 10.17, and then click **Next**.

Figure 10.17

Input Mask Wizard

12   Click **Next** two times to accept the default input mask for a phone number; then click **Finish**.

13   The Field Properties section of the PhoneNumber field should look like Figure 10.18.

Figure 10.18

Input Mask for the PhoneNumber Field

14   Click **Save** from the Quick Access toolbar.

15   Click **View** and then click **Datasheet View**.

16   Type **1/1/15** in the First Purchase field of Supplier ID 1.

17   Click in the **First Purchase** field of Supplier ID 2. Note that the date displayed for Supplier ID 1 has changed to 1/1/2015.

18   Type **February 12, 2015** in the First Purchase field of Supplier ID 2.

19   Click in the **First Purchase** field of Supplier ID 3. Note that the date displayed for Supplier ID 2 has changed to 2/12/2015.

20   Type **Mar 20, 2015** in the First Purchase field of Supplier ID 3.

21   Click in the **First Purchase** field of Supplier ID 4. Note that the date displayed for Supplier ID 3 has changed to 3/20/2015.

22 Type **4/30/15** in the First Purchase field of Supplier ID 4 and 5. Part of your screen should look like Figure 10.19.

Zip	ST	Country	Phone	Fax	First Purchase
⊞ 10035	NY	USA	212-555-1354	212-555-6874	1/1/2015
⊞ 76258	TX	USA	940-555-0817	940-555-1187	2/12/2015
⊞ 07430	NJ	USA	201-555-5730	201-555-3872	3/20/2015
⊞ 92629	CA	USA	949-555-4166	949-555-9718	4/30/2015
⊞ 07801	NJ	USA	201-555-3215	201-555-8741	4/30/2015
＊	NY	USA			

Record: ◄ ◄ 6 of 6 ► ►► ► No Filter Search ◄ ►

Figure 10.19

Partial View of Modified Supplier Table

23 Add a new supplier to the Supplier table by typing **6** in the ID column and **Fanatic** in the Supplier column and then pressing [**Tab**].

24 Type **Paula Lyon** as the Contact, then press [**Tab**].

25 Type **Sales associate** as the Title, then press [**Tab**].

26 Type **10332 5th Avenue** as the Address, then press [**Tab**].

27 Type **New York** as the City, then press [**Tab**].

28 Type **10003** as the Postal Code, then press [**Tab**].

29 Press [**Tab**] twice to accept the default State and Country values of NY and USA.

30 Type **2125551345** as the Phone Number, then press [**Tab**]. Note the input mask will place the parentheses and dashes accordingly. (Although the input mask will affect future entries into this field, it will not affect the form of *existing* entries—e.g., by placing the area code in parentheses.)

31 Type **2125551346** as the Fax Number, then press [**Tab**]. Observe that, in the absence of an input mask, the data is accepted as is.

32 Go back to the Fax Number field and reenter the fax number as **212-555-1346** (to be consistent with previous entries); then press [**Tab**].

33 Type **6/1/15** as the First Purchase field.

34 Click **Save** from the Quick Access toolbar.

35 Close the Supplier table.

You have witnessed the affects and benefits of default values, display formatting, and input masks. Perhaps now is a good time to see how Access can enforce additional constraints on data entry to ensure that only valid data from database tables are entered as a part of a record.

Referential Integrity

In the previous chapter you established relationships between the product, supplier, category, and buyer tables. This action identified the common fields between each table. You can further define that relationship by using referential integrity.

Kyle explains that referential integrity is a system of rules that Microsoft Access uses to ensure not only that relationships between records in related tables are valid but also that you don't accidentally delete or change related data. When referential integrity is enforced, you must observe the following rules.

- You cannot enter a value in the Foreign Key field of the related table that does not exist in the Primary Key of the primary table. A *Foreign Key* is a field that refers to the Primary Key field in another table and indicates how the tables are related: the data in the Foreign Key and Primary Key fields must match, although the field names need not be the same.

- You cannot delete a record from a primary table if matching records exist in a related table.

- You cannot change a Primary Key value in the primary table if that record has related records. If you want Microsoft Access to enforce these rules for a relationship, you should select the Enforce Referential Integrity check box when you create or edit the relationship. If referential integrity is in force and you break one of the rules while changing related tables, Microsoft Access displays an error message and does not allow the change.

"Wait just a minute!" Nathan exclaims. "Primary key, foreign key, referential integrity, I'm confused!"

"I know," responds Kyle. "Let me give you an example. Once I show you how this affects our product, supplier, category, and buyer tables, I think you will have a better understanding."

Kyle explains that one of the foreign keys he was referring to included the SupplierID field located in the Product table. It is considered a Foreign Key field because it refers to a Primary Key field in another table. In this case, the Primary Key to which it refers is the SupplierID field located in the Supplier table. Kyle also notes that this field, SupplierID, is the Primary Key field in the Supplier table as can be seen in Figure 10.20.

"Further," Kyle explains, "to ensure validity in the Product table we should enforce referential integrity. In doing so, every entry in the SupplierID field of the Product table will have to match one of the records in the SupplierID field of the Supplier table."

"This is still a bit baffling," says Meagan.

"Just watch as I establish referential integrity for the SupplierID field and test it by adding another record," responds Kyle.

To establish referential integrity:

1 Click the **Database Tools** tab on the Ribbon.

2 Click the **Relationships** tool in the Relationships group.

3 Move the tables around the screen, so they match Figure 10.20, by clicking the title bar of each window and then dragging it to a new location.
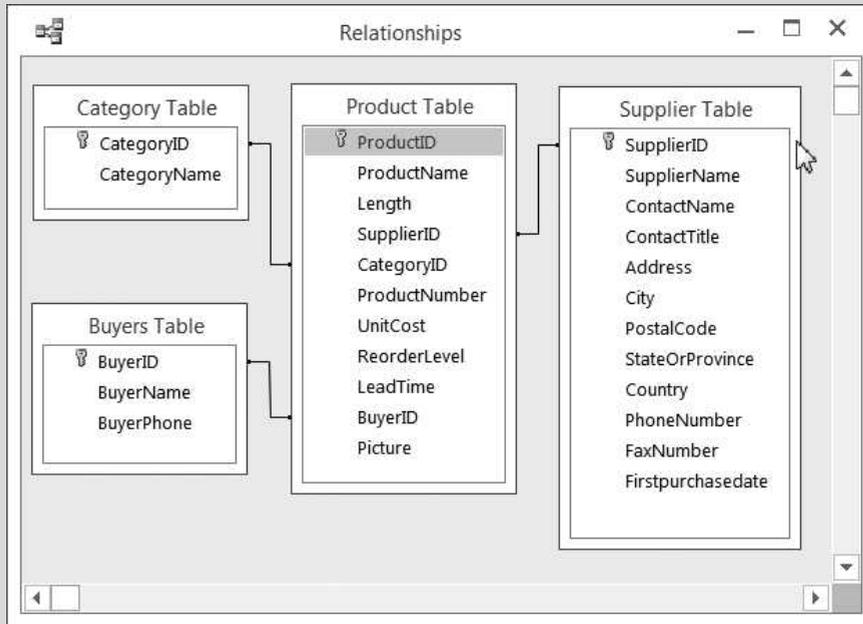
Figure 10.20
Relationships Window

4 Double-click the line that connects the SupplierID field of the Product table with the SupplierID field of the Supplier table.

5 Click the **Enforce Referential Integrity** check box in the Edit Relationships window as shown in Figure 10.21; then click **OK**.

Figure 10.21
Edit Relationships Window

6 Note the changed line connecting the two tables. In particular, note the one-to-many reference shown by the dark line, the 1, and the infinity symbol.

7 Click **Relationship Report** from the Tools group of the Design tab on the Ribbon. If a security notice appears, click **Open**.

8 Click **Print** and then click **OK** to print the Relationships Report as shown in Figure 10.22.

Figure 10.22

Printed Relationships
Report

Relationships for Ch10-01_student_name
Sunday, August 18, 2013

Category Table	Product Table	Supplier Table
CategoryID	ProductID	SupplierID
CategoryName	ProductName	SupplierName
	Length	ContactName
	SupplierID	ContactTitle
	CategoryID	Address
	ProductNumber	City
	UnitCost	PostalCode
	ReorderLevel	StateOrProvince
	LeadTime	Country
	BuyerID	PhoneNumber
	Picture	FaxNumber
		Firstpurchasedate

Buyers Table
BuyerID
BuyerName
BuyerPhone

9 Close the Relationships Report window and click **No** when asked if you want to save changes to the design of Report1.

10 Close the Relationships window and then click **Yes** if asked to save changes to relationships.

11 Double-click the **Product Table**.

12 Enter a new record by typing **117** as the ProductID in the last line of the Product Table, press [**Tab**], type **Allwave** as the ProductName in the Product Name field, and then press [**Tab**].

13 Type **8.6**. in the Length field; then press [**Tab**].

14 Type **7** in the Supplier ID field, then press [**Tab**].

15 Type **G** in the Category ID field, then press [**Tab**].

16 Type **F98** in the Product Number field, then press [**Tab**].

17 Type **750** in the Unit Cost field, then press [**Tab**].

18 Type **1** in the Reorder Level field, then press [**Tab**].

19 Type **14** in the Lead Time field, then press [**Tab**].

20 Type **604** in the Buyer ID field, then press [**Tab**].

21 Insert image 117.bmp for this product like you've done before, and then press [**Tab**].

22 Note that the last Tab completes the entry for this new product. However, since you established referential integrity, an error message (see Figure 10.23) appears. This occurred because there is no Supplier ID 7 in the Supplier table and so Access rejected your entry. Click **OK** in the error message to return to the Product table.

Figure 10.23
Error Message

23 Type **6** in the Supplier ID field, and then close the Product table. This time Access accepts the entry in the Supplier ID field because it matches a record found in the Supplier ID field of the Supplier table.

"That makes more sense now," Meagan and Nathan agree.

Documenting a Database

"Now that we've made all these changes to our database, how do we document them?" Nathan asks.

"Good question" responds Kyle. "Access has a feature called the Database Documenter that will provide a list of table, query, form, and report attributes."

Kyle suggests you document some of the changes you made to the product and supplier tables. In particular, he would like to see documentation of the unit price field in the Product table (where you added a validation rule) and documentation of the phone number field in the Supplier table (where you added an input mask).

To document the information requested:

1 Click **Database Documenter** from the Analyze group of the Database Tools tab on the Ribbon.

2 Click the **Tables** tab in the Documenter window.

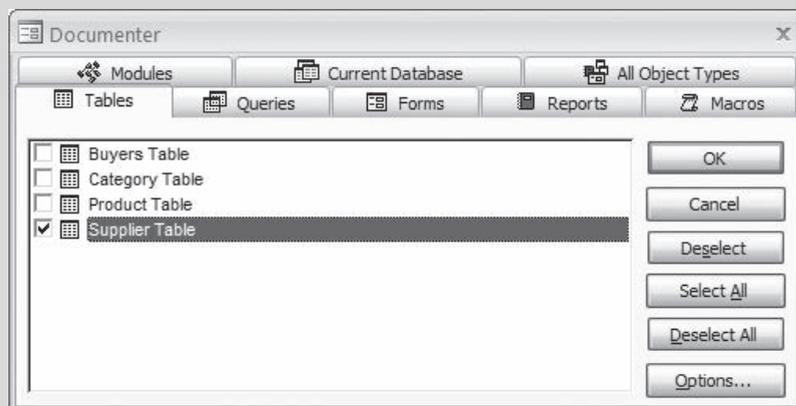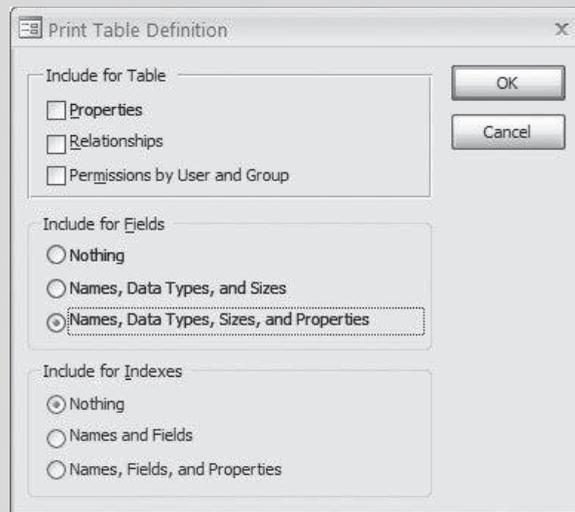**3** Click the **Supplier Table** check box as shown in Figure 10.24.

Figure 10.24
Documenter Window

4 Click the **Options** button.

5 Check or uncheck boxes and select option buttons as per Figure 10.25.

Figure 10.25

Print Table Definition

6   Click **OK** in the Print Table Definitions window, and then click **OK** in the Documenter window.

7   Click in the lower portion of the **Zoom** button in the Zoom group of the Print Preview tab of the Ribbon.

8   Click **150%**.

9   Navigate to page 4 of the report by clicking the arrows located in the lower left-hand corner of the Print Preview window, and locate information on the PhoneNumber field.

Trouble? Page 4 on your screen may not contain information on the PhoneNumber field. If not, look on pages 3 or 5 to find it and then change the page you print in step 10 accordingly.

10   Click **Print**, click **Pages** in the Print window, and then type **4** in the From and then type 5 in the To: text boxes and then click **OK** to print. Your resulting printout should contain the information shown in Figure 10.26.

11   Click **Close Print Preview**.

12   Click **Database Documenter** from the Analyze group of the Database Tools tab on the Ribbon.

13   Click the **Tables** tab in the Documenter window.

14   Click the **Product Table** check box and then click **OK**.

15   Click in the lower portion of the **Zoom** button in the Zoom group of the Print Preview tab of the Ribbon.

16   Click **150%**.

17   Navigate to page 3 of the report by clicking the arrows located in the lower left-hand corner of the Print Preview window, and locate information on the UnitCost field.

Trouble? Page 3 on your screen may not contain information on the UnitCost field. If not, look on pages 2 or 4 to find it and then change the page you print in step 18 accordingly.

PhoneNumber		Text	50
	AggregateType:	-1	
	AllowZeroLength:	False	
	AppendOnly:	False	
	Attributes:	Variable Length	
	Caption:	Phone Number	
	CollatingOrder:	General	
	ColumnHidden:	False	
	ColumnOrder:	Default	
	ColumnWidth:	1830	
	DataUpdatable:	False	
	DisplayControl:	Text Box	
	GUID:	{guid {D396690E-F676-11D3-B511-939E8A1E7E2A}}	
	IMEMode:	0	
	IMESentenceMode:	3	
Note the InputMask specified here →	InputMask:	!\(999") "000\-0000;;_	
	OrdinalPosition:	9	
	Required:	False	
	SourceField:	PhoneNumber	
	SourceTable:	Supplier Table	
	TextAlign:	General	
	UnicodeCompression:	True	

Figure 10.26

Database Documenter Information on the Phone Number Field of the Supplier Table

18 Click **Print**. click **Pages** in the Print window, and then type **3** in the From and To: text boxes. Your resulting printout should contain the information shown in Figure 10.27.

UnitCost		Currency
	AggregateType:	-1
	AllowZeroLength:	False
	AppendOnly:	False
	Attributes:	Fixed Size
	Caption:	Unit Cost
	CollatingOrder:	General
	ColumnHidden:	False
	ColumnOrder:	Default
	ColumnWidth:	1200
	CurrencyLCID:	0
	DataUpdatable:	False
	DecimalPlaces:	Auto
	Format:	$#,##0.00;($#,##0.00)
	GUID:	{guid {FA1F2364-E5F1-11D3-B511-FAF49AA7C228}}
	OrdinalPosition:	6
	Required:	True
	ResultType:	0
	SourceField:	UnitCost
	SourceTable:	Product Table
	TextAlign:	General
Note the ValidationRule and ValidationText specified here →	ValidationRule:	>0 And <5000
	ValidationText:	Unit Cost must be > $0 and < $5,000

Figure 10.27

Database Documenter Information on the Unit Cost Field of the Product Table

19 Click **Close Print Preview**.

Meagan notes that in the Supplier table documentation she can see the input mask created for the PhoneNumber field and that in the Product table documentation she can see the validation rule and validation text created for the UnitCost field.

"What about all the other information provided for the fields in question?" Meagan asks.

"Helpful," comments Kyle, "but not that important for us right now. It's time to practice!"

End Note

In this chapter, you have learned more about the use of tables in the Access program. You have learned how to add, change, and delete records; how to add a picture with an OLE field; and how to change the structure of a database, which included changing field data types and column widths and changing record row heights. You have also learned how to create field validation rules, default values, and formats. Finally, you learned about the advantages and functionality of specifying referential integrity. In the next chapter you will experience more of the query process.

Chapter 10 Questions

1   Describe the process for deleting a record from a table.

2   Define OLE.

3   What can you do in Access to change the structure of a database?

4   Why would you want to change the column width and/or row height of a table?

5   What do validation rules do?

6   What is the process for adding a validation rule to a field?

7   Why would you establish default values for a field?

8   What are input masks?

9   What is referential integrity?

10   What rules must be followed if referential integrity is enforced?

Chapter 10 Assignments

1   Add, change, and delete records to the What SUP database (use the Ch10-02 file)

     a.   Add the following record to the Buyers table: BuyerID 605, Farley, 555-7187.

     b.   Add G as a CategoryID with a CategoryName of Women's as a category to the Category table.

     c.   Delete the following record from the Buyers table: BuyerID 601.

     d.   Change the buyer for the following Product IDs from buyer 601 to buyer 605: Product ID 104, 108, 113, and 115.

     e.   Print the first page of the product, buyers, and category tables as modified in a landscape orientation.

     f.   Save your file as Ch10-02_01_student_name (replacing student_name with your name).

2   Add pictures to the What SUP database (use the Ch10-02 file; **do not use the file you just updated in Assignment 1**)

     a.   Add pictures for the remaining products in the Product table using the picture files provided. Each product has a picture associated with it and is labeled with the product ID number.

b.   Print the second page of the Product table as modified in landscape orientation.

c.   Save your file as Ch10-02_02_student_name (replacing student_name with your name).

3   Change the structure of the What SUP database (Use the Ch10-02 file; **do not use the file you just updated in Assignment 1 or 2.**)

a.   Add the following product to the Product table. ProductID: 117; ProductName: LadyG; Length: 8.5; SupplierID: 6; CategoryID: F; ProductNumber: 3983AE; UnitCost: 620; Reorder Level: 1; Lead Time: 3; Buyer ID: 604; Picture: 117.bmp.

b.   Modify the caption and re-size the column width of each field of the Product table so that the table will fit on one page when printed in landscape orientation.

c.   Print the Product table in landscape orientation.

d.   Create a validation rule for the Reorder Level field of the Product table, making the field a required one and making sure the reorder level is greater than 0 but less than 25 units. Create your own feedback statement and insert it as the validation text.

e.   Establish 7 as the default value for the Lead Time field of the Product table.

f.   Establish a phone number input mask for the BuyerPhone field of the Buyers table.

g.   Enforce referential integrity between the Product table and the Buyer and Category tables.

h.   Print a Relationships report.

i.   Print documentation on the properties of the Reorder Level and Lead Time fields of the Product table and the BuyerPhone field of the Buyers table.

j.   Save your file as Ch10-02_03_student_name (replacing student_name with your name).

Chapter 10 Case Problem 1:
KELLY'S BOUTIQUE

Note: You must have completed Case 1 in the previous chapter in order to continue working on this case.

In Chapter 9 you created a database for Kelly's Boutique consisting of a Book table, a Department table, and a Publisher table. You also created an initial form, query, and report. Kelly would now like you to make some adjustments to the tables previously created by adding and deleting some records, adding some OLE fields and pictures, and changing the structure of the database. Make the following changes for Kelly using the ch9-03_student_name file

you created in Chapter 9. (*Note:* Open your ch9-03_student_name file first, save it as ch10-03_student_name, and then make the listed changes.)

a. Add Warner as the tenth publisher to the Publisher table with a contact Yee and phone 555-7894.

b. Add the following records to the Book table:

ISBN	Dept	Book Title	Num	Author	Price
039480029	Children	Hop on Pop	6	Seuss	7.99
039480001	Children	The Cat in the Hat	6	Seuss	7.99
446676098	Adult	The Notebook	10	Sparks	16.95

c. Add a Picture field for OLE objects to the Book table.

d. Add pictures to the Book table for *Green Eggs and Ham*, *Hop on Pop*, *Harry Potter and the Prisoner of Azkaban, Divine Secrets*, and *Deep End of the Ocean*. Picture files are labeled by book name and are located on your student disk in an Images folder.

e. Resize the column width of each field and the record's row height of each table so that they fit on one page when printed.

f. Establish a phone number input mask for the Phone field of the Publisher and Department tables.

g. Enforce referential integrity between the Book table and the Department and Publisher tables.

h. Create a validation rule for the List price field of the Book table, making the field a required one and making sure the price is no less than $1 but no more than $100. Create your own feedback statement and insert it as the validation text.

i. Establish Children as the default value for the Department field of the Book table.

j. Print the Book, Department, and Publisher tables.

k. Print the Relationships report.

l. Print documentation on the properties of the List Price field of the Book table and the Phone field of the Publisher table.

m. Make sure you keep a copy of this file for use in the next chapter.

Chapter 10 Case Problem 2:
WINE DEPOT

Note: You must have completed Case 2 in the previous chapter in order to continue working on this case.

In Chapter 9 you created a database for the Wine Depot consisting of a Wine Products table, a Winery table, and a Buyer table. You also created an initial query, form, and report. Barbara has now asked you to make some changes to those files. Make the following changes for Barbara using the ch9-04_student_name file you

created in Chapter 9. (*Note:* Open your ch9-04_student_name file first, save it as ch10-04_student_name, and then make the listed changes.)

    a.   Add buyer 105, Carly Simon, 555-6874 to the Buyer table.

    b.   Add winery 20 (Robert Mondovi, American, 105) and winery 21 (Wente, American, 104) to the Winery table.

    c.   Delete wines with SKU 15966 and 16769.

    d.   Delete winery 2.

    e.   Add the following records to the Wine Products table:

SKU	Type	Winery	Price	Cost	Size	Vintage	Quantity
12564	Merlot	21	12.99	8.00	750	2000	24
12895	Sauvignon Blanc	4	15.49	9.00	750	2002	12
16900	Syrah	11	30.00	24.00	750	2001	12
11350	Pinot Noir	11	30.00	24.00	750	2001	12
11475	Pinot Noir	1	22.00	17.50	750	2001	48
12380	Pinot Noir	20	21.00	18.00	750	2000	24
12383	Chardonnay	20	18.00	12.00	750	2000	36
12384	Fume Blanc	20	17.49	11.00	750	2001	36

    f.   Enforce referential integrity between the tables.

    g.   Print the Relationships report.

    h.   Add a Picture field for OLE objects to the Wine Products table.

    i.   Add pictures to the Wine Products table for products 11475, 12384, 12895, 14539, and 15347. (*Note:* Pictures for these products are provided in an Images folder on your student disk and are labeled with the SKU number.)

    j.   Establish a phone number input mask for the Phone field of the Buyer table, and then change all the phone numbers in the table to include an area code of 805.

    k.   Create a validation rule for the Price field of the Wine Products table, making the price field required and making sure the price is no less than $1 but no more than $100. Create your own feedback statement and enter it as the validation text. Save the changes you made.

    l.   When creating your validation rule, you might well have checked to see if the data already stored actually met that rule. If you did check, you found that the validation rule was in conflict with some of the existing data. Change the rule so that the price must be no less than $1 but now no more than $200. Create your own feedback statement and enter it as the validation text. Save the changes you made.

    m.   Establish a default value of 750 for the Size field of the Wine Products table.

    n.   Resize the column width of the Wine Products table so that it can fit on one page when printed in landscape orientation.

o. Print each table.

p. Print documentation on the properties of the Phone field of the Buyer table and the Price field of the Wine Products table.

q. Make sure you keep a copy of this file for use in the next chapter.

Chapter 10 Case Problem 3:
SNICK'S BOARD SHOP

Note: You must have completed Case 3 in the previous chapter in order to continue working on this case.

In Chapter 9 you created a database for the Snick's Board Shop consisting of a Products table, a Category table, and a Manufacturer table. You also created an initial query, form, and report. Caitlin has now asked you to make some changes to those files.

Make the following changes for Caitlin, using the ch9-05_student_name file you created in Chapter 9. (*Note*: Open your ch9-05_student_name file first, save it as Ch10-05_student_name, and then make the listed changes.)

a. Add CategoryID 6, CategoryName T-shirts to the category table.

b. Add ManufacturerID AH, ManufacturerName Anti-Hero to the manufacturer table.

c. Add ProductID 62-01296, ProductName Anti-Hero Logo T-Shirt, CategoryID 6, ManufacturerID AH, Price $14.99, Style Red, Quantity 30 to the product table.

d. Change ProductID 65-23174 to 61-23174

e. Delete ProductID 65-01837 from the product table.

f. Enforce referential integrity between the tables.

g. Print the Relationships report.

h. Add a Picture field for OLE objects to the Products table.

i. Add pictures to the products table. (*Note:* Pictures for these products are provided in the Images folder and are labeled with the ProductID.)

j. Add a PhoneNumber field to the manufacturer table with a standard phone number input mask and then add the following phone numbers to the manufacturer table.

ManufacturerID	PhoneNumber
AH	619-555-8521
EMT	305-555-7861
S9	415-555-7142

k. Create a validation rule for the Price field of the product table, making the price field required and making sure the price is greater than $1 but less than $500. Create your own feedback statement and enter it as the validation text. Save the changes you made.

l. Establish a default value of 20 for the Quantify field of the product table.

m. Resize the column width of the product table so that it can fit on one page when printed in landscape orientation.

n. Use Access's help feature to learn how to sort tables alphabetically by a certain field. Then sort and save each table by its primary key.

o. Print each table.

p. Print documentation on the properties of the PhoneNumber field of the manufacturer table and the quantity field of the product table.

q. Make sure you keep a copy of this file for use in the next chapter.

Chapter 10 Case Problem 4:
ROSEY'S ROSES

Note: You must have completed Case 4 in the previous chapter in order to continue working on this case. In Chapter 9, you created a database for Rosey's Roses consisting of a Product table, a Type table, and a Grower table. You also created an initial query, form, and report. You have now been asked to make some changes to those files.

Make the following changes using the ch9-06_student_name file you created in Chapter 9. (*Note:* Open your ch9-06_student_name file first, save it as Ch10-06_student_name, and then make the listed changes.)

a. Add Type "Creeper", and Description "Low-growing roses used as ground cover." to the Type table.

b. Add Grower ID "400", Grower Name "Owen Farms", and Contact "Maria Lopez" to the Grower table.

c. Add ID "15", Type "Creeper", Description "Sunlight #3", Quantity "35", Cost/Unit "30.00", and Grower ID "400" to the Product table.

d. Delete ID "7" from the Product table.

e. Delete the existing relationships between tables.

f. Change the Field Size of the following fields in the Product table: Type – 10 and Description – 30.

g. Add a Picture field for OLE objects to the Product table.

h. Add pictures to the Product table. (Note: Pictures for these products are provided in the Images folder and are labeled with the product ID.)

i. Add a Phone Number field to the Grower table with a standard phone number input mask and a field size of 10, and then add the following phone numbers: ID 100 – 503-555-1957, ID 200 – 408-555-8741, ID 300 – 212-555-1154, and ID 400 – 805-555-6974.

j. Create a validation rule for the Cost/Unit field of the Product table, making the Cost/Unit field required and making sure the Cost/Unit is

greater than $1 but less than $100. Create your own feedback state-ment and enter it as the validation text.

k. Establish a default value of 10 for the Quantify field of the Product table.

l. Recreate relationships between tables and enforce referential integrity.

m. Print the relationships report.

n. Print each table.

o. Print documentation on the properties of the Phone Number field of the Grower table, the Quantity field of the Product table, and the Cost/Unit field of the Product table.

p. Make sure you keep a copy of this file for use in the next chapter.