Basic Skills and Tools Using Access 2013

1. Describe the primary functions using Microsoft Access.
2. Describe the steps for creating a new database file using Access.
3. Describe the steps for creating and modifying a table and fields using Access.
4. Describe the steps for creating relationships between tables using Access.

Introduction to Access

Microsoft Access 2013 is a powerful database program that allows you to enter and organize large amounts of data. Because Access allows you to relate tables and databases to one another, it is often referred to as a *relational database.* Plug-In T5, "Designing Database Applications," explains relational databases and their structures in detail.

This plug-in introduces the basics of creating a database using Microsoft Access. It is designed to show you the essentials, along with a few added-value features, to get you off to a good start using the program.

In brief, a relational database is a group of tables related to one another by common fields. A *table* (or datasheet) looks similar to a spreadsheet. Each *row* in the table contains all the data for a single *record.* Each *column* in the table represents a specific data value called a *field.* All records in a relational database have the same fields. For example, a table called *EMPLOYEE* might include fields for *Employee ID, Last Name, First Name, Address, City, State,* and *Zip.* Another table called *TIME SHEET* might have fields for *Time Sheet Number, Employee ID, Week, Hours Worked,* and *Rate of Pay.* The two tables are related by the *Employee ID* field, so the database can generate reports combining information from the two tables. Figure T6.1 displays this relationship.

Access comes with templates for common database categories, including project planning, employee time sheets, expense reporting, and inventory management.
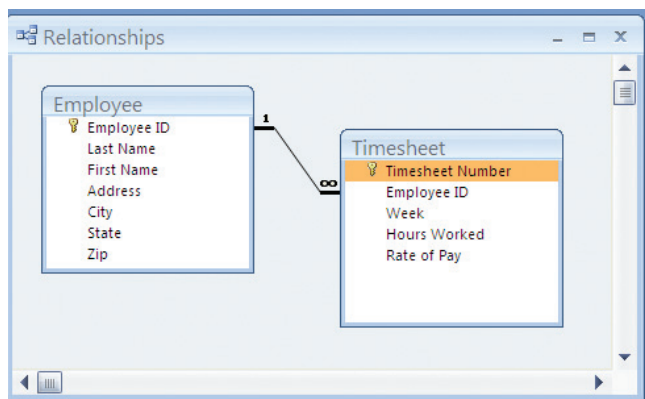
FIGURE T6.1 Database Relationship Example

An Access database includes more than just data. In addition to tables, an Access database file contains several different types of database objects:

- Saved queries for retrieving and organizing data.
- Forms for entering and displaying data on screen.
- Reports for printing table data or the results of queries.

This plug-in focuses on creating an Access database file, in addition to building tables, fields, attributes, and relationships. Plug-In T7, "Problem Solving Using Access 2013," concentrates on building queries, and Plug-In T8, "Decision Making Using Access 2013," spotlights forms and reports.
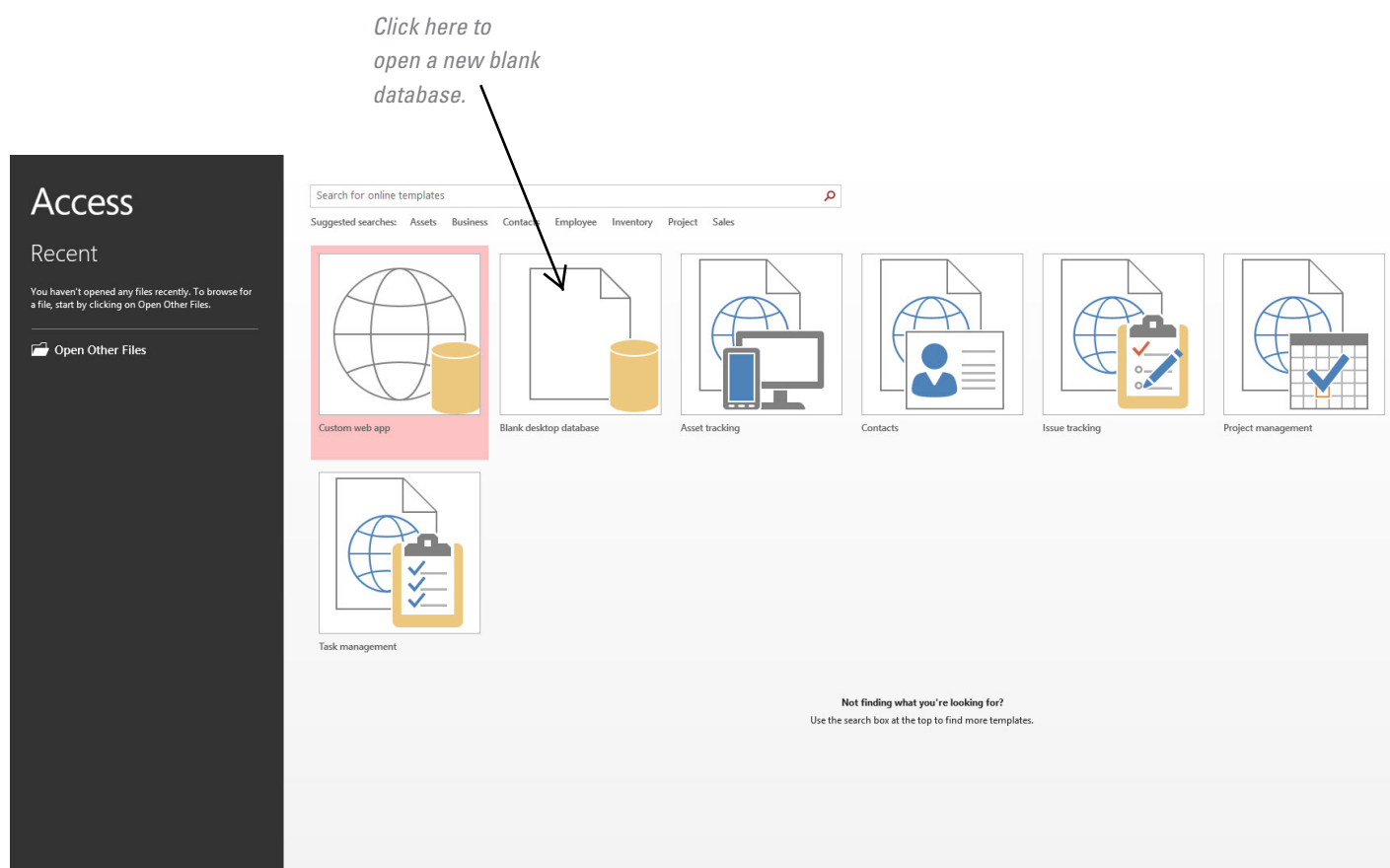
CREATING A NEW BLANK DATABASE

When creating a new blank database, the first thing you do is name your database. In Access, the database file cannot be moved to another disk or folder using the *Save As* command, so be sure to save the database to the preferred location when you start. (You can always move the database later using Windows Explorer.)

To create a blank database, follow these steps:

1. Open Access, click the **File** tab, and then click **New.**
2. On the page double click **Blank Database** (illustrated in Figure T6.2).

FIGURE T6.2 Create a New Blank Database

Click here to open a new blank database.

3. In the Blank Database pane, type **Slopeside Bikes** for the database file name in the **File Name:** box. (see Figure T6.3)

4. Click **Create.** Access will save the new blank database in the specified database file (which will have the .accdb extension).

5. Access creates the database with an empty table named **Table1,** and then opens Table1 in **Datasheet** view. The cursor is placed in the first empty cell in the **Add New Field** column.(seeFigureT6.4)
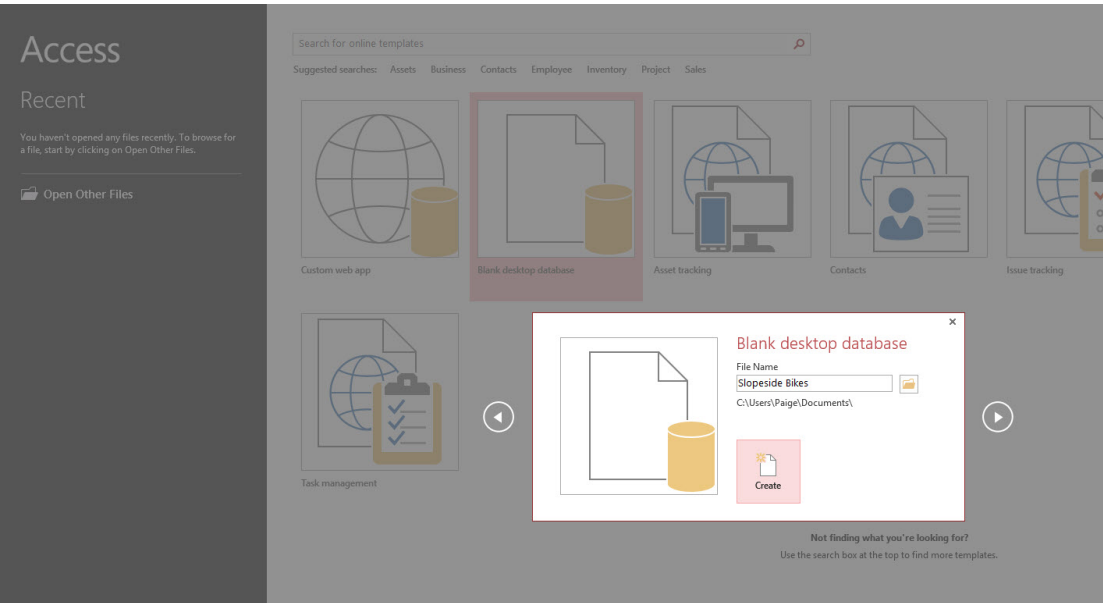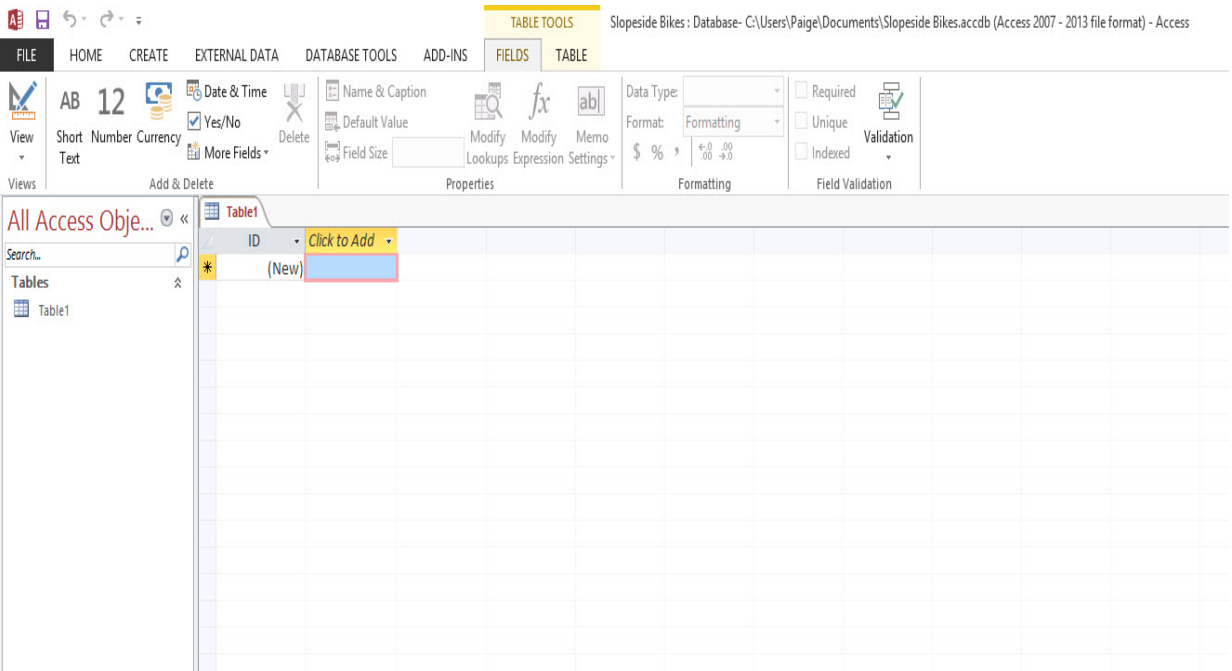
OPENING AN EXISTING DATABASE

When you start Access, the task pane to the right lists the most recently opened databases. To open a database that is not listed in the task pane, use the Open command. To open a database.

1. Click the **File** tab, and then click **Open.**
2. In the **Open** dialog box, browse to the database that you want to open.
3. Double-click the name of the database to open it, or click the name of the database once to highlight it, then click the **Open** button.

USING THE DATABASE TEMPLATES

Access includes a variety of templates to help you get started with some of the most common types of databases.

Templates include databases to manage contacts, expenses, and inventory. Here is an overview on how to create a new database using a template (refer to Figure T6.5):

1. Click the **File** tab, and then click **New.**
2. Several featured templates are displayed under the **Office.com Templates**
3. Click on the template name **Contacts,** then name your file in the **File Name Box,** just below the **Blank Database Preview Box.**
4. Access creates the database and then opens it. A form is displayed in which you can begin entering data.

FIGURE T6.5

Create a Database
Using a Template
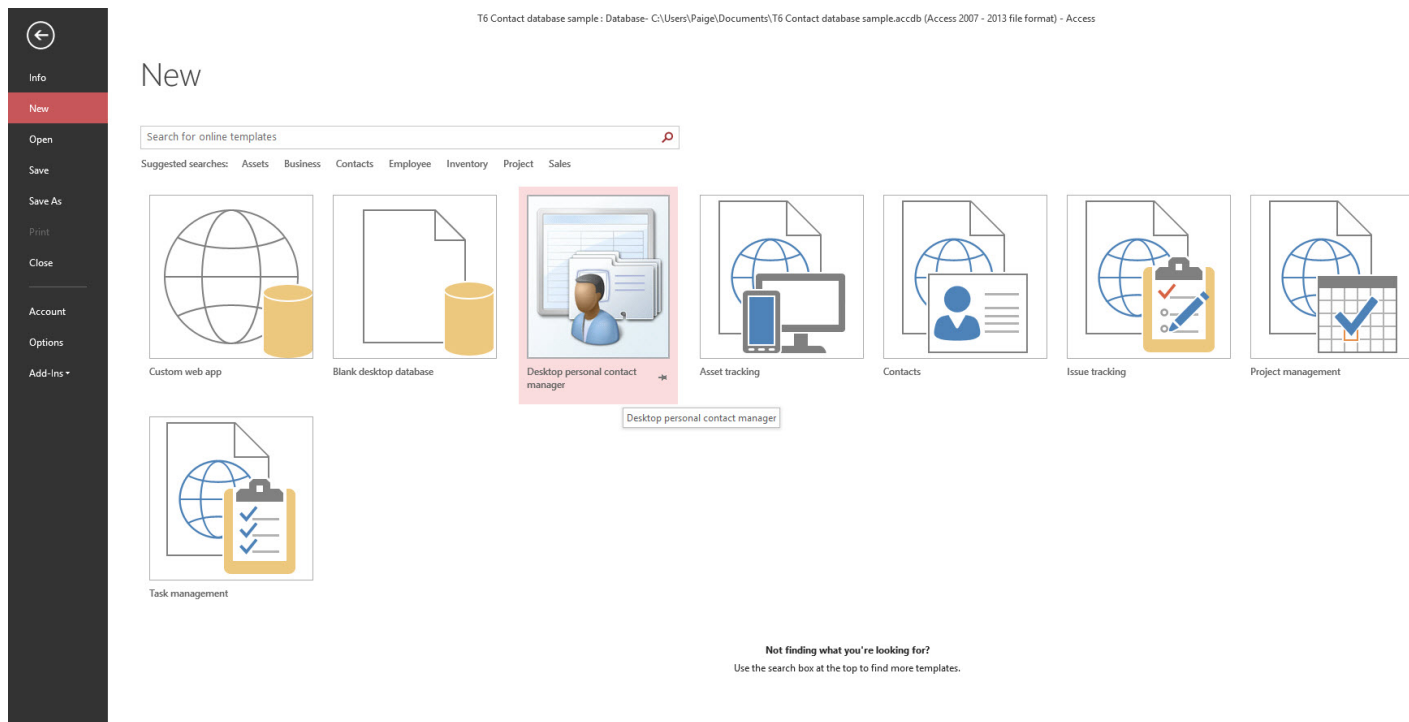
USING THE DATABASE WINDOW AND OBJECT VIEWS

Whenever a database is open, Access displays the Database window (shown in Figure T6.6), which serves as the central location for working with the database objects (tables, queries, forms, reports, etc.) in the opened database.

The following are among the important ways to work with database objects using the Database window:

■ *To work with a particular type of database object,* click the **Shutter Bar Open/Close** button **(<<)** and select the object you want to work with—Tables, Queries, Forms, Reports, Pages, and so on.

■ *To view a database object,* select the object name under the Navigation Pane and double-click the object to open it.

■ *To change the design of a database object,* select the object name under the Navigation Pane, right-click and choose the **Design View** button.

■ *To create a new database object* of the type currently displayed in the Database window, click the **Create** tab and then select the button type to create the new object (Table, Form, Report, Query Wizard, or Data Access Page).

■ *To make a copy of a database object,* right-click the object and choose **Copy** from the shortcut menu. Then right-click a blank spot in the Database window and choose **Paste** from the shortcut menu.

■ *To rename a database object,* right-click the object and choose **Rename** from the shortcut menu.

■ *To delete a database object,* right-click the object and choose **Delete** from the shortcut menu.

■ *To close the current database,* together with the Database window, click the **File** tab, then click the **Close Database** button.

FIGURE T6.6

Access Database Window
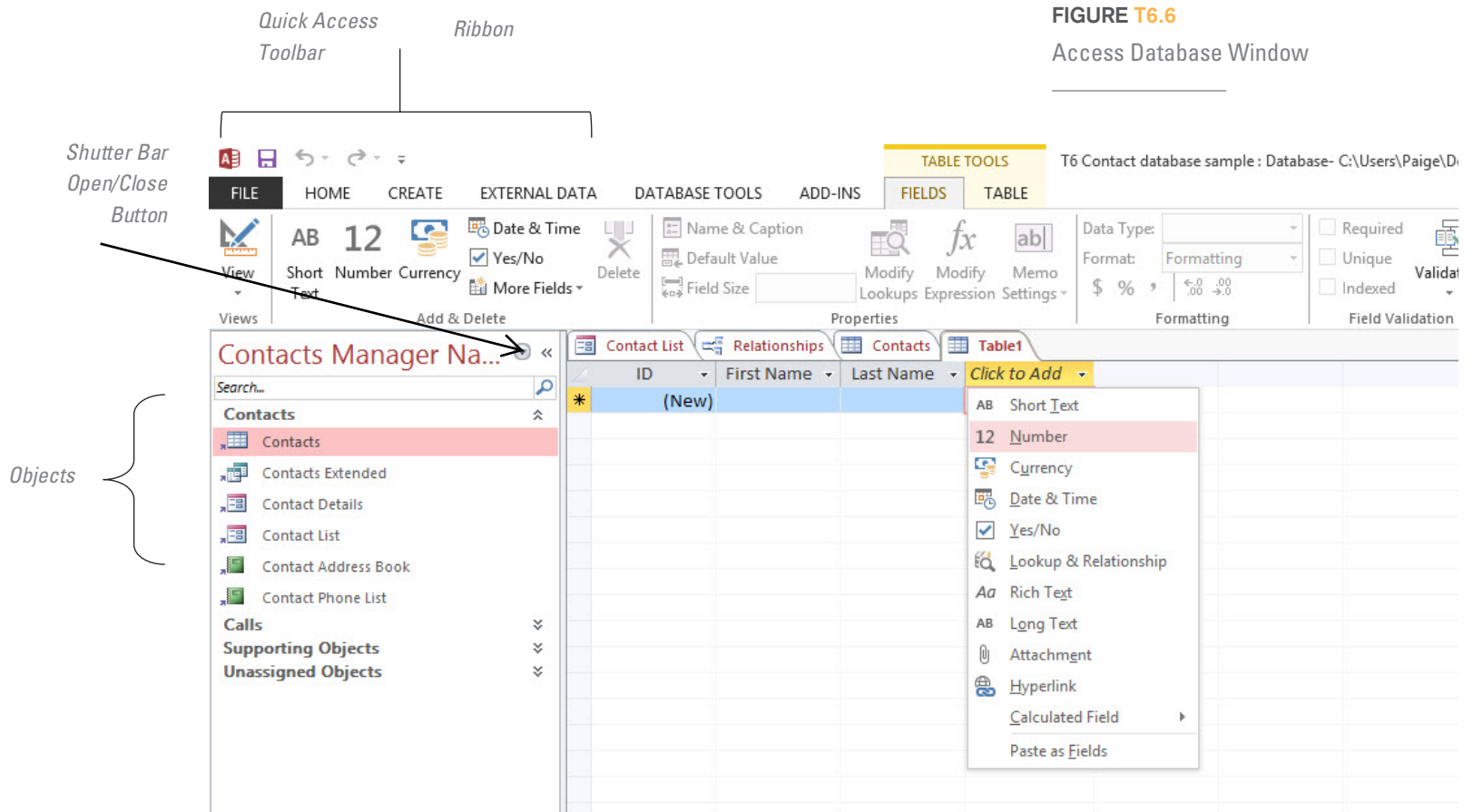
USING TABLE VIEWS

You can open database objects in different views, depending on what you want to do. *Datasheet view* is the view to use when entering data (see Figure T6.7). Use *Design view* when you want to change the structure or properties of the table. To open a table in Datasheet view from the Database window:

1. Under the Navigation Pane, click the **Shutter Bar Open/Close** button and make sure that all of the **All Access Objects** are selected.

2. To automatically open a table in Datasheet View, double-click the name of the table under the **Tables** section of the Navigation Pane. This is the Datasheet view where you can enter data in the table.

3. To change to Design view, click the **View** button in the **Views** group on the toolbar (refer to Figure T6.7). In Design view, you can add or remove fields or change field properties.

4. To switch back to Datasheet view, click the **View** button again.

FIGURE T6.7

Datasheet View
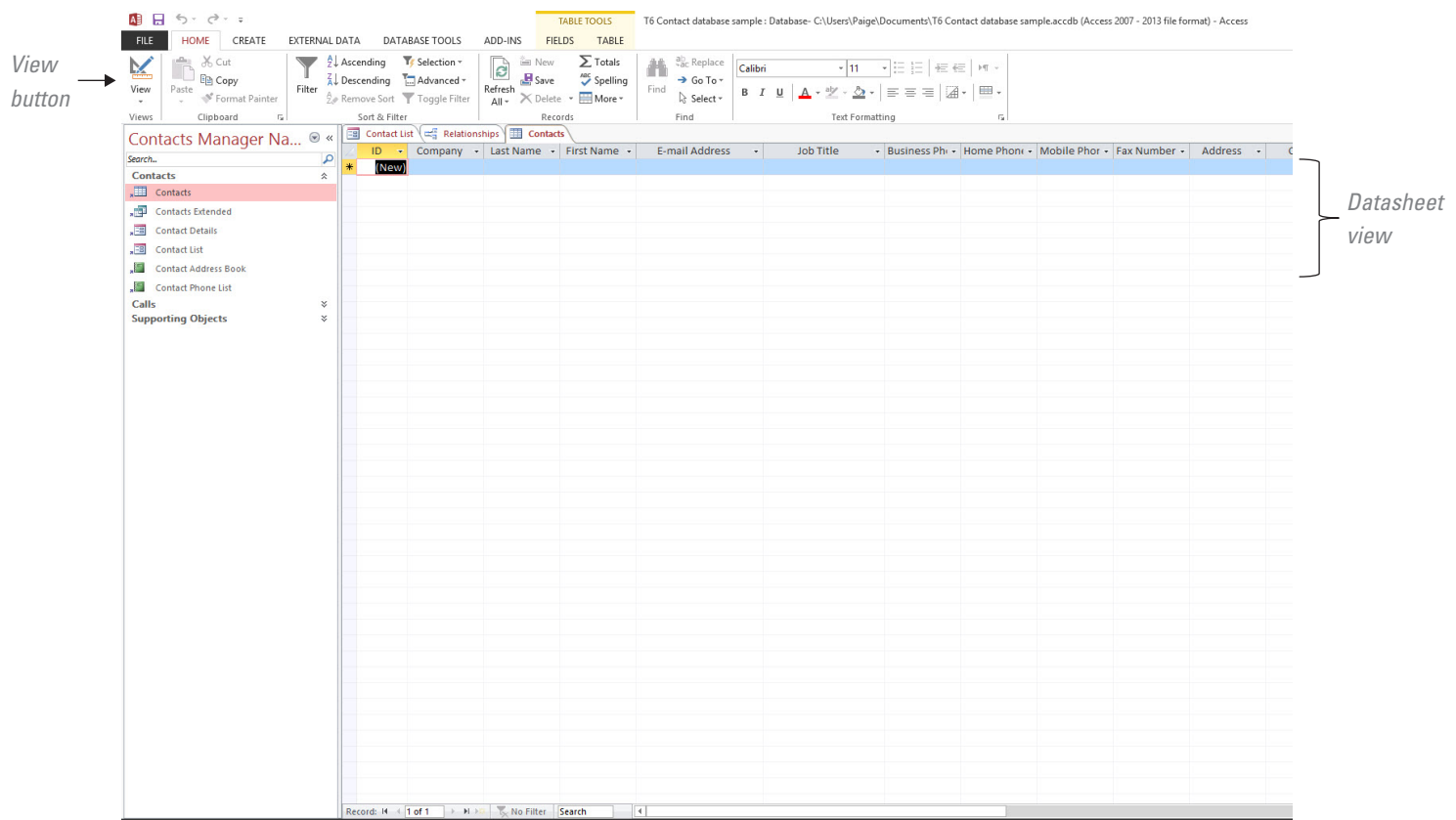
Creating and Modifying Tables

Access gives you two different ways to create tables:

- Create a table using data entry.
- Create a table in Design view.

CREATING A TABLE USING DATA ENTRY

Sometimes you need to create a very simple table. In this case, the data entry method might be easiest. A new table created with the data entry method appears as a plain datasheet. Fields are named **Field1, Field2, Field3,** etc., until you rename them. To create a table using the data entry method (refer to Figure T6.8):

1. Click the **Create** tab and then click the **Table** button.
2. The new table appears and is ready for data entry.
3. Rename the fields that you are going to use by double-clicking the field name (**Field1, Field2,** etc.) and typing the new field name (First Name, Last Name, and select the appropriate data type as displayed in Figure T6.9).

FIGURE T6.8

Create a Table
by Entering Data

Field names are labeled Field1, Field2, etc., until you rename them and be sure to select the data type.
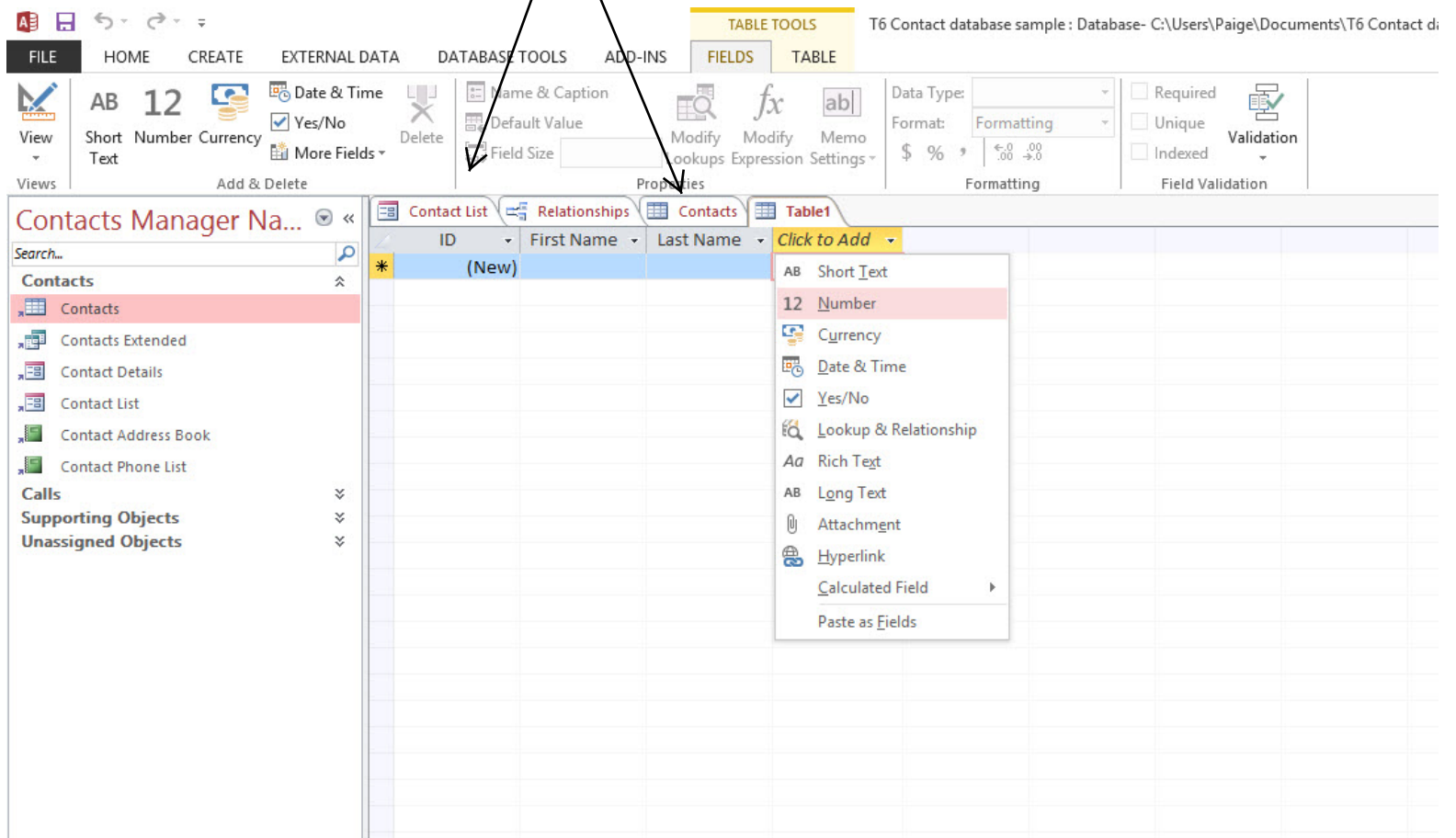
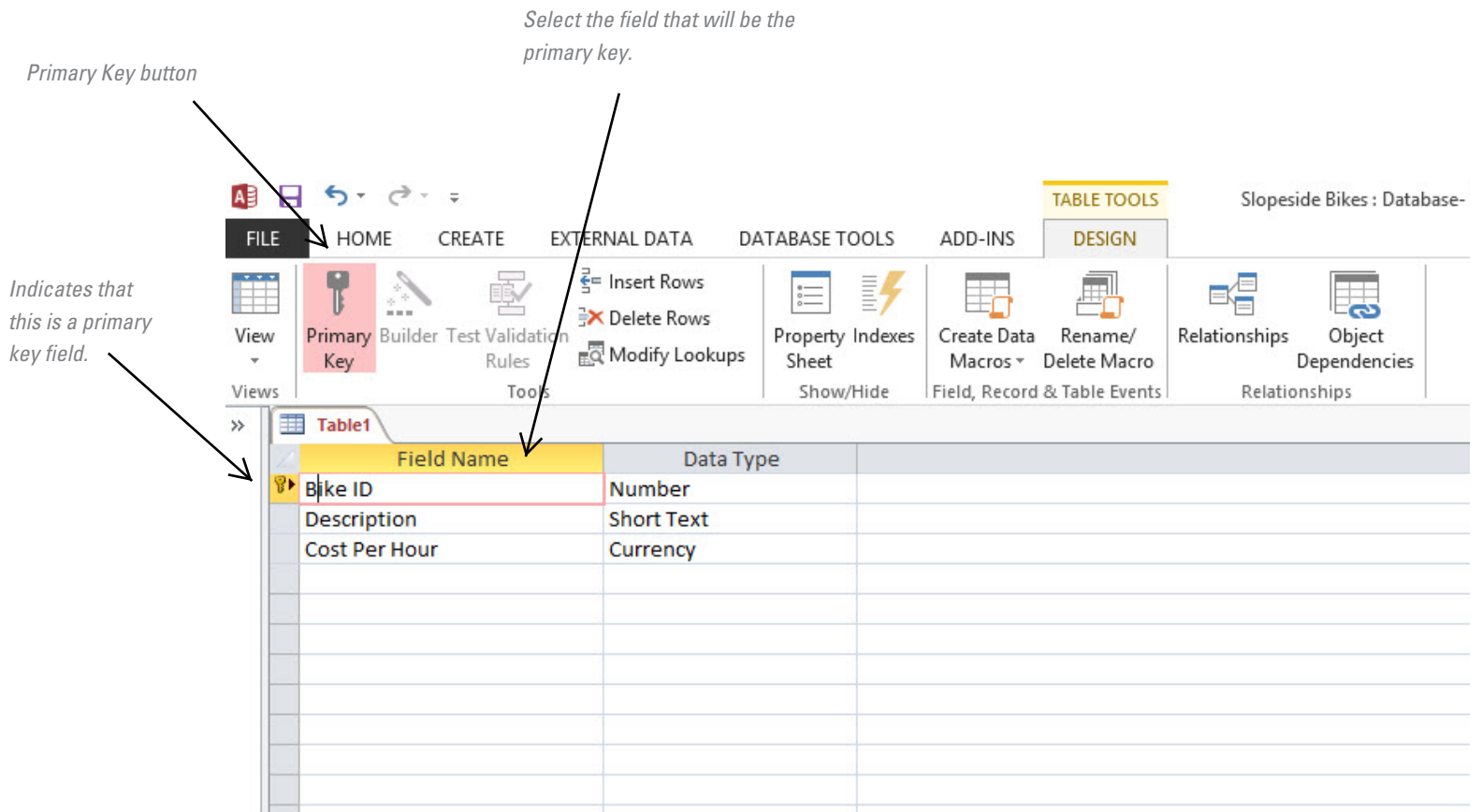| Data Type	Usage	Size
Short Text (formerly known as "Text")	Alphanumeric data (names, titles, etc.)	Up to 255 characters.
Long Text (formerly known as "Memo")	Large amounts of alphanumeric data: sentences and paragraphs.	Up to about 1 gigabyte (GB), but controls to display a long text are limited to the first 64,000 characters.
Number	Numeric data.	1, 2, 4, 8, or 16 bytes.
Date/Time	Dates and times.	8 bytes.
Currency	Monetary data, stored with 4 decimal places of precision.	8 bytes.
AutoNumber	Unique value generated by Access for each new record.	4 bytes (16 bytes for ReplicationID).
Yes/No	Boolean (true/false) data; Access stores the numeric value zero (0) for false, and -1 for true.	1 byte.
OLE Object	Pictures, graphs, or other ActiveX objects from another Windows-based application.	Up to about 2 GB.
Hyperlink	A link address to a document or file on the Internet, on an intranet, on a local area network (LAN), or on your local computer	Up to 8,192 (each part of a Hyperlink data type can contain up to 2048 characters).
Attachment	You can attach files such as pictures, documents, spreadsheets, or charts; each Attachment field can contain an unlimited number of attachments per record, up to the storage limit of the size of a database file.	Up to about 2 GB.
Calculated	You can create an expression that uses data from one or more fields. You can designate different result data types from the expression.	Dependent on the data type of the Result Type property. Short Text data type result can have up to 243 characters. Long Text, Number, Yes/No, and Date/Time should match their respective data types.

CREATING A TABLE IN DESIGN VIEW

Most Access objects are displayed in Design view, which allows you to work with the underlying structure of your tables, queries, forms, and reports. In this next step, you will be using the Slopeside Bikes database that you created in the "Creating a New Blank Database" section to use for many of the remaining steps in this plug-in. To create a table using Design view, follow these steps:

1. Click the **Create** tab, and then click the **Table Design** button.
2. Click in the **Field Name** cell and type **Bike ID.**
3. Click in the **Data Type** cell, click the list arrow and select **Number.** To make the Bike ID field a primary key, click on the **Primary Key** button in the **Tools** group on the toolbar. In the **Field Properties** pane (below the table), make sure the **Required** property is set to **Yes** and the **Field Size** is set to **Long Integer.**
4. Using the same steps above, create fields for the following (see Figure T6.10):
   a. Field Name = **Description,** Data Type = **Short Text,** Field Size = **25,** Required = **Yes**
   b. Field Name = **Cost Per Hour,** Data Type = **Currency,** Required = **Yes**

   Note: Designate a primary key. The *primary key* consists of one or more fields that Access can use to uniquely identify the records contained within the table. A table must have a primary key if it is on the "one" side of a one-to-many relationship, as explained in Plug-In T5.

   When a single field is designated as the primary key, the field's *Indexed* property is automatically set to *Yes (No Duplicates).* This setting cannot be changed. When data in a record are entered or modified, Access will not allow a primary key field to be left blank.

   To designate a field, or a group of fields, as the primary key, select the field or fields in the field list and click the **Primary Key** button. Access will mark the primary key field(s) with a key icon, as shown in Figure T6.11 . To remove the primary key designation from a field, select it and click the **Primary Key** button again.

5. Close the table, and click **Yes** to the save changes prompt. Enter **BIKE** as the **Table Name.**
6. Create another new, blank table as before. Enter fields for each entry in Figure T6.12 , using field sizes and descriptions as appropriate. Remember to set the **primary key** and ensure that the **Required** property is set to **Yes** as appropriate.

Primary Key button

Select the field that will be the primary key.

Indicates that this is a primary key field.

FIGURE T6.11

Setting the Primary Key

7. Close the table, and click **Yes** to the save changes prompt. Enter **CUSTOMER** as the **Table Name.**

8. Create another new, blank table as before. Enter fields for each entry in Figure T6.13 , using field sizes and descriptions as appropriate. Since there are three primary keys in this scenario (each acts as a composite key comprised as one primary key), make sure all three **(Drivers License, Date,** and **Bike ID)** are selected by holding down the **CTRL** key when clicking each field, then select the **Primary Key** button.

9. Close the table, and click **Yes** to the save changes prompt. Enter **RENTAL** for the **Table Name.**
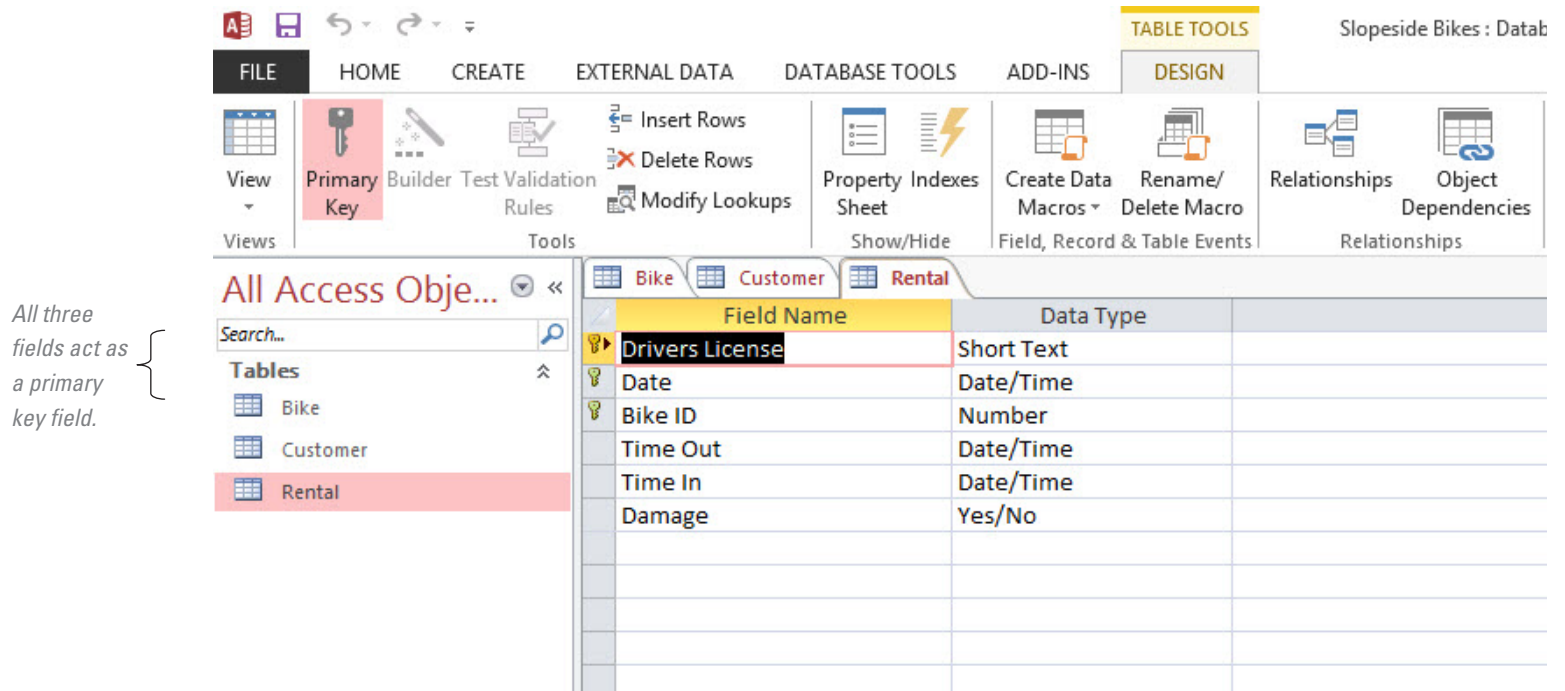
FIGURE T6.12

Customer Table

All three fields act as a primary key field.
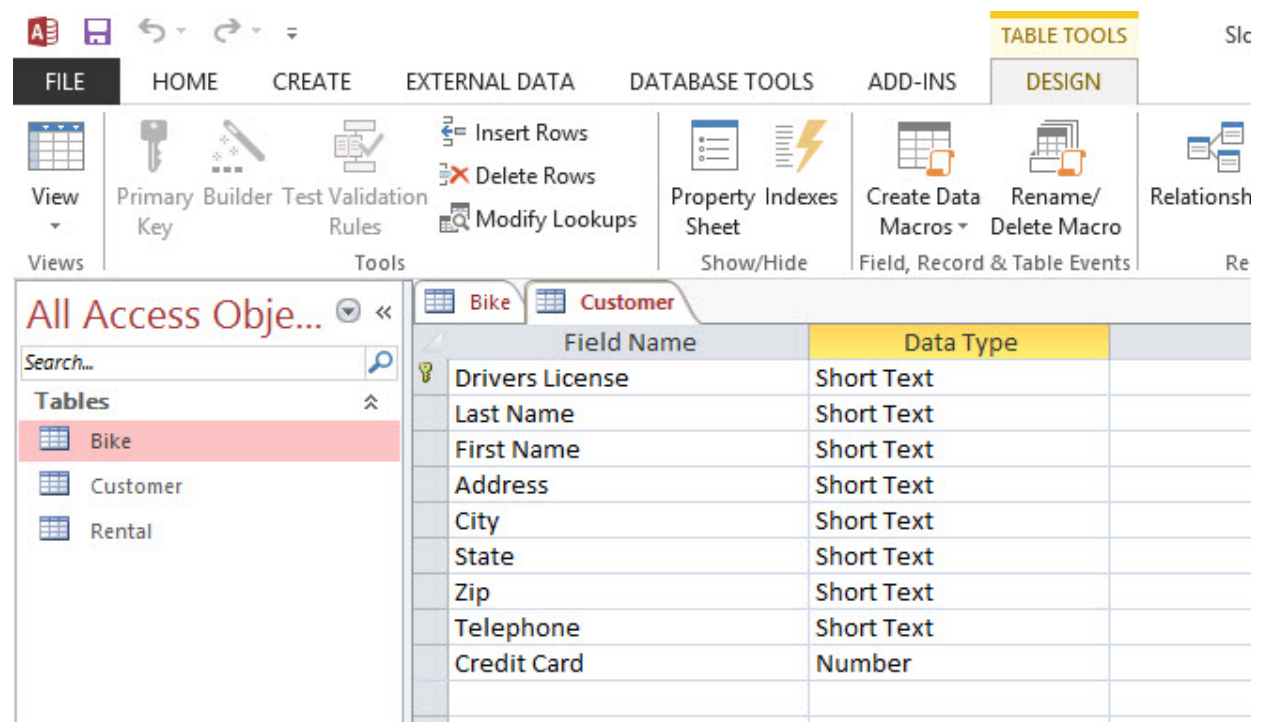
FIGURE T6.13

Rental Table

CHANGING DATA TYPES

By default, the data type for a new field is *Text.* You can change the data type to *Number, AutoNumber, Date/Time, Currency,* or one of the other options available. Specifying the appropriate data type for a field is crucial to designing a useful database. For example, you cannot run calculations on a field with the Text data type, and you cannot sort a date field efficiently unless you use the Date/Time data type.

Carefully consider the type of data you will include in each field before you decide on the data type. To change the data type for a field:

1. In the Navigation Pane, open the table you wish to modify in Design view.
2. Click the existing data type for the field that you want to change.
3. Click the drop-down arrow to see the list of other available data types.
4. Select the appropriate data type for your data.

USING THE INPUT MASK WIZARD

To ensure that users enter data in a particular format, use the *Input Mask* property. Rather than typing the mask format yourself, Access has a wizard that offers samples of the most common data formats. To use the Input Mask Wizard (see Figure T6.14):

1. Open the **CUSTOMER** table in Design view that you created in a previous section.
2. Click the **Telephone** field.
3. Click the **Input Mask** box in the **Field Properties** pane.
4. Click the Build button (the **. . .** ellipsis button) to the right of the box.
5. If you need to save the table, Access will prompt you to do so now.
6. The **Input Mask Wizard** appears. Select **Phone Number** under the **Input Mask:** column.
7. Click the **Next** button to continue.

8. In this step, you can modify the input mask or change the placeholder character. To change the **Placeholder character:** click the drop-down arrow and select the character you want. You can test the new format by typing values in the **Try It:** box.

9. Finally, choose how you want to store the data. Click the **With the symbols in the mask, like this:** radio button.

10. Click **Next** to go to the last step.

11. Click **Finish** to complete the input mask.

FIGURE T6.14

Input Mask Wizard
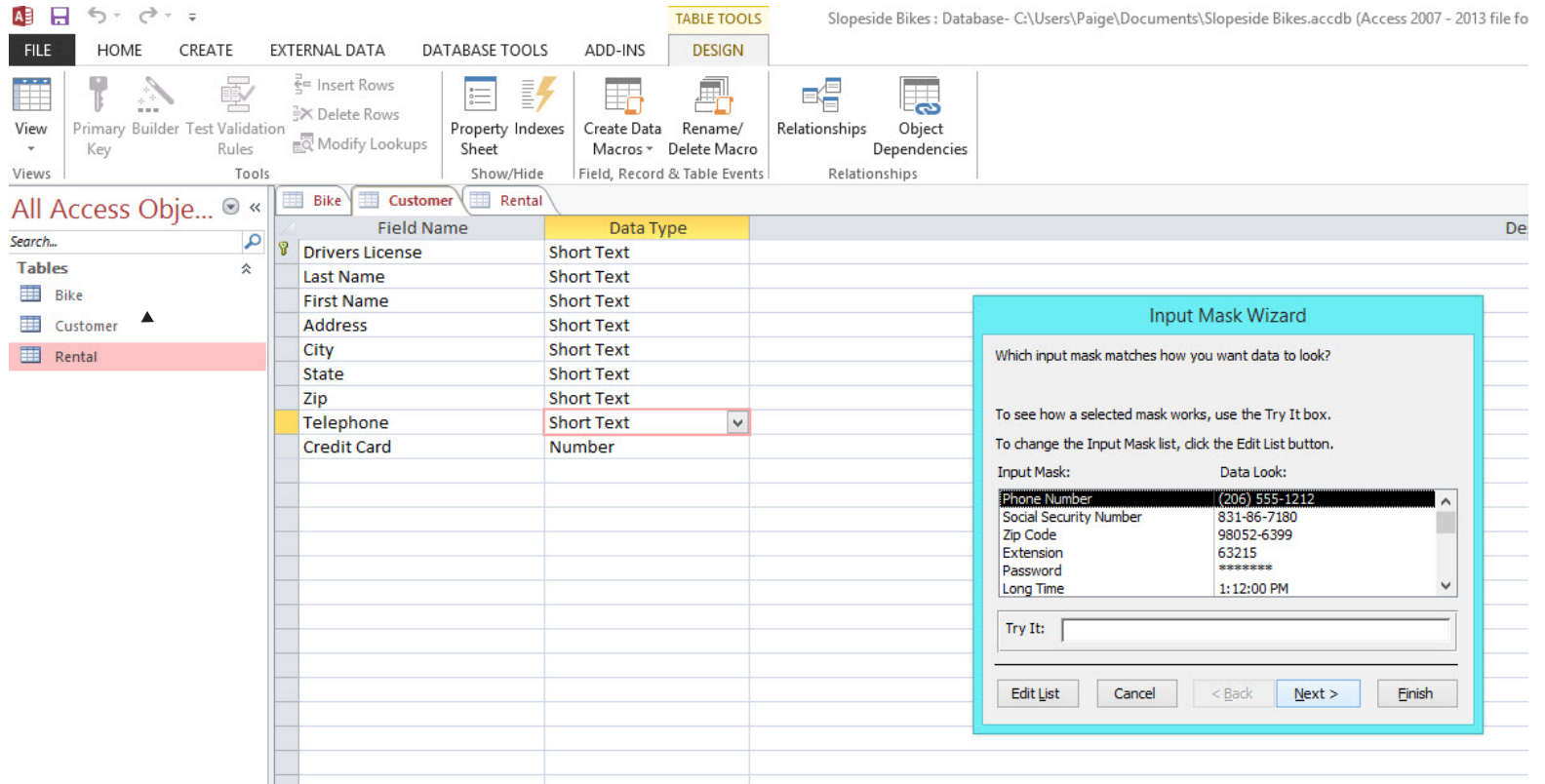
USING THE FORMAT PROPERTY

Use the format property to ensure that data are entered in a consistent format. You can choose from predefined formats or design your own.

1. Open the **BIKE** table in **Design** view that you created in a previous section.

2. Click the **Cost Per Hour** field.

3. Click the drop-down arrow under **Format** in the **Field Properties** pane to dis-play the list of predefined formats.

4. Select the **Currency** format.

5. Close the **BIKE** table window and click **Yes** at the save changes prompt.

Note: You can include Autotext in your custom text formats. For example, if you are entering apartment numbers, you could use the format **"Apt. " @-@.** Entering the value **B1** will display **Apt. B-1.** Placing quotation marks around **"Apt. "** tells Access that this is a text string that should be included automatically in each data entry. Notice the space inside the quotation marks to ensure that a space will display between "Apt." and the apartment number. Using this text format will save data entry time.

Defining Relationships

Remember that Access is a relational database. Objects in your database are related to one another through relationships defined by common fields between tables. There are three types of relationships: one-to-many, one-to-one, and many-to-many.

One-to-many relationships are the most common. In a one-to-many relationship, the primary table contains a primary key field that is included as a field (as a foreign key) in the secondary table. Thus, one record in the first table can relate to many records in the second table.

When these fields have the same names, Access automatically creates the one-to-many relationship for you. However, the fields may have different names. In those cases, you may want to manually create the relationship using the Relationships window.

USING THE RELATIONSHIPS WINDOW

To define relationships between tables follow these steps:

1. Open the **Relationships** window by clicking on the **Database Tools** tab, then clicking the **Relationships** button in the **Show/Hide** group (refer to Figure T6.15)
2. The **Show Table** dialog box appears. Select each table listed (i.e., **BIKE, CUSTOMER,** and **RENTAL**) and click the **Add** button, then click the **Close** button.

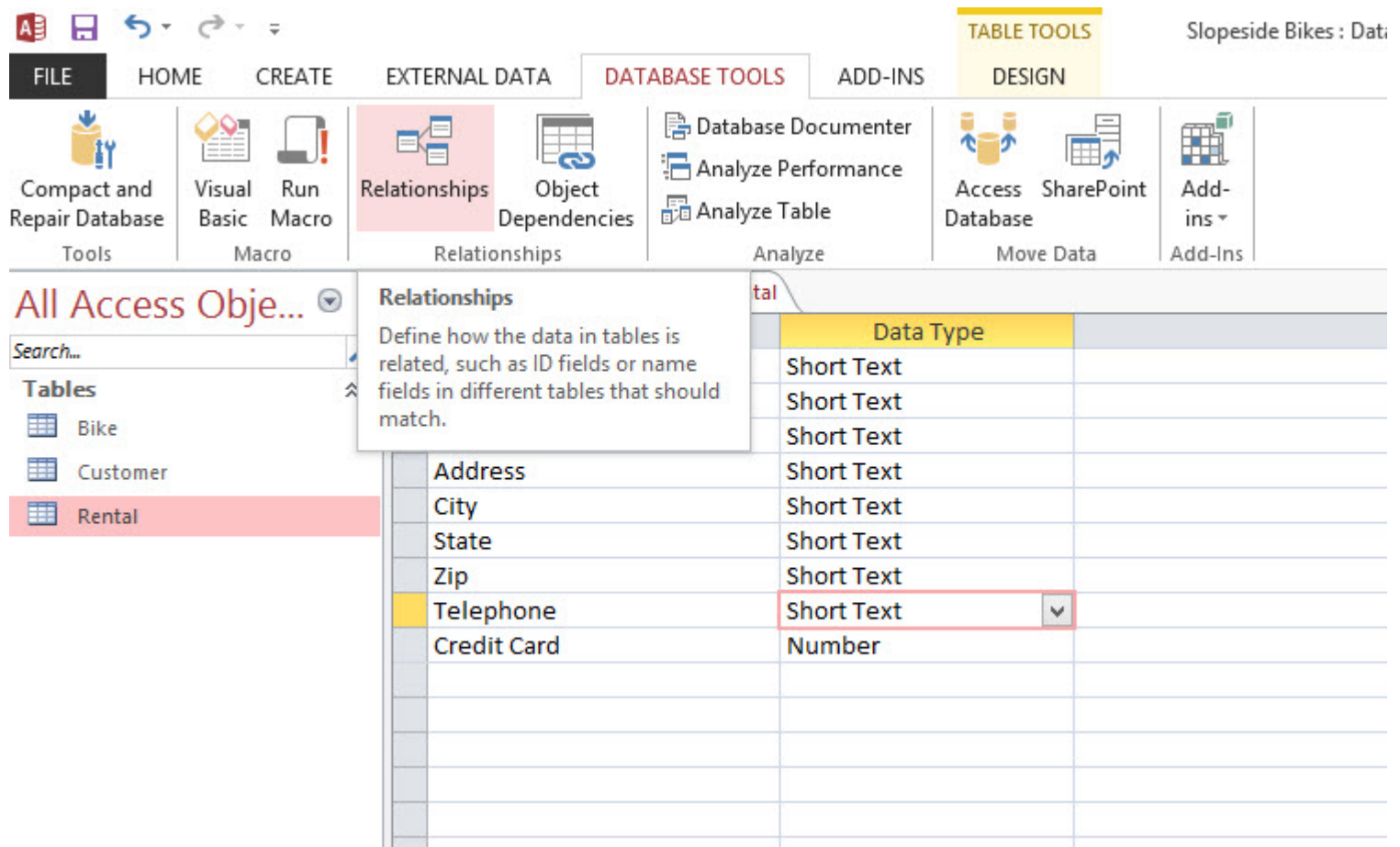**FIGURE T6.15**

The Relationships Button

3. The **Relationships** diagram should appear. To define a new relationship, click and drag the **Bike ID** primary key from the **BIKE** table and drop it on the **Bike ID** foreign key in the **RENTAL** table. Make sure the table names and field names being linked are the correct ones. The **Edit Relationships** dialog box should appear (see Figure T6.16). Select **Enforce Referential Integrity.** Then click the **Create** button. Note that related fields do not need to have the same name, only the same data type (although it is best to give the same name to clarify the relationship).

a. To change the features of a relationship, double-click the relationship's line in the **Relationships** window.

b. To delete a relationship, click the line to select it and then press the **Delete** key.

4. Complete the diagram with the relationships shown in FigureT6. 17.

5. Close the **Relationships** window, and save the layout.

Notice the symbols on the relationship lines. The **"1"** indicates the "one" table in the one-to-many relationship. The infinity symbol **"∞"** indicates the "many" table. When these symbols appear, you know that the relationship has referential integrity enforced.
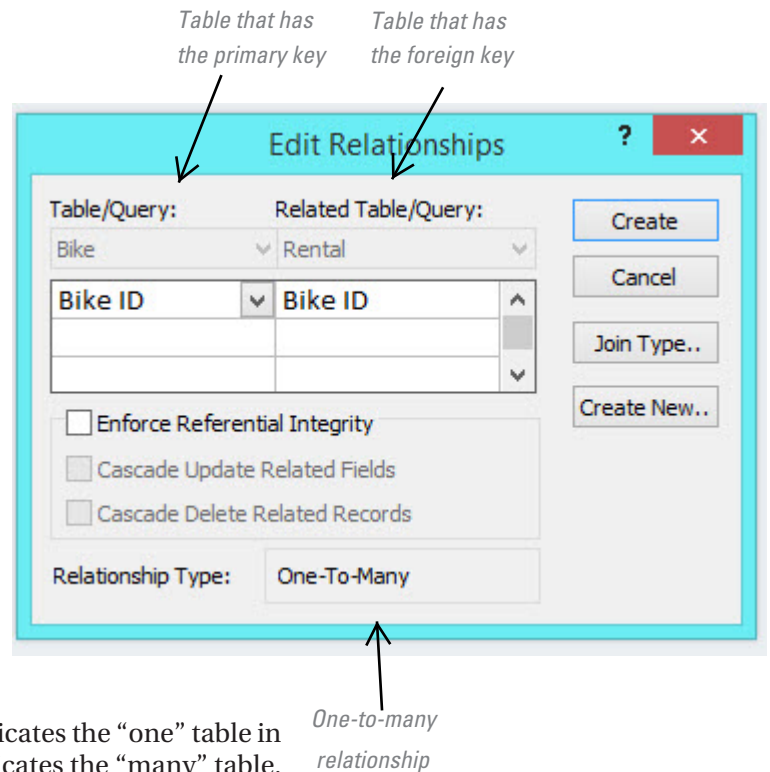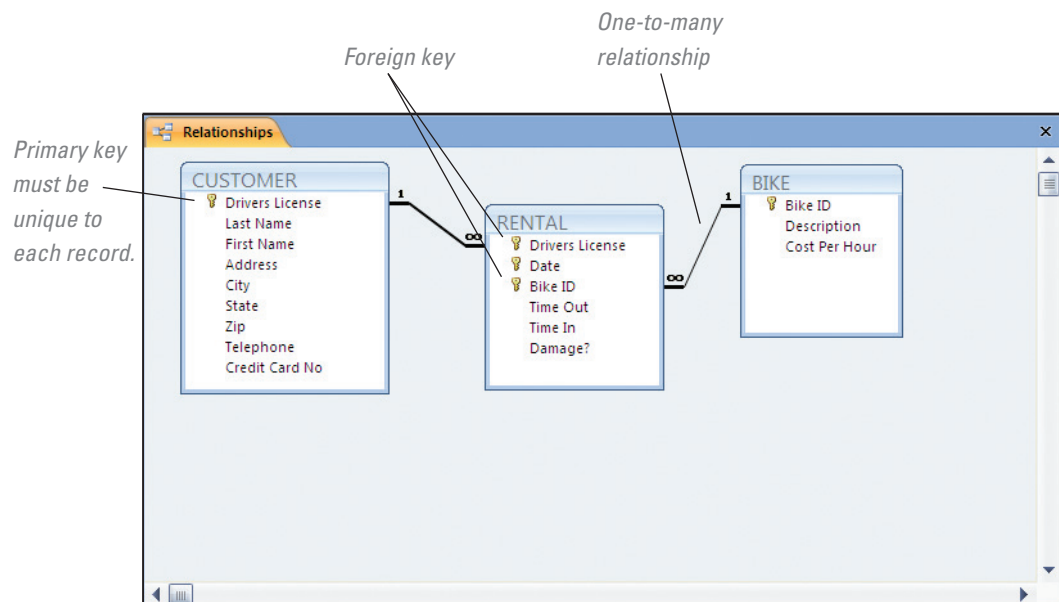
Table that has
the primary key

Table that has
the foreign key

One-to-many
relationship

FIGURE **T6.17**

Completed Relationships
Window

Primary key
must be
unique to
each record.

Foreign key

One-to-many
relationship

M ost organizations maintain and manage large amounts of information. One of the most efficient information management computer-based applications is Microsoft Access 2013. Access provides a powerful set of tools for creating and maintaining a relational database. A few of the basic modules that most users utilize when working with Access are building tables and relationships.

★ **MAKING BUSINESS DECISIONS**

1. WasteNot Recycling

WasteNot Recycling picks up recyclables from homeowners in Boulder, Colorado. Neighborhoods subscribe to the service so that pickup is cost-effective. WasteNot provides special containers to subscribers for sorting recyclables: a blue container for paper products and a purple container for aluminum, plastic, and glass products.

Subscribers place their recycling containers on the curb for biweekly pickup. Each recycling container is weighed before being emptied. WasteNot drivers carry handheld recording devices used to track each pickup. Subscribers receive quarterly profit-sharing checks based on their contributions. If WasteNot does not make a profit, subscribers are not paid for their recyclables. If WasteNot makes a profit, subscribers share in that profit. WasteNot has asked you to help develop a relational database that will effectively track subscribers, using the data downloaded from the drivers' devices. WasteNot has provided you with a snapshot of two tables you need to create. The Customer table shown here holds static customer information such as name, address, and phone. The Customer Record table holds data about each recyclable pickup.

Specifically, WasteNot needs you to:

Customer Table

Customer ID	Last Name	First Name	Street	City	State	ZIP Code	Phone	First Pickup
1	Wagoner	Sam	5480 Alpine Street	Boulder	CO	80308	(303) 161-5545	05/25/2004
2	Calahan	Eliza	2140 Edgewood Avenue	Boulder	CO	80308	(303) 886-6003	05/25/2004
3	Lake	James	701 Eastman Road	Boulder	CO	80308	(303) 562-4499	08/25/2005
4	Meadows	Sara	Pond Hill Drive	Boulder	CO	80308	(303) 792-3646	02/28/2004
20	Smith	Alto	114 Lexington Street	Boulder	CO	80308	(303) 838-7111	06/02/2004
64	Monarch	Shiela	431 Phillips Lane	Boulder	CO	80308	(303) 352-4847	07/17/2005
65	Guo	Amy	1935 Snow Avenue	Boulder	CO	80308	(303) 555-6731	05/19/2005
80	Rivera	Juan	482 Weston Avenue	Boulder	CO	80308	(303) 815-2456	12/28/2004
85	Williams	Max	230 Southpark Circle	Boulder	CO	80308	(303) 333-0000	07/19/2003

Customer ID	Srvc Date	Weight Paper	Weight Other
1	11/22/2007	8	15
1	10/15/2007	32	85
1	11/7/2007	12	43
2	11/7/2007	19	0
2	11/22/2007	28	174
3	10/15/2007	5	8
3	11/22/2007	16	32
3	12/4/2007	7	12
20	10/15/2007	18	40
20	11/22/2007	35	60
80	10/15/2007	10	10
80	11/7/2007	9	13
80	11/22/2007	16	18
80	12/4/2007	18	21

1. Create a Microsoft Access database.
2. Create the tables, fields, data types, and primary key(s) for the database.
3. Create the relationship(s) needed between the tables.
4. Populate the database with the data provided above.

2. It's A Grind Coffee Shop

It's A Grind Coffee Shop is an Oakland, California, neighborhood coffee shop. Besides serving gourmet coffee, It's A Grind dishes up sandwiches and desserts. Local bands, Internet connections, and floor-to-ceiling books on every wall provide entertainment. Kate Fitzgerald, the proprietor, has decided that a database would be helpful in the acquisition of new books. Although customers rarely buy books, they do disappear or fall apart from use. Kate needs a way to keep track of which books she has so that she does not pick up duplicates. She has hired you to help design a database to keep track of the books. To assist with the design, Kate has provided you with some data in an Excel spreadsheet, **T6_ItsAGrindCoffee_ Data.xls.** The spreadsheet is not normalized; Kate asks you to assist with that before you start to create the database.

Specifically, Kate wants you to:

1. Create a Microsoft Access database.
2. Create the tables, fields, data types, and primary key(s) for the database using the structure provided in the **T6_ItsAGrindCoffee_Data.xls** file.
3. Create the relationship(s) needed between the tables.
4. Populate the database with the data provided in the **T6_ItsAGrindCoffee_Data.xls** file.

3. Academic Software

Launched in 2005 in Boston, Massachusetts, Academic Software has consistently been the fastest-growing education-focused software retailer in North America. It is committed exclusively to academic customers, offering thousands of full-version software titles at great discounts. Academic Software has partnered with the top technology manufacturers, including

Adobe, Microsoft, Sibelius, Sony Media Software, and Wacom, to offer excellent service and prices, which are available only to students, schools, and teachers.

From the very beginning, Academic Software has relied heavily on technology to ensure a positive shopping experience for its customers. The company's philosophy is simple: Hire amazing people, give them the best tools, and help them deliver an unbeatable customer experience.

One facet of Academic Software's business that needs assistance is its database organization. You have been asked to assist Academic Software with creating a relational database structure for organizing software, vendors, and academic categories. Currently this information is stored in an Excel spreadsheet, **T6_AcademicSoftware_Data.xls,** which Academic Software has provided to you.

Specifically, you are asked to:

1. Create a Microsoft Access database.
2. Create the tables, fields, data types, and primary key(s) for the database using the structure provided in the **T6_AcademicSoftware_Data.xls** file.
3. Create the relationship(s) needed between the tables.
4. Populate the database with the data provided in the **T6_AcademicSoftware_Data.xls** file.

4. On-Campus Health

On-Campus Health is the infirmary located on the campus of the University of Denver. Recordkeeping at the infirmary's pharmacy, although meticulous and professional, is inefficient. Maintaining the recordkeeping using mostly manual systems is becoming more costly as additional people are hired to meet stricter industry regulations regarding the Health Insurance Portability and Accountability Act (HIPAA) and because of state regulations that affect the sale, storage, and dispensing of prescription drugs. Although On-Campus Health succeeded in automating some of the data management for the pharmacy in an Excel spreadsheet, a more substantial change is needed to properly maintain and store data.

Students who use the infirmary can request prescriptions, either by presenting a written order from a doctor or asking for a refill of an existing prescription. The pharmacist adds this request to the system by getting the required information to fill it, including information about the drug, the student's name, the student's health plan, and the prescribing doctor. Use the data that On-Campus Health has provided you in the file **T6_CampusHealth_Data.xls** to complete the following:

1. Create a Microsoft Access database.
2. Create the tables, fields, data types, primary key(s), and the like for the database.
3. Create the relationship(s) needed between the tables.
4. Populate the database with the data provided in the Excel file.