

- i. Ask your instructor whether to include any other courses you are currently taking.
- j. Include a completed and well-structured Documentation worksheet.
- k. Insert the File Name in the left footer of all worksheets.
- l. Modify any page settings to ensure your worksheets each will print on a single page. Specify portrait or landscape orientation as is appropriate to maximize readability.
- m. Save your file, and then close Excel. Submit your file as directed by your instructor.

Perform 2: Perform in Your Career

Student data file needed:

 Blank Excel workbook

You will save your file as:

 e01pf2TimeTrack_LastFirst.xlsx



Finance &
Accounting



Human
Resources

Personal Time Tracking

You have started working as a computer programmer with BetaWerks Software Corporation. The company requires you to track the time that you spend doing different things during the day each week. This helps the company determine how many of your hours are billable to customers. You have several different projects to work on as well as a few training sessions throughout the week. The company pays for one 15-minute coffee break and a one-hour lunch each day. Any additional time is considered personal time.

- a. Start **Excel**, and then open a blank workbook. Save the file as **e01pf2TimeTrack_LastFirst** using your first and last name. Rename Sheet1 with a name appropriate to this exercise.
- b. Create a worksheet to track your time for the company this week. The following requirements must be met:
 - The worksheet should identify the first day of the workweek with a title such as: Week of mm/dd/yyyy.
 - Your time must be broken down by project/client and weekdays.
 - Time not billable to a project should be classified as Unbillable.
 - Unbillable time should be broken into at least two categories: Breaks and Work.
- c. Set up your worksheet so you can easily calculate the amount of time you spent working on each account, in meetings, in training, and on breaks according to the information below:
 - Monday, you spent two hours in a meeting with your development team. This is billable to the BetaWerks Software company as unbillable hours. Following the meeting, you took a 20-minute coffee break. After your break, you spent two hours and 15 minutes working on your project for the Garske Advising. After a one-hour lunch, you attended a two-hour training and development meeting. Before heading home for the day, you spent two hours working on the ISBC Distributing project.
 - Tuesday morning you spent four hours on the Klemisch Kompany project. To help break up the morning, you took a 20-minute coffee break at 10:00. You only had time for a 30-minute lunch because you had to get back to the office for a team-building activity. The activity lasted 40 minutes. To finish the day, you spent four hours working on the Garske Advising assignment.
 - Wednesday morning, you spent two hours each on the Garske Advising and Klemisch Kompany projects. Lunch was a quick 30 minutes because you had a conference call with Mr. Atkinson from ISBC at 1 p.m. The conference call took one hour, and then you spent an additional three hours working on the project.
 - Thursday, the day started with a 30-minute update with your supervisor. Following the meeting, you were able to spend two hours on the ISBC project. After a 15-minute coffee break, you started on a new project for K&M Worldwide for 90 minutes.

You took a 45-minute lunch break, and then spent two and a half hours on the Klemisch Kompany project and two hours on your work for L&H United.

- Friday started with a two-hour training and development session about a new software package that BetaWerks is starting to implement, followed by a 15-minute coffee break. After your coffee break, you were able to squeeze in two more hours for L&H United before taking a one-hour lunch. After lunch, you put in four hours on the Klemisch Kompany project before finally going home for the week.
- d. BetaWerks bills your time spent on each account according to the following rates:

Klemisch Kompany	\$275
Garske Advising	\$250
ISBC Distributing	\$225
K&M Worldwide	\$175
L&H United	\$200

- e. Your salary is \$100,000/year with benefits. Given two weeks of vacation, you cost BetaWerks \$2,000 in salary and benefits per week.
- f. Include in your worksheet a calculation of your profit/loss to BetaWerks for the week.
- g. Be sure to document your worksheet using a separate Documentation worksheet, comments, and instructions.
- h. Modify any page settings to ensure your worksheets each will print on a single page. Specify portrait or landscape orientation as is appropriate to maximize readability.
- i. Insert the **File Name** in the left footer of all worksheets.
- j. Save your file, and then close Excel. Submit your file as directed by your instructor.

Perform 3: Perform in Your Team

Student data file needed:

 Blank Excel workbook

You will save your file as:

 e01pf3CheckReg_TeamNumber.xlsx

Check Register



Finance &
Accounting

You volunteer your time with a local nonprofit, the Mayville Community Theatre. Because of your business background, the board of directors has asked you to serve as the new treasurer and to track all of the monetary transactions for the group.

- a. Select one team member to set up the document by completing Steps b through e. Then continue with Step d.
- b. Open your browser, and then navigate to either <https://www.skydrive.live.com>, <https://www.drive.google.com>, or any other instructor assigned location. Be sure all members of the team have an account on the chosen system—a Microsoft or Google account.
- c. Create a new workbook, and then name it **e01pf3CheckReg_TeamNumber**. Replace Number with the number assigned to your team by your instructor.
- d. Rename Sheet1 as **Check Register - Team #**. Replace # with the number of your team.
- e. Share the worksheet with the other members of your team. Make sure that each team member has the appropriate permission to edit the document.
- f. Hold a team meeting, and make a plan. Layout the worksheet you are going to build on paper, discuss the requirements of each of the remaining steps, and then divide the remaining steps (g–n) among team members. Note that the steps should be completed

in order, so as each team member completes his or her steps, he or she should notify the entire team, not just the team member responsible for the next step.

- g. Create the Check Register worksheet to track receipts and expenditures that should be assigned to one of the following categories: **Costumes**, **Marketing**, **Operating and Maintenance**, **Scripts and Royalties**, and **Set Construction**. Also track the following for each receipt or expenditure: the date, amount of payment, check/reference number, recipient, and item description.
- h. Enter the following receipts and expenditures under the appropriate category.

Date	Item	Paid To	Check or Ref. #	Amount
11/1/2015	Starting Balance	N/A		\$1793.08
11/2/2015	Royalties for "The Cubicle"	Office Publishing Company	9520	-\$300.00
11/2/2015	Scripts for "The Cubicle"	Office Publishing Company	9521	-\$200.00
11/5/2015	Building Maintenance—Ticket Office	Fix It Palace	9522	-\$187.92
11/8/2015	Patron Donation	N/A	53339	\$1,000.00
11/12/2015	Costumes for "The Cubicle"	Jane's Fabrics	9523	-\$300.00
11/22/2015	Building Materials for set construction of "The Cubicle"	Fix It Palace	9524	-\$430.00
11/30/2015	TV and Radio ads for "The Cubicle"	AdSpace	9525	-\$229.18
11/30/2015	General Theater Operating Expenses—November	The Electric Co-op, City Water Works	9526	-\$149.98
12/15/2015	Ticket Revenue from "The Cubicle"	N/A	59431	\$1,115.50
12/30/2015	General Theater Operating Expenses—December	The Electric Co-op, City Water Works	9527	-\$195.13

- i. Periodically, money is deposited into the checking account. Include a way to track deposits.
- j. Finally, include a running balance. This should be updated any time money is deposited or withdrawn from the account.
- k. If the running account balance drops below \$1,000, there should be a conditional formatting alert for any balance figure below the threshold.
- l. Document the check register using a separate Documentation worksheet, explicit instructions, and comments where helpful.
- m. Modify any page settings to ensure your worksheets each will print on a single page. Specify portrait or landscape orientation as is appropriate to maximize readability.
- n. Insert the File Name in the left footer on all worksheets in the workbook. Include a list of the names of the students in your team in the right section of the footer.
- o. Press **Ctrl+Home**, save your file, and then close Excel. Submit your file as directed by your instructor.



Finance &
Accounting

Student data file needed:

 e01pf4ProjBill.xlsx

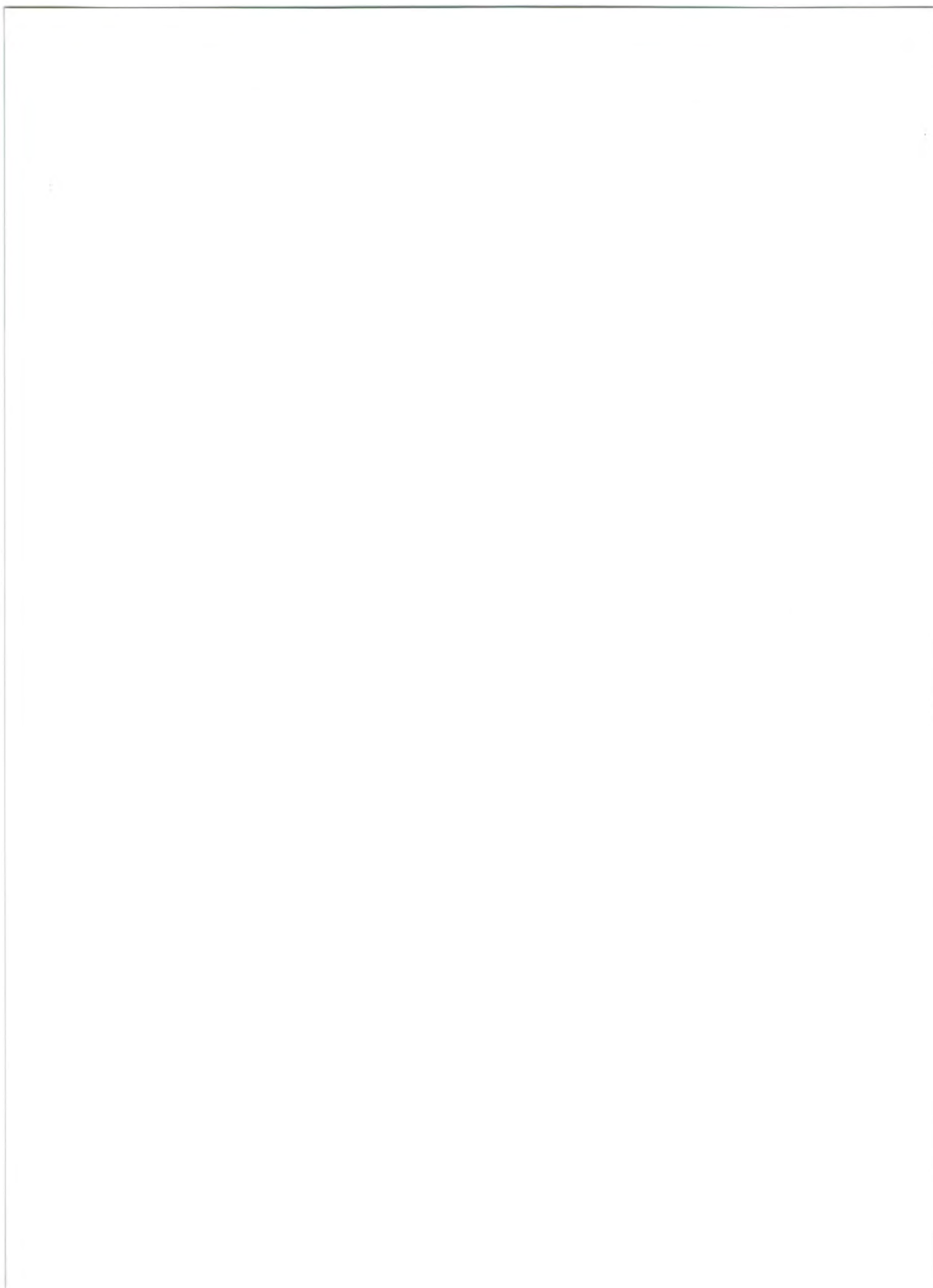
You will save your file as:

 e01pf4ProjBill_LastFirst.xlsx

Project Management Billing

John Smith works with you at the Excellent Consulting Company. Each week, consultants are required to track how much time they spend on each project. A worksheet is used to track the date, start time, end time, project code, a description of work performed, and the number of billable hours completed. At the bottom of the worksheet, the hours spent on each project are summarized so clients can be billed. In your role as an internal auditor, you have been asked to double-check a tracking sheet each week. By random selection, Mr. Smith's tracking worksheet needs to be checked this week. Make sure his numbers are accurate, and ensure that his worksheet is set up to minimize errors. His worksheet is also badly in need of some formatting for appearance and clarity.

- a. Start **Excel**, and then open **e01pf4ProjBill**. Save the file as **e01pf4ProjBill_LastFirst** replacing LastFirst with your own name.
- b. Make sure all calculated figures are correct. If you subtract Start Time from End Time and multiply the difference by 24, the result is the number of hours between the two times.
- c. Examine client totals, and then correct any problems with formulas.
- d. Apply formatting such as cell styles, bold, a theme, and so on to improve the appearance of the worksheet.
- e. Apply any data formatting that will make the data easier to interpret.
- f. Add documentation.
- g. Insert the File Name in the left footer on all worksheets in the workbook.
- h. Modify any page settings to ensure the worksheets each will print on a single page. Specify portrait or landscape orientation as is appropriate to maximize readability.
- i. Save your file, and then close Excel. Submit your file as directed by your instructor.



Microsoft Office Excel 2013

Module 2

Conducting Business Analysis

WORKSHOP 3 | CELL REFERENCES, NAMED RANGES, AND FUNCTIONS

OBJECTIVES

1. Understand the types of cell references p. 488
2. Create named ranges p. 496
3. Create and structure functions p. 500
4. Use and understand math and statistical functions p. 502
5. Use and understand date and time functions p. 508
6. Use and understand text functions p. 511
7. Use financial and lookup functions p. 515
8. Use logical functions and troubleshoot functions p. 520

Prepare Case

Painted Paradise Resort and Spa Wedding Planning

Clint Keller and Addison Ryan just booked a wedding at Painted Paradise Resort and Spa. When requested by a happy couple, the Turquoise Oasis Spa coordinates a variety of events including spa visits, golf massages, and gift baskets made up of various spa products. Given the frequency of wedding events at the Turquoise Oasis Spa, Meda Rodate has asked for your assistance in designing an Excel workbook that can be used and reused to plan these events in the future.



Sales & Marketing



Finance & Accounting



Vladimir Voronin / Fotolia

REAL WORLD SUCCESS



"The skills I have learned through Excel have become incredibly valuable in my everyday life. I recently worked at a private golf course, and was asked to create an inventory workbook to track Beverage Cart sales. This would allow the golf course to forecast demand and predict the amount of starting inventory we needed to maintain. In addition, we needed to use functions that would be user-friendly for the beverage cart employees. At the end of the day, the beverage cart employees would count to see how many items from the set amount of inventory were missing, input the numbers into the Excel workbook, and Excel would compute the amount of sales the beverage cart employee would need to turn in. The remaining amount would equal the tips the employee had earned. The use of Excel functions not only helped the Golf Course track its inventory, but also its profits."

- Kristen, alumnus

Student data file needed for this workshop:



e02ws03Wedding.xlsx

You will save your file as:



e02ws03Wedding_LastFirst.xlsx

Referencing Cells and Named Ranges

The value of Excel expands as you move from using the spreadsheet for displaying data to analyzing data in order to make informed decisions. As the complexity of a spreadsheet increases, techniques that promote effective and efficient development of the spreadsheet become of utmost importance. Integrating cell references within formulas and working with functions are common methods used in developing effective spreadsheets. These skills will become the foundation for more advanced skills.

A **cell reference** is used in a formula or function to address a cell or range of cells. A cell reference contains two parts, a column reference—the alphabetic portion that comes first, and a row reference—the numeric portion that comes last. For example, cell reference B4 refers to the intersection of column B and row 4. When a formula is created, you can simply use values, like =5*5. However, writing a formula without cell references is limiting. Formulas with cell references are substantially more powerful. For example, the formula =B4*C4, where cells B4 and C4 contain values to be used in the calculation, allows the formula to reference a cell (or cell range) rather than a value (or values). This means that when data changes in an individual cell, any formulas that reference the cell are automatically recalculated. In this section you will use cell referencing and named ranges to build a worksheet model for planning events at the Turquoise Oasis Spa.

Understand the Types of Cell References

There are three different types of cell referencing: relative, absolute, and mixed. A **relative cell reference** changes when the formula or function is copied to another location. The change in the cell reference will reflect the number of rows and/or columns that the cell was copied from, relative to its original location. An **absolute cell reference** does not change if a formula or function is copied to another location. An absolute reference is specified by placing a dollar sign (\$) sign in front of both the column letter(s) and row number. For example, to make B4 an absolute reference you would specify \$B\$4. A **mixed cell reference** is essentially a combination of relative and absolute cell references. In a mixed cell reference, the column or row portion of the reference is absolute and the corresponding row or column is relative. For example, \$B4 is a mixed reference where the column is absolute and the row is relative. B\$4 is a mixed reference where the column is relative and the row is absolute. In essence, the dollar sign (\$) sign locks down the letter or number it precedes so it will not change when copied.

QUICK REFERENCE

Types of Cell Referencing

Below are examples of the three types of cell referencing for cell A4:

1. Relative cell referencing: =A5+B5
2. Absolute cell referencing: =\$A\$5+B5
3. Mixed cell referencing: =\$A5+B5

Cell referencing is a useful feature when formulas need to be copied across ranges in a spreadsheet. When creating a spreadsheet and developing a formula that will not be copied elsewhere, relative and absolute cell referencing is not necessary. However, data arranged in a table may require a formula to perform calculations on each row, or record. Excel allows this process to be completed quickly and easily by using cell referencing. The formula can be constructed once and then quickly copied across a range of cells.

REAL WORLD ADVICE**Creating Dynamic Workbooks**

The use of cell references in formulas helps make spreadsheets in Excel extremely powerful. By using a cell reference to refer to a value in a formula you can make your spreadsheet flexible. In other words, using cell references makes your spreadsheet easier to use and more efficient. If something about your business changes and requires an update to a value in your spreadsheet, you need only make the update in one place.

Open the Starting File

Meda Rodate would like for the Turquoise Oasis Spa to become more efficient in planning for wedding events. She has asked for your help in designing an Excel workbook to accomplish this goal. You will begin by opening the wedding planning workbook and organizing the number and pricing of spa gift baskets by constructing common Excel functions using various types of cell referencing.

E03.00**To Open the Excel Workbook**

- a. Start **Excel**, click **Open Other Workbooks**, double-click **Computer**, and then browse to your student data files. Locate and select **e02ws03Wedding**, and then click **Open**.
- b. Click the **FILE** tab, click **Save As**, and then Browse to your student files. In the File name box, type **e02ws03Wedding_LastFirst** using your last and first name, and then click **Save**.
- c. Click the **INSERT** tab, and then in the Text group, click **Header & Footer**.
- d. On the **HEADER & FOOTER TOOLS DESIGN** tab, in the Navigation group, click **Go to Footer**. If necessary, click the left section of the footer, and then click **File Name** in the Header & Footer Elements group.
- e. Click any cell on the spreadsheet to move out of the footer, press **[Ctrl]+[Home]**, click the **VIEW** tab, and then in the Workbook Views group, click **Normal**, and then click the **HOME** tab.

Using Relative Cell Referencing

Relative cell referencing (as shown in Figure 1) is the default reference type when constructing formulas in Excel. Remember that relative cell referencing changes the cells in a formula if it is copied or otherwise moved to another location. This includes the use of copy and paste or the AutoFill feature to copy a formula to another location. If a formula is copied to the right or left, the column references will change in the formula. If a formula is copied up or down, the row references will change in the formula.

Relative cell referencing is useful in situations where the same calculation is needed in multiple cells but the location of the data needed for the calculation changes relative to the position of the calculation cell. The GiftBaskets worksheet contains a list of individual items that are included in the different types of gift baskets offered at the Turquoise Oasis Spa. The worksheet contains the prices for individual items in the baskets, the number of each item in the basket, and the prices of each basket.

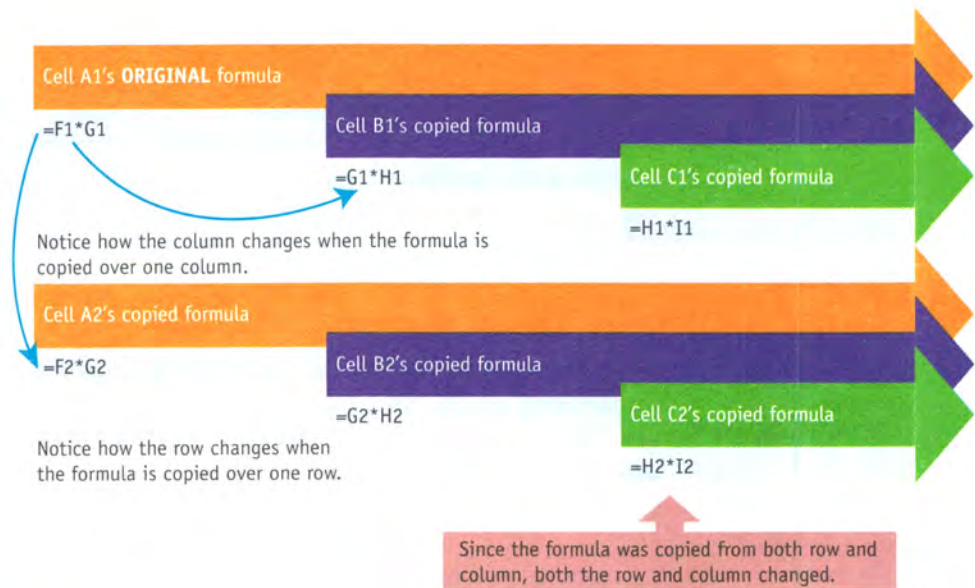


Figure 1 Understanding relative cell referencing

The Turquoise Oasis Spa allows wedding parties to specify up to three different kinds of custom gift baskets. Each gift basket can contain up to four different items in each basket. The workbook has been set up such that cells with a blue fill need to be changed from one event to another. In this exercise you will use relative cell referencing to display the total number of items in each type of gift basket.

SIDE NOTE

Alternate Method

You can also use AutoFill with a formula in a horizontal range by selecting the range and pressing **Ctrl** and typing R.

E03.01



To Use Relative Cell Referencing

- Click the **GiftBaskets** worksheet, and then click cell **F9**.
- Type **=SUM(B9:E9)** and then press **Ctrl**+**Enter**.
- Click the **AutoFill handle** on the bottom-right corner of cell **F9**, and then drag down to copy the formula to cell **F11**.

Notice that the formula in cell F11 refers to cells B11:E11. Since the formula copied down, the row reference changed from 9 to 10 and finally to 11.

Formula with relative cell referencing

Quote for Customized Gift Baskets

Customized Baskets	Description of Custom Basket	Bulk Discount
Basket 1	Attendees' Unwind and Renew	10%
Basket 2	Wedding Party Pamper Yourself	
Basket 3	Parents of the Bride and Groom Stress Free	

# of Items per Basket	Lavendar Candle	Chamomile Body Lotion	Foot Renew Cream	Soothing Bath Salts	Items Per Basket
Basket 1	2	1	1	0	4
Basket 2	2	2	2	2	8
Basket 3	3	2	2	4	11

Item Price List	Lavendar Candle	Chamomile Body Lotion	Foot Renew Cream	Soothing Bath Salts
Retail Price	\$ 4.99	\$ 7.99	\$ 5.99	\$ 8.99
Price After Bulk Discount				

Figure 2 Relative cell referencing

d. Save your workbook.

Using Absolute Cell Referencing

Absolute cell referencing (as shown in Figure 3) is useful when a formula needs to be copied and the reference to one or more cells within the formula must not change as the formula is copied. Thus, the column and row address of a referenced cell remains constant regardless of the position of the cell when the formula is copied to other cells.

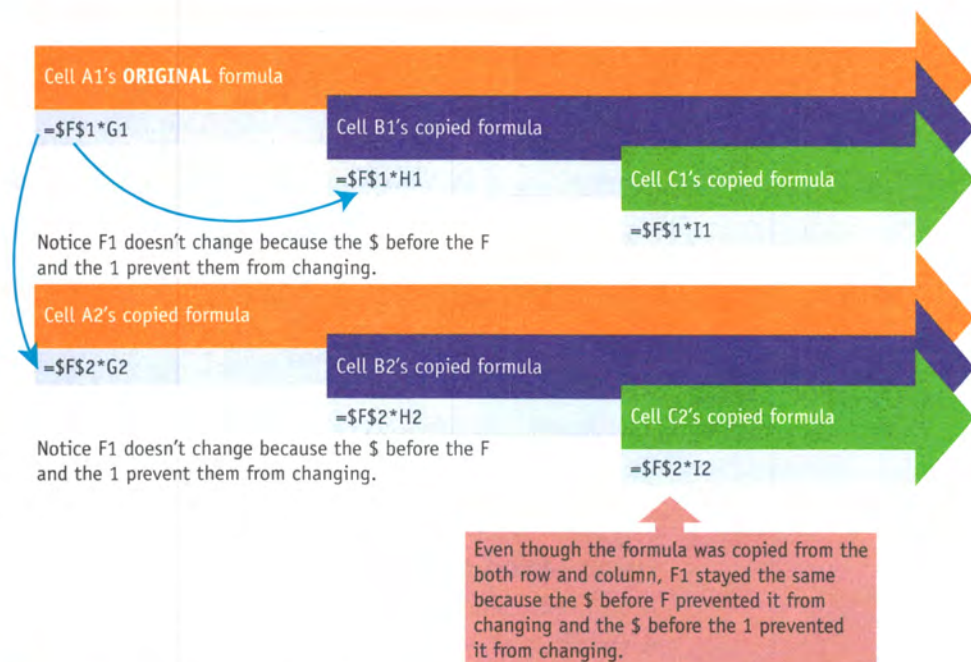


Figure 3 Understanding absolute cell referencing

Meda has decided to offer a bulk percentage discount on all gift baskets purchased for this event due to the large number of baskets being ordered. In this exercise you will modify the formulas in cells B15:E22 of the GiftBaskets worksheet using absolute cell referencing to include this discount.

E03.02



To Use Absolute Referencing to a Formula

- Click the **GiftBaskets** worksheet, and then click cell **B15**.
- Type **=B14-(B14*\$E\$3)** and then press **Ctrl+Enter**.
- Click the **AutoFill handle** on cell **B15**, and then drag to the right to copy the formula to cell **E15**.

Notice that the formula in cell E15 now refers to cell E3. The dollar sign in front of the column and row headings force Excel to keep the same cell reference as the formula is copied. Notice the formula in cell E15 also refers to cell E3.

Also, notice that the \$ sign before row 3 is not required since the formula was not copied to a different row. However, no matter where this formula is copied to on the worksheet the calculation should always use cell E3. Thus, common practice is to put a \$ sign before the column and row making the cell reference absolute.

SIDE NOTE

Using **F4**

An alternative to typing the \$ signs is to press **F4** after typing or selecting the cell reference.

Formula with absolute reference for cell E3

Formula with absolute reference for cell E3

Formula copied across range

Quote for Customized Gift Baskets					
Customized Baskets	Description of Custom Basket	Bulk Discount 10%			
Basket 1	Attendees' Unwind and Renew				
Basket 2	Wedding Party Pamper Yourself				
Basket 3	Parents of the Bride and Groom Stress Free				
# of Items per Basket	Lavendar Candle	Chamomile Body Lotion	Foot Renew Cream	Soothing Bath Salts	Items Per Basket
Basket 1	2	1	1	0	4
Basket 2	2	2	2	2	8
Basket 3	3	2	2	4	11
Item Price List	Lavendar Candle	Chamomile Body Lotion	Foot Renew Cream	Soothing Bath Salts	
Retail Price	\$ 4.99	\$ 7.99	\$ 5.99	\$ 8.99	
Price After Bulk Discount	\$ 4.49	\$ 7.19	\$ 5.39	\$ 8.09	
Price Per Basket	Lavendar Candle	Chamomile Body Lotion	Foot Renew Cream	Soothing Bath Salts	Per Basket Price
Basket 1					\$
Basket 2					\$
Basket 3					\$

Figure 4 Absolute cell referencing

- Save your workbook.

Using Mixed Cell Referencing

Mixed cell references can be very useful in the development of spreadsheets. Mixed cell references refer to referencing a cell within the formula where part of the cell address is preceded by a dollar sign to lock—either the column letter or the row value—as absolute reference. This will leave the other part of the cell as relatively referenced when the formula is copied to new cells. Figure 5 shows a representation of how mixed cell referencing works.

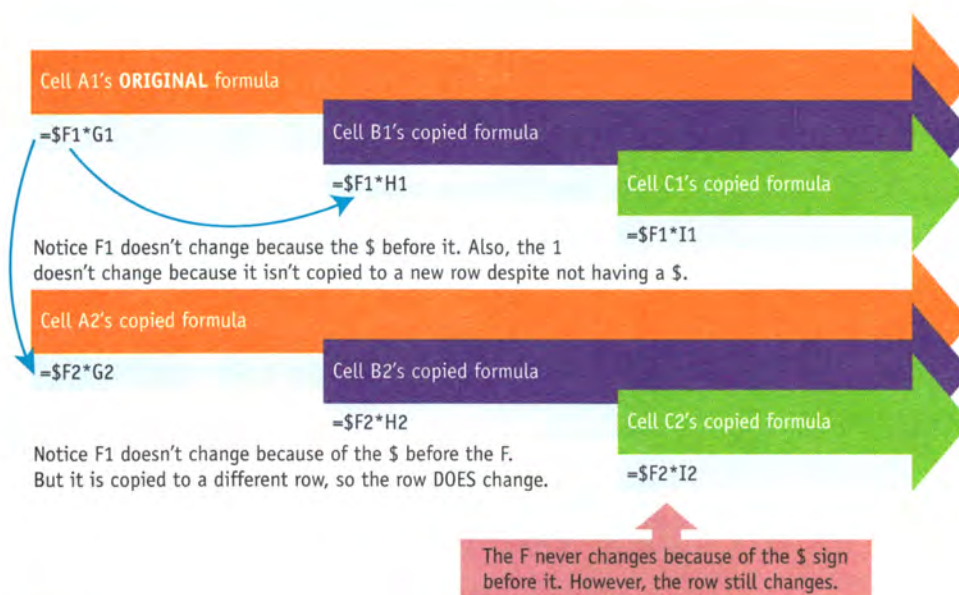


Figure 5 Understanding mixed cell referencing

REAL WORLD ADVICE

Layout of a Spreadsheet Model

Think of a spreadsheet model as an interactive report. Some of the data is static and may not change often, if ever. Some of the data, as in the Wedding Planning workbook, will need to change with each use of the spreadsheet. It can be helpful to color-code cells so anyone using the spreadsheet can easily see which cells require a change and which should be left alone. For example, in the Wedding Planning workbook cells with a blue fill are cells that need to be updated from one event to another.

If you need to verify that the formula has the correct relative and absolute referencing after it has been copied or moved into other cells within the spreadsheet, a quick and easy verification is to examine one of the cells in edit mode. Best practice dictates following these steps:

1. Double-click a cell containing the formula to enter edit mode.
2. In edit mode, notice the color-coded borders around cells match the cell address references in the formula. Using the color-coding as a guide, verify that the cell(s) are referenced correctly.
3. If the referencing is incorrect, notice which cells are not referenced correctly.
4. Exit out of edit mode by pressing **[Esc]** and returning to the original formula.
5. Edit the cell references, and then copy the corrected formula again.
6. Always recheck the formula again to see if your correction worked when copied into other cells or cell ranges.

Repeat this process as needed. Instead of typing the dollar signs within your cell references, **[F4]** can be used to change the type of cell referencing. If the insertion point is placed within a cell reference in your formula, press **[F4]** one time and Excel will insert dollar signs in front of both the row reference and column reference. If you press **[F4]** again, Excel places a dollar sign in front of the row number only. If you press **[F4]** a third time, Excel places a dollar sign in front of the column reference and removes the dollar sign from the row reference. Pressing **[F4]** a fourth time returns the cell to a relative reference.

QUICK REFERENCE

Using **F4**

F4 can be used to change the type of cell referencing.

1. Press **F4** one time to place a \$ in front of both the column and row value (absolute reference).
2. Press **F4** a second time to place a \$ in front of the row value only (mixed reference).
3. Press **F4** a third time to place a \$ in front of the column value only (mixed reference).
4. Press **F4** a fourth time to remove all \$ characters (relative reference).

In this exercise you will update the range B18:E20 to include formulas that calculate the price of individual items included in each basket type using mixed cell referencing.

E03.03



To Use Mixed Cell Referencing

- a. Click the **GiftBaskets** worksheet, and then click cell **B18**.
- b. Type **=B9*B\$15** and then press **Ctrl+Enter**.
- c. Click the **AutoFill handle** on cell **B18**, and then drag down to copy the formula to cell **B20**.

Notice that the formula in cell B20 still refers to cell B15. The dollar sign in front of the row heading forces Excel to use row 15 as the referenced row no matter where the formula is copied to. However, the column will change as the formula is copied to the left or right in the worksheet.

- d. With range **B18:B20** still selected, click the **AutoFill handle** on cell B20, and then drag to the right to copy the formulas to the range **E18:E20**. Notice that as the formulas are copied column B changes while the row reference to row 15 remains unchanged as the formula is copied to the range.

Formula with mixed cell reference for cell B15

Formula copied across range

Quote for Customized Gift Baskets					
Customized Baskets	Description of Custom Basket	Bulk Discount			
Basket 1	Attendees' Unwind and Renew	10%			
Basket 2	Wedding Party Pamper Yourself				
Basket 3	Parents of the Bride and Groom Stress Free				
# of Items per Basket	Lavendar Candle	Chamomile Body Lotion	Foot Renew Cream	Soothing Bath Salts	Items Per Basket
Basket 1	2	1	1	0	4
Basket 2	2	2	2	2	8
Basket 3	3	2	2	4	11
Item Price List	Lavendar Candle	Chamomile Body Lotion	Foot Renew Cream	Soothing Bath Salts	
Retail Price	\$ 4.99	\$ 7.99	\$ 5.99	\$ 8.99	
Price After Bulk Discount	\$ 4.49	\$ 7.19	\$ 5.39	\$ 8.09	
Price Per Basket	Lavendar Candle	Chamomile Body Lotion	Foot Renew Cream	Soothing Bath Salts	Per Basket Price
Basket 1	\$ 8.98	\$ 7.19	\$ 5.39	\$ -	\$ 21.56
Basket 2	\$ 8.98	\$ 14.38	\$ 10.78	\$ 16.18	\$ 50.34
Basket 3	\$ 13.47	\$ 14.38	\$ 10.78	\$ 32.36	\$ 71.00
Basket Orders	Baskets Requested	Basket Subtotals			

Figure 6 Mixed cell referencing

- e. Click cell **E14**, type **11.99** and then press **Enter**.

Notice that the values in cells E19:E20 have been updated. For reference, E20 previously displayed \$32.36; now it displays \$43.16.

- f. **Save**  your workbook.

CONSIDER THIS | Cell Referencing

In cell B18 of the GiftBaskets worksheet the formula uses mixed cell referencing by referring to cell B\$15. Would there have been a different result if absolute referencing would have been used? Would there have been a different result if relative referencing had been used? Why would these options be incorrect?

REAL WORLD ADVICE

Building for Scalability

When you develop a spreadsheet you should consider the potential for the model to expand. A good spreadsheet model allows the user to add more data as needed. Instead of assuming current conditions will never change, your spreadsheet should be built to accommodate growth. While developing the model, you may consider using hypothetical data so you can see how the model will look when it has real data.

QUICK REFERENCE

Understanding Referencing Based on Copy Destination

Cell references in a formula can change when copied. To understand where to put a \$ sign, you must understand how the cell references will change when copied. Excel determines what to change by the original location and the copy destination. Remember, the \$ locks down the letter or number it precedes so it will not change.

Original Location	Copy Destination	Column Becomes	Row Becomes	Considerations
A1	Formula will not be copied.	N/A	N/A	Cell referencing is irrelevant.
A1	A5	The column references will not change.	The row references will change by 4 rows.	Adding a \$ sign before the column is irrelevant. Add a \$ before the row if the row should not change.
A1	C1	The column references will change by 2 columns.	The row references will not change.	Add a \$ before the column if the column should not change. Adding a \$ before the row is irrelevant.

(Continued)

QUICK REFERENCE

Understanding Referencing Based on Copy Destination (Continued)

Original Location	Copy Destination	Column Becomes	Row Becomes	Considerations
A1	C5	The column references will change by 2.	The row references will change by 4.	Since both the column and row references will change, add a \$ before any references that should not change.

Create Named Ranges

Once you are comfortable working with formulas and cells there is a natural progression to using named ranges and functions. A **named range** is a group of cells that have been given a name that can then be used within a formula or function. Named ranges are an extension of cell references and provide a quick alternative for commonly used cell references or ranges.

Spreadsheet formulas that use cell references such as `=C5*C6` may be easy to interpret when simple. However, as the size and complexity of the workbook increases, so does the difficulty and time needed to incorporate cell references in formulas. This is especially the case with workbooks that use multiple worksheets. The use of named ranges enables a developer to quickly develop formulas that make sense. It also increases the legibility of formulas to other individuals using the same workbook. For example, the formula `=SUM(BasketSubtotals)` is much easier to interpret than `=SUM(C23:C25)`. You can quickly understand the formula if it is written with assigned names you designate.

Creating Named Ranges Using the Name Box

Named ranges are easy to create as you develop a spreadsheet. A named range can be either a single cell or a group of cells. Most named ranges are groups of cells used within multiple formulas. A simple way to name a range is to select the range and use the Name Box to create the name. This allows for a custom name to be given to the range. When naming ranges, a descriptive name should be used for the range being named. Named ranges do have some restrictions for the types of characters that can be used. Named ranges cannot start with a number, cannot contain spaces, and the name cannot resemble a cell reference.

QUICK REFERENCE

Conventions for Naming Ranges

Below is a list of conditions that must be met when creating named ranges.

1. Names for ranges must start with a letter, an underscore (`_`), or a backslash (`\`).
2. Create names that provide specific meaning to the range being named.
3. Spaces cannot be used while creating a named range. Instead use an underscore, a hyphen character, or capitalize the first letter of each word. For example, `HairStyles`.
4. Do not use combinations of letters and numbers that resemble cell references.

In this exercise you will create a named range using the Name box. This named range can then be used in future calculations as an absolute cell reference.

E03.04



To Create a Named Range Using the Name Box

- Click the **GiftBaskets** worksheet, and then select the range **C23:C25**.
- Click in the **Name** box to select the existing text. Type **BasketSubtotals** and then press **Enter** to create a new named range. Notice that when the range C23:C25 is selected the text **BasketSubtotals** will be displayed in the Name box.

SIDE NOTE

Selecting a Range

The name box will display a list of all named ranges in a workbook. Click any named range in the name box to select that range in a sheet.

Named range displayed in Name box

Price Per Basket	Lavendar Candle	Chamomile Body Lotion	Foot Renew Cream	Soothing Bath Salts	Per Basket Price
Basket 1	\$ 8.98	\$ 7.19	\$ 5.39	\$ -	\$ 21.56
Basket 2	\$ 8.98	\$ 14.38	\$ 10.78	\$ 21.58	\$ 55.73
Basket 3	\$ 13.47	\$ 14.38	\$ 10.78	\$ 43.16	\$ 81.80

Basket Orders	Baskets Requested	Basket Subtotals
Basket 1	50	\$ 1,078.20
Basket 2	8	\$ 445.82
Basket 3	2	\$ 163.60

Total Baskets in Order	10
Total Billing Amount	
Prepared for:	Keller - Ryan Wedding

Figure 7 Name range applied to C23:C25

Troubleshooting

If you click outside of the Name Box before pressing **Enter**, the named range will not be created.

- Save** your workbook.

Modifying Named Ranges

If a named range has been created incorrectly it can be redefined by selecting the correct data and naming the range again. Alternatively, the Name Manager can be used to modify an existing range or to view a list of already defined ranges. The **Name Manager** can be used to create, edit, delete, or troubleshoot named ranges in a workbook.

Currently the range **BasketsRequested** only includes gift basket option 2 and 3. In this exercise you will modify a named range that was previously created in the workbook.

E03.05



To Modify a Named Range

- Click the **GiftBaskets** worksheet, click the **Name** box arrow, and then click **BasketsRequested**.
Notice that the range selected is B24:B26. This is the incorrect range. The correct range is B23:B25.
- Click the **FORMULAS** tab, and then in the Defined Names group, click **Name Manager**.

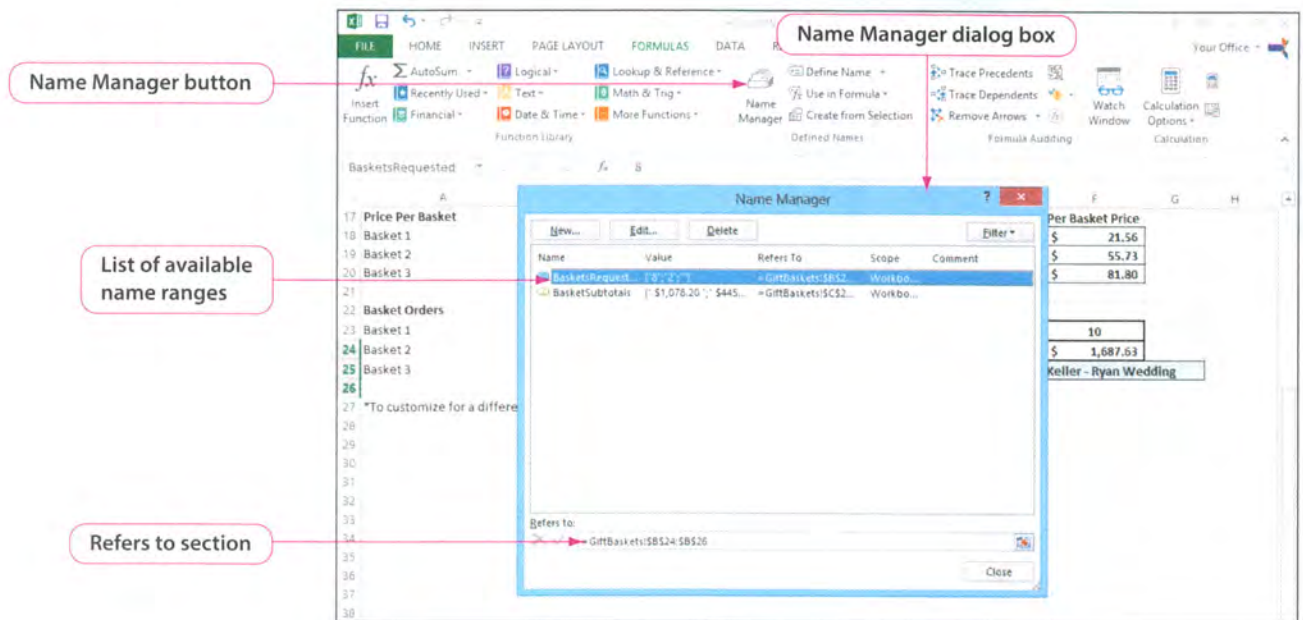


Figure 8 Name Manager

- c. From the displayed list of names, click **BasketsRequested**, and then in the Refers to box, select the text **\$B\$24:\$B\$26**.
- d. Type **\$B\$23:\$B\$25**, click **Close**, and then click **Yes** to accept the changes to the named range.
- e. Click the **Name** box arrow, and then click **BasketsRequested**.
Notice that the correct range, B23:B25, is now selected.
- f. **Save** your workbook.

Using Named Ranges

Using named ranges in place of cell references is a simple process. Instead of typing the cells that you want to use in a formula, you can type the range name you have created. Excel will begin to recognize the name you are typing and offer to automatically complete the name for you. Another method of using named ranges is to use the Paste Name feature in Excel. While typing a formula you can press **F3** to view a list of named ranges in the workbook and then insert it into the formula you are constructing.

Meda has requested that the worksheet display the total amount that the wedding party is to be billed for the gift baskets being made. In this exercise you will use a named range to create a calculation to display the total price of the requested gift baskets in the worksheet.

E03.06



To Use Named Ranges in a Formula

- a. Click the **GiftBaskets** worksheet, and then click cell **F24**.
- b. Type **=SUM(B** and then notice that a list of functions and named ranges beginning with the letter "B" appear in a list.
The named ranges appear with a next to the name of the range. The functions have to the left of the function name.

- c. Type **ask**, press **↓**, and then press **Tab** to select the **BasketSubtotals** named range. Press **Ctrl**+**Enter** to complete the formula.
- d. **Save** your workbook.

Creating Named Ranges from Selections

At times your worksheet's data will be organized in such a way that the names for your ranges exist in a cell in the form of a heading, either for each row or each column in the data set. Rather than selecting each row or column separately in a time-consuming process, you can use the Create from Selection method.

The Create from Selection method is a process that produces multiple named ranges from the headings in rows, columns, or both, from the data set. The key element is to realize that the names for the ranges need to exist in a cell adjacent to the data range. Most commonly, these names are column headers that make for very convenient names for each column of data.

In this exercise you will create named ranges for the item subtotals for each type of gift basket. You will then apply the named ranges to the formulas in cells F18:F20.

E03.07



To Create Named Ranges and Apply the Names to Formulas

- a. Click the **GiftBaskets** worksheet, and then select the range **A18:E20**.
- b. On the **FORMULAS** tab, in the Defined Names group, click **Create from Selection**.

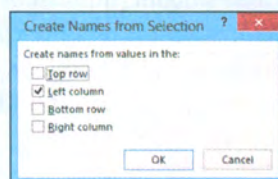


Figure 9 Create from Selection dialog box

- c. Confirm that the **Left column** check box is selected, and then click **OK**.
- d. Select the range **B18:E18**.
Notice that the Name box displays the name **Basket_1**. In creating the named range Excel substituted all space characters in the name with underscore characters. Ranges B19:E19 and B20:E20 will appear similarly.
- e. Select the range **F18:F20**, and then in the Defined Names group, click the **Define Name** arrow, and then click **Apply Names**. Notice that Excel has detected three potential named ranges that can be substituted into the formulas in the selected range.

SIDE NOTE

Create from Selection

After selecting the range of data you wish to name, the keyboard shortcut **Ctrl**+**Shift**+**F3** will create a single or multiple named ranges from the selection.

Apply Names dialog box

Names detected in selected cells

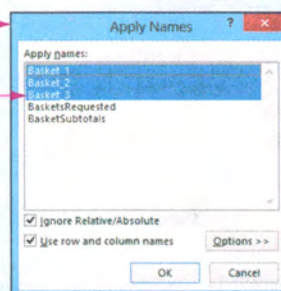


Figure 10 Apply Names dialog box

- f. Click **OK**. Notice that the formula in cell F18 now reads =SUM(Basket_1).
- g. **Save**  your workbook.

REAL WORLD ADVICE

When to Use Named Ranges

Like any useful feature, Named ranges can be overused. Named ranges make it easy to understand formulas and can be used to select a range of cells quickly. However, you must invest time and effort to create and use the named ranges. Named ranges have the most value when sets of data are used in multiple formulas or when other users need to understand the construction of the spreadsheet. Not every cell or range in your workbook needs to be a named range. If you need a formula to copy across a range of cells with the references remaining relative, named ranges are not the best option. You should do a mental cost-benefit analysis to ensure it is worth the time and effort. Your decision on when to use named ranges will become easier with practice and experience.

Understanding Functions

A **function** is a named calculation where Excel calculates the output based on the input provided. These can be fairly simple such as using the SUM function that adds any cell address range as input. Conversely, functions can be more complex. For example, calculating a monthly loan payment is accomplished by indicating various arguments—the loan amount, number of payments, and interest rate. **Arguments** are any inputs used by a function to compute the solution. As long as you have the correct inputs, Excel will perform the calculation for the function. In this section, you will use common business functions to continue building the worksheet module used for planning events at the Turquoise Oasis Spa.

Create and Structure Functions

Functions are composed of several elements and need to be structured in a particular order. When discussing functions, you need to be aware of the syntax of an Excel function. The **syntax** is the structure and order of the function and the arguments needed for Excel to perform the calculation. If you understand the syntax of a function, you can easily learn how to use new functions quickly. The syntax for a function is represented in Figure 11.

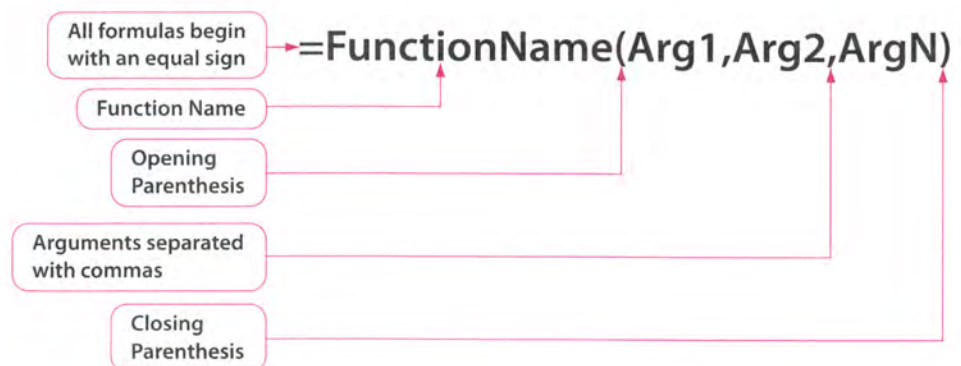


Figure 11 Syntax of a function

The FunctionName is any function that is in the Excel library. Examples are SUM, COUNT, and TODAY. With all functions, a pair of parentheses () are required after the FunctionName that may contain arguments associated with the function. Functions such as SUM() have one or more arguments that are required. If the required argument(s) are not supplied an error will occur. Some functions, like TODAY() do not have any arguments. These functions do not need any inputs to be able to generate output. The TODAY() function simply uses the clock on the computer to return the current date. Even though there are no arguments needed, the () parentheses are always included, which helps Excel understand that a function is being used.

Arguments can either be required or optional. The required arguments always come before any optional arguments. All arguments are separated with commas. Optional arguments are identified with square brackets [] around the argument name. You never type the square brackets into the actual construction of the function. They are only used to inform you that the argument is optional.

For example, the syntax for the SUM function is:

=SUM(number1, [number2], ...)

The first argument is required; the SUM function must have a number, cell, or range to begin the calculation. The second argument—a second cell or range—is optional. Notice that the second argument uses square brackets to identify that it is optional. The periods following the second argument indicate that one or more arguments can be added as needed. The SUM function can hold up to 255 arguments.

Arguments, like variables in a math equation, need to be appropriate values that are suitable for the function. With Excel, the acceptable values can take six common forms, including other functions, as shown in Table 1.

Form of Input	Example	Explanation
Numeric value	5	Type the value
Cell reference	C5	Type the cell or range of cells
Named range	SALES	Type the name of the range
Text string	"Bonus"	Type the text with quotes " " so Excel will recognize it as a text string rather than a named range
Function	SUM(C5:C19)	Type a function following the correct syntax of the function name, pair of parentheses, and any arguments
Formula	(C5+D5)/100	Type the formula following correct mathematical formula structure

Table 1 Function argument formats

Functions are typically categorized for easy access. The primary categories are shown in Table 2. Functions can be found in the Formulas tab under these categorical names. They can also be searched to find the usage and syntax of functions that are unfamiliar.

Category	Description
Compatibility	A set of functions that are compatible with older versions of Excel
Cube	Working with data and filtering, similar to pivot tables
Database	Performing calculations in Excel on data that meets specific criteria
Date & Time	Working with serial date and time values
Engineering	Working with engineering formulas and calculations
Financial	Working with common financial formulas
Information	Providing data about cell content within a worksheet
Logical	Evaluating expressions or conditions as being either true or false
Lookup & Reference	Working with indexing and retrieving information from data sets
Math & Trig	Working with mathematics
Text	Working with text strings
Statistical	Working with common statistical calculations
User Defined	Working with functions created by the user or by third-party add-ins
Web	Working with URL, XML, and web services connections

Table 2 Function categories

Use and Understand Math and Statistical Functions

At the most fundamental level, spreadsheets are used to perform calculations. These calculations may result in loan payments, GPA calculations, profit margins, or even age calculations. Excel has a large array of functions available for simple and complex mathematical functions. There are functions available to sum, count, perform algebra or trigonometry, and create a wide range of statistical calculations.

Using Math and Trig Functions

The math and trigonometry functions are useful for various numerical manipulations. For example, there are several functions that round data in a cell or calculation. The **ABS function**, for example, returns the absolute value of the number analyzed by the function. A cell or calculation resulting in the number -4 would be returned as 4 by the **ABS function**. The **INT function** rounds down any decimal values associated with a number to the nearest whole number. The **ROUND function** is important when you want to round a number to a specific number of digits. The **ROUND function** can round values to the left or right of the decimal in a number. For example, using the **ROUND function** you could change the number 115.89 to 116 by rounding to the ones place. You could also display 120 by rounding to the integer value to the tens place. While **ROUND** will round to the nearest digit, **ROUND DOWN** and **ROUND UP** can be used to force the rounding in a particular direction. Commonly used math functions are shown in Table 3.

When a function is used to round data, the result of that function is used in future calculations. This is different from formatting a cell to a specific number of decimal places as formatting does not change the underlying data.

Function	Usage
ABS(Number)	Returns the absolute value of a number
INT(Number)	Rounds a number down to the nearest integer
RAND()	Returns a random number from 0 to less than 1
RANDBETWEEN(Bottom,Top)	Returns a random integer between the numbers you specify
ROUND(Number,Num_digits)	Rounds a number to a specified number of digits
ROUNDDOWN(Number,Num_digits)	Rounds a number down to a specified number of digits
ROUNDUP(Number,Num_digits)	Rounds a number up to a specified number of digits

Table 3 Commonly used math functions

There are two common methods for creating functions: by using the Function Arguments dialog box and by typing the function in the cell. The **Function Arguments** dialog box provides additional information and previews results of the formula being constructed. When first developing the skills for using functions in Excel, the Function Arguments dialog box can be very valuable. As more experience with functions are gained, the Function Arguments dialog box may become less useful, particularly when nesting multiple functions together.

Meda has received some historical data on wedding events that she would like to have summarized. When planning new events, this historical data will be helpful to refer to. The data contains four items of interest:

1. The number of days spent by wedding parties at the Painted Paradise Resort and Spa—the value was previously calculated used decimals based on check-in and checkout times. Meda would like this data to be in integers or whole number of days. Since wedding parties receive a late checkout time, these values would need to be rounded down to the nearest whole number.
2. The price of merchandise that was returned after the wedding took place—the price in the column represents the money refunded to customers for the merchandise. The system used at the spa erroneously allowed employees to enter some of this data as a negative value or as a positive value. This data must be displayed as positive values.
3. Data displaying the amount spent in total by each wedding party at the Turquoise Oasis Spa—the average of this column has been calculated in the WeddingSummary worksheet cell C2. Currently, the average is formatted to display too many decimal places. However, the actual value of the cell has many more than two decimals. Meda plans to use this average in subsequent calculations. Formatting the cell to two decimals will not change the value of the cell. Thus, the value needs rounded to two decimals.
4. Data indicating whether the bridal party from the wedding is a member of the spa—the system used by the spa indicates a 1 for spa members and a null value for nonmembers. When this data was imported into Excel the result for nonmembers was the text “Null”.

E03.08



To Use the INT and ABS Functions

SIDE NOTE

Alternate Method

Instead of typing B9 in the Function Arguments dialog box, you can click cell B9. The cell reference will be supplied automatically.

- Click the **WeddingSummary** worksheet, and then click cell **C9**.
- To the left of the formula bar, click **Insert Function** . Click the **Or select a category** arrow, and then select **Math & Trig**.
- In the **Select a function** box, scroll down, click **INT**, and then click **OK**.
- Type **B9** and notice that to the right of the dialog box, you see the value currently in cell B9. Under the current value you will see a preview of the result of the INT function.

Insert Function button

Required arguments are bold

Description of function

Value in currently referenced cell

Formula result

Description of argument

Most Frequent Length of Stay	Average Amount Spent at Spa	Median Amount Spent at Spa	Number of Weddings	Spa Members Scheduling Wed
Arroyo	874.6993548			
Proctor				
Minor				
Pearce				
Shea				
Galvan				
Crowe				
Meeks	2.45	47.7		
Kendrick	3.65	10.24		

Figure 12 Function Arguments dialog box

- Click **OK**, and then double-click the **AutoFill handle** to copy cell **C9** down to **C39**.
Notice the values in column B have now been rounded down to the nearest whole number. Illustratively, the value of cell C24 is 4.00 even though the value in cell B24 is 4.50. Since all of the values are now whole days without a decimal value, the format for C9:C39 needs to have decimals decreased to zero decimals.
- With the range **C9:C39** selected, click the **HOME** tab, and then in the Number group, click **Decrease Decimal** twice.
- Click cell **E9**, and then click **Insert Function** . If necessary, click the **Or select a category** arrow, and then select **Math & Trig**.
- In the **Select a function** box, click **ABS**, and then click **OK**.
- In the **Function Arguments** dialog box, in the **Number** box, type **D9** and then click **OK**. Double-click the **AutoFill handle** to copy cell **E9** down to **E39**. All values in column D now appear as positive numbers.
- Save** your workbook.

SIDE NOTE

Function Help

Click the Help on this function link in the lower left of the Function Arguments dialog box to open Excel Help for the function being used.

CONSIDER THIS | Exploring Functions

Use the Insert Function button in the formula bar to find a function with which you are not familiar. Read the description for the function in the Insert Function dialog box. Use Microsoft Help or the Internet to learn more about the function, and share it with another person. Did you have any trouble understanding the function? Is the Insert Function button a useful tool for exploring new functions?

Inserting a Function Using Formula AutoComplete

Functions can also be constructed without using the Function Arguments dialog box. This is accomplished by typing the equal sign and typing the function name directly into the cell. Excel will still provide guidance using this method. Additionally, as needed, you can always enter the Function Arguments dialog box to get more assistance.

When you initially type in the beginning of a function name, the Formula AutoComplete listing of functions will be shown from which you can select the appropriate function. Formula AutoComplete will provide a list of functions and named ranges that match the text following the equal sign. The list will automatically reflect changes as you type in more letters. Excel will even display a short description of the function when the function name is highlighted. As the function names appear you can use $\downarrow$, $\uparrow$, $\rightarrow$, $\leftarrow$, or your mouse to move through the listing. To select a function, press **Tab** or double-click the selected function.

Once the function is selected, the arguments will be listed in a movable tag, called a ScreenTip, to provide guidance in completing the function. The argument you are currently editing will be displayed in bold. If you have entered some of the arguments, you can click the argument in the ScreenTip, and Excel will relocate the insertion point to that argument. In this exercise you will insert the ROUND function using Formula AutoComplete.

E03.09



To Insert a Function Using Formula AutoComplete

- Click the **WeddingSummary** worksheet, and then double-click cell **C2** to begin editing the function.
- Click after the **equal sign** to place the insertion point before the AVERAGE function. Type **ROUND(** to begin the new function.
Notice how the Formula AutoComplete suggested possible functions while you typed "round". Also, notice that the number argument is shown in bold font to indicate that this is the argument being edited.
- Point to the **left edge** of the ScreenTip box, and then drag the ScreenTip to the right of cell **C2**.

SIDE NOTE

Formula AutoComplete

To reduce typing and possible errors, you can use the arrow keys or the mouse to select functions from the Formula AutoComplete list.

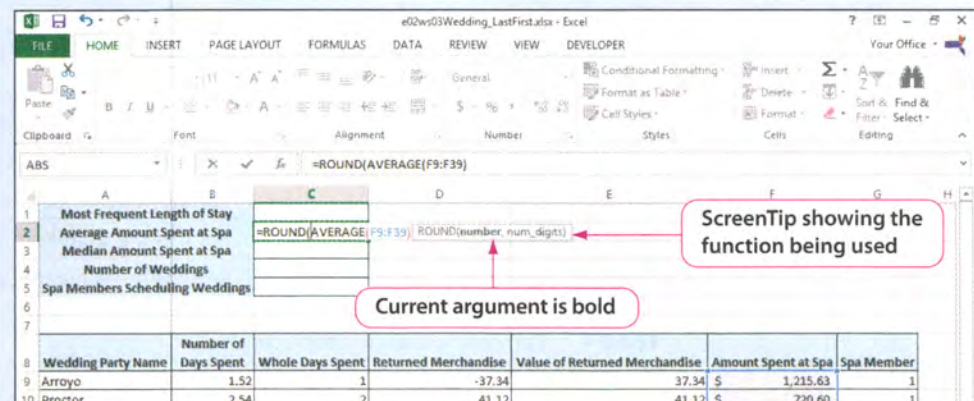


Figure 13 ScreenTip showing the ROUND function

- d. Click after the **ending parenthesis** for the AVERAGE function, type , and then notice the num_digits argument of the ROUND function is in bold.
- e. Type 2) to complete the num_digits argument. This will round the result of the AVERAGE function to two decimal places.
- f. Press **Ctrl+Enter**.
 Notice that the value in cell C2 is now \$874.70, or rounded to two decimal places. Importantly, if you had formatted cell C2 to display only two decimal places, the cell would also show \$874.70 on the screen. However, formatting does not change the value. So, even though the cell would show \$874.70, the cell value used in subsequent mathematical calculations would still be \$874.699355. If you increase the number of decimals for cell C2 after using the ROUND function, you will see the cell value is changed to \$874.700000.
- g. **Save**  your workbook.

REAL WORLD ADVICE

Rounding vs. Formatting

Formatting text as currency will only give the appearance of true rounding. Any calculations using a cell formatted as currency but containing extra decimal places will include all decimal places in the calculation. Using the ROUND function will eliminate extra decimal places. Thus, future calculations will use the value displayed as a result of the ROUND function.

Using Statistical Functions

Similar to mathematical functions, statistical functions, as shown in Table 4, handle common statistical calculations such as averages, minimums, and maximums. Statistical functions are extremely useful for business analysis as they aggregate and compare data. Common descriptive statistics are used to describe the data. The average, median, and mode are common descriptive statistics that help describe the nature of a data set. They help understand and predict future data.

Statistical Functions	Usage
AVERAGE(Number1,[Number2],...)	Returns the mean from a set of numbers
COUNT(Value1,[Value2],...)	Counts the number of cells in a range that contain numbers
COUNTA(Value1,[Value2],...)	Counts the number of cells in a range that are not empty
COUNTBLANK(Range)	Counts the number of empty cells in a range
MEDIAN(Number1,[Number2],...)	Returns the number in the middle of a set of numbers
MAX(Number1,[Number2],...)	Returns the largest number from a set of numbers
MIN(Number1,[Number2],...)	Returns the smallest number from a set of numbers
MODE.SNGL(Number1,[Number2],...)	Returns the value that occurs most often within a set

Table 4 Commonly used statistical functions

The **MEDIAN** function is used to measure the central tendency or the location of the middle of a set of data. For example, in a range from 1 to 3, 2 would be the middle of the data or the median. Another measure commonly used to locate data in a range is mode. There are three methods for calculating the mode of a range of data in Excel 2013. The **MODE.SNGL** function returns the most frequently occurring value in a range of data. If more than one number occurs multiple times in a range of data, the **MODE.MULT** function can be used to return a vertical array, or list, of the most frequently occurring values in a range of data.

The **MODE** function, like **MODE.SNGL**, returns the most frequently occurring value in a range of data. It is important to note that in Excel 2010 this function was replaced by **MODE.SNGL** and **MODE.MULT**. The **MODE** function is still available in Excel 2010 and 2013 to provide backwards compatibility with earlier versions of Excel. Because of this, the function will appear in the Formula AutoComplete menu with a warning icon  next to it.

The **COUNTA** function is useful for counting the number of cells within a range that contain any type of data. This is distinct from the **COUNT** function that only counts cells in a given range that contain numeric data. Using **COUNTA** is a great method to count the number of records in a data set. On the **WeddingSummary** worksheet column G contains a list of whether or not the bridal party was a member of the spa. When the data was imported into Excel the system used by the spa marked members with the number one. Nonmembers were marked with the text "Null".

E03.10



To Use Statistical Functions

- a. Click the **WeddingSummary** worksheet, and then click cell **C1**.
- b. Type **=MODE.SNGL(C9:C39)** and then press **Ctrl+Enter**.
Cell C1 now displays the most frequently occurring number of days stayed by a wedding party, 4.
- c. Click cell **C3**, type **=MEDIAN(F9:F39)** and then press **Enter**.
Cell C3 now displays the median amount spent by wedding parties at the spa, \$899.77, representing the middle value as compared to the data for the average amount spent at the spa.
- d. Click cell **C4**, type **=COUNTA(A9:A39)** and then press **Enter**.
The **COUNTA** function counts all of the cells in the range A9:A39 to display the 31 wedding parties represented in the data.
- e. Click cell **C5**, type **=COUNT(G9:G39)** and then press **Ctrl+Enter**.
The **COUNT** function counts the numbers occurring in column G. Notice that since the only values in column G are numbers, **COUNTA** would also work in this instance.
- f. **Save**  your workbook.

Use and Understand Date and Time Functions

Date and time functions are useful for entering the current day and time into a worksheet as well as calculating the intervals between dates. This category of functions is based on a serial date system where each day is represented sequentially from a starting point. In Microsoft applications, that standard is 1/1/1900, which has a serial number of 1. Thus, dates prior to that will not be recognized by the system. Interestingly, when Apple initially made its starting point, it began in 1904. Excel settings can be changed to use the Apple starting point, but it is generally accepted practice to keep the default setting of 1/1/1900 as the starting point. Using two different starting points for dates in Excel spreadsheets can cause significant problems. Common date and time functions are shown in Table 5.

Function	Usage
DATE(Year,Month,Day)	Returns the number that represents the date in Microsoft Excel date-time code
DATEDIF(Date1,Date2,Interval)	Returns the time unit specified between two dates, including the two dates (inclusive)
DAY(Serial_number)	Returns the day of the month, a number from 1 to 31
MONTH(Serial_number)	Returns the month, a number from 1 to 12
NETWORKDAYS(Start_date,End_date,[Holidays])	Returns the number of whole workdays between two dates, inclusive; does not count weekends and can skip holidays that are listed
TODAY()	Returns the computer system date
WEEKDAY(Serial_number,[return_number],[Return_type])	Returns a number from 1 to 7 representing the day of the week. Can be set to return 0–6 or 1–7
WEEKNUM(Serial_number,[Return_type])	Returns the week number in the year, which week of the year the date occurs
YEAR(Serial_number)	Returns the year of a date, an integer in the range 1900–9999

Table 5 Common date functions

CONSIDER THIS

Dates in Microsoft Applications

Do you suppose the same Microsoft employees developed Access, Excel, Word, and PowerPoint? Is it possible that even within a company, there may have been differences in the starting date? Does Access use the same 1/1/1900 for its date starting point? See if you can find out.

Using Date and Time Functions

Excel tracks time by the number of days that have occurred since 1/1/1900. Time is represented by the decimal portion of this number. The decimal is based on the number of minutes in a day ($24 \times 60 = 1440$). Thus, a 0.1 decimal is equal to 144 minutes. A full date and time value—such as 5/14/2015 8:35 AM—would appear as 42138.35804. There are 42138 days between 1/1/1900 and 5/14/2015. The time of 8:35 AM is represented by the .35804 portion of the number.

The TODAY and NOW functions are two common functions for inserting the current date into a spreadsheet. There is a slight—but significant—difference between the TODAY and NOW functions. The key difference is that the **TODAY** function simply puts in the current date while the **NOW** function puts in the current date and time. If you think about it, the TODAY function only works with integer representation of days while the NOW function uses decimals to include the time in addition to the day. Both functions can be formatted to show just the date, and you can work with time calculations that mix the two functions. Common time functions are listed in Table 6.

Function	Usage
HOUR(Serial_number)	Returns the hour in a time value, from 0 to 23
MINUTE(Serial_number)	Returns the minute in a time value, from 0 to 59
MONTH(Serial_number)	Returns the month, a number from 1 to 12
SECOND(Serial_Number)	Returns the number of seconds in a time value, from 0 to 59
NOW()	Returns the computer system date and time

Table 6 Common time functions

REAL WORLD ADVICE

NOW vs. TODAY

Be careful using NOW versus TODAY, especially when doing date calculations. Both functions use a serial number, counting from 1/1/1900. But, the NOW function also includes decimals for the time of day while TODAY works with integer serial numbers. At noon, on 5/1/2015 the NOW function has the value of 42125.5 while the TODAY function has a value of 42125.0. If you are using these date functions inside another function this could change the result if you are comparing a date the user provided. It is suggested to use the TODAY function if a user will be inserting the date into Excel by hand so the hand-typed value will be compared or used in a calculation with the function, eliminating the decimal issue.

DATEDIF is a useful date function because it enables you to calculate the time between two dates. The function can return the time unit as days, months, or years. However, while all the other functions are listed and can be found in Excel, Help and the Function Library do not offer any information about the DATEDIF function. You will not find any information on the DATEDIF function unless you search the Microsoft site. Since no information exists on it within Excel, this is one function that you must hand type and do the research to understand the syntax. Nonetheless, DATEDIF is one of the more useful date functions.

The syntax of the function is as follows:

=DATEDIF(Date1, Date2, Interval)

The first argument is the starting date in time—the older date—while the second argument is the ending date in time—the newer, more recent date. It may be helpful to remember that time lines are usually depicted as moving left to right, just as they would be listed in the DATEDIF function. The third argument is the interval that should be used, like the number of months or days between the two dates. The unit is expressed as a text value and therefore must be surrounded by quotes for correct syntax. The viable unit value options are shown in Table 7.

Unit Value	Description
"D"	Returns the number of complete days between the dates
"M"	Returns the number of complete months between the dates
"Y"	Returns the number of complete years between the dates
"MD"	Returns the difference between days in two dates, ignoring months and years
"YM"	Returns the difference between months in two dates, ignoring days and years
"YD"	Returns the difference between days in two dates, ignoring years

Table 7 Unit value options for DATEDIF

The options "D", "M", and "Y" are commonly used to calculate differences between dates. For example, using "Y" for the Interval argument is common practice for calculating an age. The options "YM", "YD", and "MD" are not as commonly used because they ignore certain aspects of the date structure. For example, using "YM" for the Interval argument with the dates 7/1/2014 and 9/12/2015 will result in a value of 2. This is because the "YM" unit value ignores the years in the two dates and only calculates the number of whole months between July (7) and September (9). Using "M" in the Interval argument will result in the value 14, the more commonly expected result.

Meda has asked for your help in completing an analysis of customers in the Keller-Ryan wedding party that have requested spa services. As part of the spreadsheet model she would like the current date to appear in cell B1 and the current age of customers to appear in column C. In this exercise you will use common date functions to complete the analysis.

E03.11



To Use Date and Time Functions

- Click the **SpaServices** worksheet tab, and then click cell **B1**.
- Type **=TODAY()** and then press **[Ctrl]+[Enter]**.
Notice that cell B1 now displays the current date. Each time the worksheet is opened, or when a cell is edited, the current date will be updated and displayed in cell B1. Since the time of day is not relevant here, the TODAY function is preferred over the NOW function.
- Click cell **C5**, type **=DATEDIF(B5,TODAY(),"Y")** and then press **[Ctrl]+[Enter]**.
The TODAY function is nested inside of the DATEDIF function. Since the interval is set to year, using "Y", the result is that the age of the guest is always current in this calculation.

Troubleshooting

No ScreenTip help will appear when typing the DATEDIF function. If the DATEDIF function returns a #NUM! error the most likely problem is mixing up the order of the two dates within the function. The first date should be the earliest date and the second date the most recent one. The other common error is actually typing in a date as the argument. Typing 12/3/2015 will be interpreted as division instead of a date. The value must either be in serial date format or typed inside of quotation marks.

- Double-click the **AutoFill handle** to copy cell **C5** down to **C22**. The current ages of all guests are now displayed in column C.
- Save** your workbook.

CONSIDER THIS | Calculating Days

Since Excel uses the 1900 date system, do you really need to use the DATEDIF function to calculate the difference between days—the “D” unit? What other way could you calculate the difference? What would that formula look like?

Use and Understand Text Functions

Excel is frequently used to bring data together from multiple different locations and/or systems, including text data. Many times, the data is inconsistent from one source to another. For example, one workbook could list First Name Last Name—Olivia Stone—and the next may list names Last Name, First Name—Stone, Olivia. In situations like this, knowing how to alter text data is extremely valuable and time saving.

There are a multitude of reasons why text data in a cell may need to be altered. Names in a cell may need to be separated or combined. Several pieces of data may be stored in a single cell but need to be separated into many columns of data for easier analysis. Excel contains a wide array of functions and features that allow for the manipulation of text data. Some newer features in Excel are optimized for touch-screen devices. This makes it easier to manipulate data when using Excel on a mobile device such as a tablet computer.

Text functions can be used to change the appearance of data, such as displaying text in all lowercase letters. Text functions can also be used to cleanse text. Cleansing text involves removing unwanted characters, rearranging data in a cell, or correcting erroneous data.

Using Text Functions

Text functions help manage, manipulate, and format text data. Data stored as text is commonly referred to as a string. Text functions can change the way data is viewed, cut a string of text into multiple pieces, or combine multiple pieces of text together into one string of text. While most text functions can be used individually, they become increasingly powerful when nested together to transform text. A list of common text functions are listed in Table 8.

The **LEFT** function returns a set number of characters from the left side of a cell. The number of characters the LEFT function will return is defined in the num_chars argument. This number can be simply typed in, or it can be more dynamically calculated using other functions. The **FIND** function searches for a specified string of text in a larger string of text and returns the position number where the specified text begins. By using the FIND function in the num_chars argument of the LEFT function, a dynamic formula can be constructed to separate a portion of text from one cell into another.

Function	Usage
CONCATENATE(text1,text2,...)	Joins text1, text2,...,textn together in order into a single string value
FIND(find_text,within_text,[start_num])	Finds find_text in within_text. The search begins at start_num (start_num defaults to 1) and is case sensitive. The starting position of find_text is returned. If the find_text is not present an error will be returned.
LEFT(text,[num_chars])	Returns a string num_chars long from the left side of text
LEN(text)	Returns a number that represents the number of characters
MID(text,start_num,num_chars)	Returns a string extracted from text beginning in position start_num that is num_chars long
RIGHT(text,[num_chars])	Returns a string num_chars long from the right side of text
TRIM(text)	Returns text with any leading, trailing, or extra spaces between words removed
UPPER(text)	Returns text with all characters in uppercase
PROPER(text)	Returns text with only the first letter in uppercase, all other letters will return in lowercase
SEARCH(find_text,within_text,[start_num])	Finds find_text in within_text. The search begins at start_num (start_num defaults to 1) and is case insensitive. The starting position of find_text is returned. If the find_text is not present an error will be returned.
TEXT(value,format_text)	Returns a number value as a string with the format specified in format_text

Table 8 Common text functions

Meda has asked that you rearrange some of the data on the SpaServices worksheet. Column A contains a list of guests first and last names. To provide better customer service Meda would like the first names of the guests in a separate column that can be used later. The names in column A are arranged in a consistent format. The text in the cell begins with the guest's first name followed by a single space character. After the space character is the guest's last name. Given this format, the space character can be used by text functions to separate the first name from the last name. You will use the FIND and LEFT functions to display only the first name of the guest in column D.

E03.12



To Nest the FIND and LEFT Functions

- Click the **SpaServices** worksheet, and then click cell **D5**.
- Type **=LEFT(A5,** to begin the text function. The LEFT function will begin at the left side of cell A5 and return all characters from position 1 until the number specified by the num_chars argument.
- Type **FIND(" ",A5))** and then press **Ctrl+Enter** to complete the function.

Notice the name Olivia appears in cell D5. To separate the first name, you take advantage of the text pattern of the space. To separate text, you must identify the text pattern. The pattern must be consistent in some way to use text functions. Here the FIND function looks for the space character that separates the first and last names. For cell A5, the FIND function returns a 7 because the name Olivia contains six characters and the space after the name is the seventh character. Since you will not want to include the space character, the TRIM function can be used to remove it.

SIDE NOTE**Alternate Method**

Subtracting a 1 from the Find function returns a 6 instead of a 7. The result is the same as using TRIM.

- d. Double-click cell **D5** to begin editing the function. Click after the **equal sign** to place the insertion point before the **LEFT** function. Type **Trim(** to begin the TRIM function.
- e. Click after the last closing parenthesis. Type **)** and then press **[Ctrl]+[Enter]** to complete the TRIM function. The number of characters in cell D5 is now 6 as the trailing space character has been removed.
- f. Double-click the **AutoFill handle**  to copy cell **D5** down to **D22**. The first names of all guests are now displayed in column D.

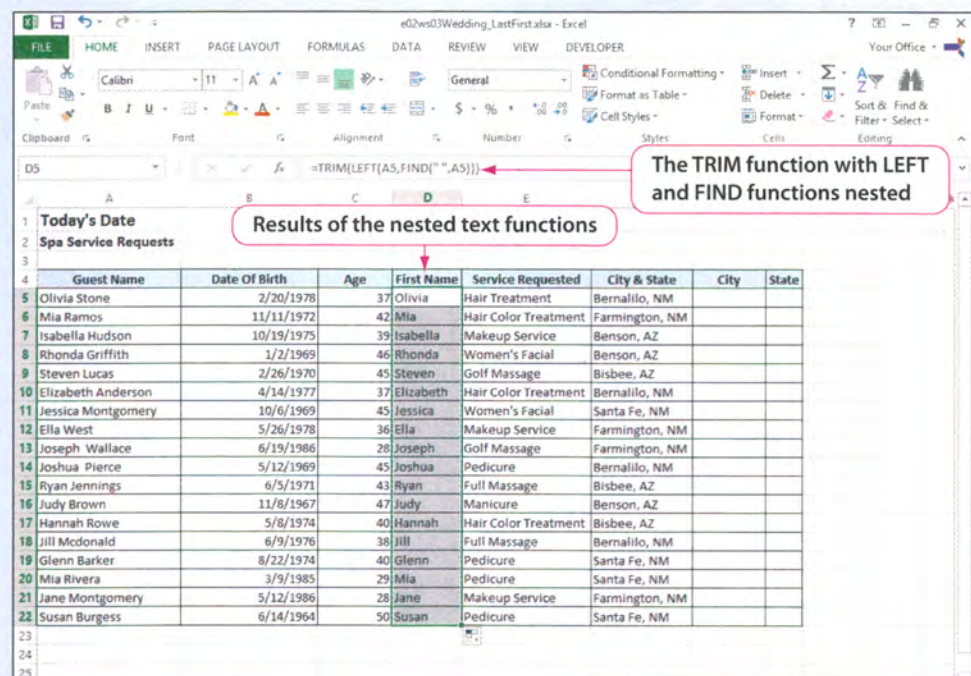


Figure 14 Result of nesting the FIND function

- g. **Save**  your workbook.

Using the Flash Fill

The Flash Fill feature in Excel 2013 makes data cleansing easier and faster than using traditional text functions. **Flash Fill** recognizes patterns in data as you type and automatically fills in values for text and numeric data. Flash Fill involves less typing than text functions, which makes it easier to use on mobile or touch-screen devices.

To work correctly Flash Fill must be completed in a column adjacent to the data being manipulated. There are two ways to use the Flash Fill. Providing two suggested values will initiate the automatic Flash Fill to a suggestion for cleansing your data. This suggestion will preview along the column adjacent to the data. Pressing **[Enter]** will accept the suggestion and populate the column of cells. Flash Fill can also be initiated on the Data tab. This is useful for cleansing data in cells that are not directly adjacent to the data or for numeric data. Flash Fill will not automatically suggest values for numeric data.

The SpaServices worksheet includes a list of the city and state of origin for each guest attending the wedding. Separating these values into individual columns will be helpful for future tasks such as counting the number of guests from each state. In this exercise you will use the Flash Fill feature to separate the guest's city and state of origin into individual columns.

E03.13



To Use Flash Fill

- Click the **SpaServices** worksheet, and then click cell **G5**.
- Type **Bernalilo** and then press **Enter** to move to cell G6.
- Type **Farmington** and notice the Flash Fill suggestion appears down the column of data. Press **Enter** to accept the suggestion.

Notice column G now contains only the city names from the list of cities and states in column F.

Troubleshooting

The Flash Fill feature requires two suggested values before it will offer a suggestion for the column of data you are in. These two suggested values must be typed in consecutive actions. If you clicked in another cell or pressed another key on the keyboard between typing "Bernalilo" and "Farmington"—Flash Fill will not offer a suggestion.

- Select cell **H5**, type **NM** and then press **Ctrl+Enter**.
Since the State column is not next to the column with the city and state text, typing a suggested value for Flash Fill will not work. Using the Flash Fill button from the DATA tab will accomplish the task of isolating the state from column F.
- Click the **DATA** tab, and then in the Data Tools group, click **Flash Fill**.
Notice column H now contains only the state abbreviations from the list of cities and states in column F. Importantly, notice that Flash Fill inserts static data. Thus, if the values in column F change, columns G and H will not be automatically updated. If you needed them to be automatically updated, you would need to use text functions.

Flash Fill button

Results of using Flash Fill

Guest Name	Date Of Birth	Age	First Name	Service Requested	City & State	City	State
Olivia Stone	2/20/1978	37	Olivia	Hair Treatment	Bernalilo, NM	Bernalilo	NM
Mia Ramos	11/11/1972	42	Mia	Hair Color Treatment	Farmington, NM	Farmington	NM
Isabella Hudson	10/19/1975	39	Isabella	Makeup Service	Benson, AZ	Benson	AZ
Rhonda Griffith	1/2/1969	46	Rhonda	Women's Facial	Benson, AZ	Benson	AZ

Figure 15 City names and state abbreviations separated with Flash Fill

- Save your workbook.

REAL WORLD ADVICE**Flash Fill vs. Text Functions**

The Flash Fill feature of Excel 2013 is a quick, powerful, and touch-screen friendly way to work with text and numeric data. It is easy to use, but the data you insert using Flash Fill is not automatically updated if the underlying data changes. Flash Fill will not update prior values if new data is added or if the existing data changes. Text functions will update their results if underlying data changes, and they can be easily copied to accommodate new data. If data will be added or changed in your workbooks on a regular basis, use text functions!

Use Financial and Lookup Functions

Excel has many functions available to help businesses make decisions. These decisions may include calculating payments on a loan or returning data from a table based upon a specific value in a worksheet. The ability to combine these processes in more complex tasks is even more powerful. For example, a lookup function can retrieve an interest rate from a table of data to be used in a subsequent loan calculation. As with other functions, lookup and reference functions when combined with financial functions can be an effective combination.

Using Lookup and Reference Functions

Lookup and reference functions look up matching values in a table of data. Lookup and reference functions can be used for simple matches or complex retrieval tasks. This can be as simple as retrieving a value from a vertical or horizontal list, or as complex as finding the value of a cell within a table of data at a given row and column intersection. Common lookup and reference functions can be found in Table 9.

Function	Usage
HLOOKUP(lookup_value,table_array, row_index_num,[range_lookup])	Finds lookup_value in the top row of table_array and returns a value from row_index
INDEX (array,row_num,[column_num])	Returns a value from array by indexes specified as row_num and column_num
MATCH(lookup_value,lookup_array, [match_type])	Finds lookup_value in lookup_array
VLOOKUP(lookup_value,table_array, col_index_num,[range_lookup])	Finds lookup_value in the first column of table_array and returns a value from column_index

Table 9 Common lookup and reference functions

The **VLOOKUP** function matches a provided value in a table of data and returns a value from a subsequent column similar to looking up a phone number in a phone book. The “V” signifies that the function matches the provided value vertically, in the first column of the table of data. The syntax of a **VLOOKUP** is as follows:

=VLOOKUP(lookup_value, table_array, col_index_number, [range_lookup])

The lookup_value argument can be any text, number, or a reference to a cell that contains data. The table_array argument is a range in a spreadsheet. The range can be a single column of cells or multiple columns of cells. The **VLOOKUP** function will match the lookup_value on the first column of the supplied table_array. The col_index_number is the column number of the corresponding value that will be returned. The optional range_lookup argument allows the **VLOOKUP** to perform an approximate or exact match.

The `range_lookup` argument is `TRUE` for an approximate match. An approximate match allows the `VLOOKUP` to return the first value less than the `range_lookup` on the first column of the `table_array`. For example, looking up the value 50 on a range containing 45 and 55 would return 45. The `range_lookup` argument is `FALSE` for an exact match. An exact match will force the `VLOOKUP` to find the same value supplied in the `lookup_value` in the first column of the `table_array`. If the value cannot be found, the function will return an error.

The Turquoise Oasis Spa has recently partnered with a local bank to offer financing to customers that are booking large, costly events. Booking spa services usually is one of the last things guests will book. Thus, some guests will book less than they desire due to budget concerns. The spa is hoping that offering a financing package and discounts for large events will increase spa revenue.

As part of the workbook you are building for the spa, Meda has asked that you finish the `WeddingFinancing` worksheet that she started. This worksheet contains cells for guests to enter information about the wedding being planned. The worksheet already has cells prepared for entering the cost of the event, the down payment supplied by the guest, the annual interest rate, and the term of the loan in years. You have been asked to complete this worksheet so that when a wedding is scheduled, the guest will have an understanding of the basic elements of the financing plan. In this exercise you will use a lookup function to return the discount that the spa will provide based on the total cost of the wedding event being planned.

E03.14



To Use the VLOOKUP function

a. Click the **WeddingFinancing** worksheet tab, and then click cell **B7**.

b. Type `=VLOOKUP(B3,` to begin the `VLOOKUP` function.

This will use the value in B3 as the lookup value to match on the list of discounts.

c. Type `E4:F8,2,TRUE)` and then press **Enter** to complete the `VLOOKUP` function.

The `VLOOKUP` matches the value in B3 on the range E4:E8. When a match is found, the corresponding row value from column F will be returned. By placing `TRUE` as the `range_lookup` argument the `VLOOKUP` will perform an approximate match. This means an event costing \$37,000 will return a 5.0% discount.

Troubleshooting

If the `VLOOKUP` function returns a `#N/A` error, check to make sure the `range_lookup` argument is `TRUE`. Using `FALSE` for the argument will force the `VLOOKUP` into an exact match. Since \$37,000 is not listed in E4:E8, an error will be returned.

VLOOKUP function performing an approximate match

Result of the VLOOKUP function



Figure 16 WeddingFinancing worksheet using the `VLOOKUP` function

- d. Click cell **B8**, type **=B3*B7** and then press **Ctrl+Enter**.

This will apply the 5.0% discount to the \$37,000 event cost resulting in a discount of \$1,850.

- e. **Save**  your workbook.

REAL WORLD ADVICE

Approximate and Exact Matches

If the `range_lookup` argument is left blank it will default to `TRUE` for an approximate match. If the `range_lookup` should be `FALSE`, but is mistakenly left blank an incorrect result will be returned. Best practice dictates that you should always specify the `range_lookup` even though it is optional.

Using Financial Functions

A foundation for a successful business is generating revenue—any income brought into the business, prior to paying any expenses out—and hopefully yielding net profits. This also applies to personal finances where individuals generate income with the main goal of covering their expenses as they go through life with a net profit to spare. Having a foundational knowledge of financial terms is thus an important element of succeeding in both your personal and professional life. Some common financial terms that you will see and hear or possibly make use of in an Excel spreadsheet are shown in Table 10.

Financial Term	Definition
APR	The annual percentage rate; an interest rate expressed in an annual equivalent
Compounding interest	A process of charging interest on both the principal and the interest that accumulates on a loan
Interest payment	The amount of a payment that goes toward paying the interest accrued
NPV	The net present value of future investments
Period	The time period of payments, such as making payments monthly
Principal payment	The amount of a payment that goes toward reducing the principal amount
Principal value	The original amount borrowed or loaned
PV	Present value—the total amount that a series of future payments is worth now
Rate (and APR)	The interest rate per period of a loan or an investment
Simple interest	The interest charged on the principal amount of a loan only
Term	The total time of a loan, typically expressed in years or months
Time value of money	Recognizing that earning one dollar today is worth more than earning one dollar in the future

Table 10 Financial terminology

Financial functions are a set of predefined functions that can be used for calculating interest rates, payments, and analyzing loans. Some common financial functions are listed in Table 11.

Financial Functions	Usage
PMT(rate,nper,pv,[fv],[type])	Calculates periodic payment for a loan based on a constant interest rate and constant payment amounts
IPMT	Calculates periodic interest payment for a loan based on a constant interest rate and constant payment amounts
PPMT	Calculates periodic principal payment for a loan based on a constant interest rate and constant payment amounts
NPV	Calculates the net present value based on a discount interest rate, a series of future payments, and future income

Table 11 Common financial functions

A common and useful financial function in Excel is the PMT function. The **PMT function** determines the periodic payment for a loan based upon constant payments and interest rate. The PMT function by default returns a negative value. The function is really calculating an outflow of cash, a payment to be made. Within the financial and accounting industry, an outflow of cash is considered a negative value. In other words, this function assumes you are actually making a payment—taking money out of your pocket to give to someone else, or a negative value. Since some people may be confused seeing the value as negative, the value can be made positive by simply inserting a negative sign prior to the function or placing the absolute value function—ABS()—around the PMT function.

The syntax of the PMT function is as follows:

=PMT(rate,nper,pv,[fv],[type])

The first argument is the rate, which is the periodic interest rate. Importantly, the interest rate must be for each period. Most loans are discussed in terms of annual percentage rate (APR), while the period would be a shorter time period such as quarterly or monthly. The APR would need to be divided by 12 to get an equivalent monthly interest rate.

The second argument is nper, which is the number of periods or total number of payments that will be made for the loan. Again, many loans are discussed in years while the payments would be monthly. Thus, you will often need to determine the total number of periodic payments with a calculation.

The third required argument is PV, which is the present value of an investment or loan—the amount borrowed that needs to be paid back. The last two arguments are optional. The FV argument is the future value attained after the last payment is made. If this argument is left blank, the PMT function assumes FV to be zero. The Type argument indicates when a payment is due. If left blank, the PMT function assumes payments are due at the end of a period, if a one is supplied then payments are assumed due at the beginning of a period.

In this exercise, you will calculate the monthly payment for the customer for the event being planned using the PMT function.

E03.15



To Use the PMT Function

- Click the **WeddingFinancing** worksheet, and then click cell **B10**.
- Type **=PMT(** to begin the PMT function.
As previously mentioned the PMT function is calculated by default as a negative value. The negative sign before the PMT function will display the final result as a positive number.
- Type **B5/12**, to complete the rate argument. Because the interest rate in cell B5 is annual, you need to divide by 12 to get the interest rate per payment—in this case monthly.
- Type **B6*12**, to complete the number of periods argument. Because the term of the loan is in years, you will need to multiply the term by 12 to get the total number of payments—in this case months—in the loan.
- Type **B9)** and then press **Ctrl+Enter** to supply the present value of the loan and complete the PMT function.

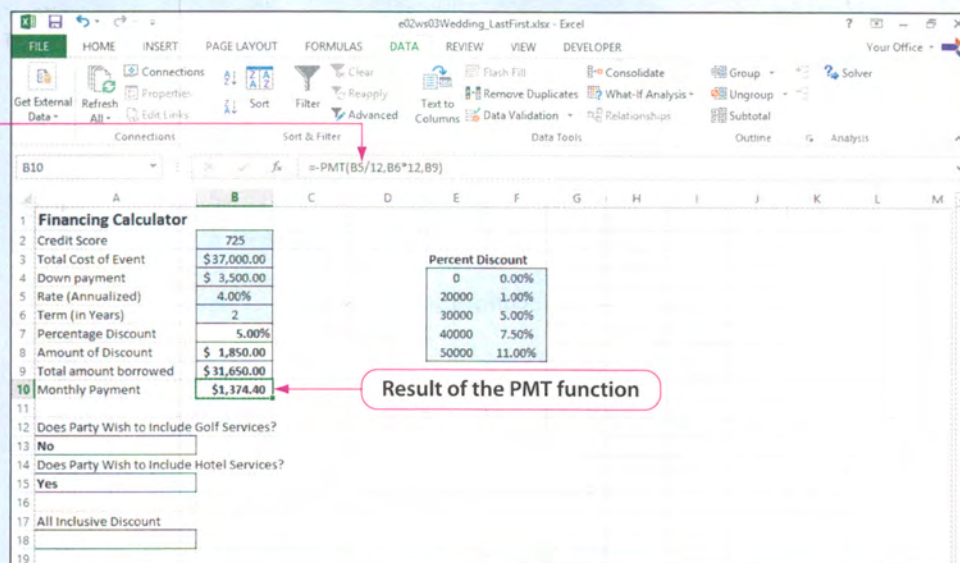
The original loan amount was \$37,000. Cell B9 takes the original amount in B3, subtracts the down payment supplied in cell B4, and subtracts the amount of the discount in cell B8.

SIDE NOTE

Unit Conversions

Be careful when converting the arguments of the PMT function. Monthly payments are converted using 12, quarterly are converted using 4.

PMT function calculating a monthly payment



Result of the PMT function

Figure 17 PMT function used to calculate a monthly payment

- Save your workbook.

Use Logical Functions and Troubleshoot Functions

When constructing a spreadsheet the need will often arise to evaluate criteria in a range of cells and make a decision based on those criteria. Excel contains functions that can evaluate a wide range of criteria and return customized results. For example, a comparison of two cells to see if their values are the same may result in a cell displaying TRUE, a customized text response, or even performing another calculation. As the formulas in a spreadsheet become more complicated errors may occur in the spreadsheet. Understanding some basic spreadsheet troubleshooting techniques can easily correct these errors.

Using Logical Functions

Logical functions evaluate statements, or declarations, as being either true or false. For example, the statement “the sky is blue” is a declaration that can be evaluated as true. If the statement was “Is the sky blue?” the response would be a yes/no instead of true/false. So, all logical functions are structured around the concept of declaring a position or statement that Excel will evaluate and return as True or False.

The best way to think of a declaration is to think of using comparison symbols like the =, >, <, or >= symbols as shown in Table 12. When you set up a statement of X>Y, Excel can evaluate that comparison as true or false.

Comparison Operator Symbol	Example	Declarative Clause
<	A < B	A is less than B
>	A > B	A is greater than B
=	A = B	A is equal to B
<=	A <= B	A is less than or equal to B
>=	A >= B	A is greater than or equal to B
<>	A <> B	A does not equal B

Table 12 Comparison operators

The most common logical function to learn is the IF function. The **IF function** will return one of two values depending upon whether the supplied logical test being evaluated is true or false. The syntax of the IF function is as follows:

=IF(logical_test,[value_if_true],[value_if_false])

The first argument is the logical_test, the statement you want to evaluate as TRUE or FALSE. Excel will then evaluate it as either true or false. The second argument is the result you want returned in the cell if the expression is evaluated as true. The third argument is the result you want in the cell if the expression is evaluated as false.

Notice that only the logical_test argument is required. The last two arguments are optional. If you leave them out, Excel will automatically return TRUE or FALSE as the result of the function. However, it is much more common and expected that you will supply something for all three arguments. If you consider the context, logical statement, and results of the IF function, the structure begins to fall into place.

It is possible to create intricate logical statements using the AND and the OR functions. These functions allow you to evaluate multiple logical statements within a single IF function. The **AND function** returns TRUE if all logical tests supplied are true; otherwise, it returns FALSE. The **OR function** returns TRUE if any one logical test supplied is true; otherwise, it returns FALSE. The components can incorporate values, cells, named ranges, and even other functions. Common logical functions and their usage are listed in Table 13.

Logical Functions	Usage
IF(logical_test,[value_if_true],[value_if_false])	Returns one of two values, depending upon whether the logical statement is evaluated as being true or false
IFERROR(value,value_if_error)	Returns a specified value if a function or formula returns an error; otherwise, it returns the value of the function or formula
AND(logical1,logical2,...)	Returns true if logical1, logical2,...logicaln all return true
OR(logical1,logical2,...)	Returns true if any one of logical1, logical2,...logicaln return true

Table 13 Common logical functions

CONSIDER THIS

Variations in Constructing Formulas

In Excel, there can be many ways that a formula can be written. Some are more efficient than others. At a minimum, every IF statement can be written two ways. Why? Provide an example with both ways.

To encourage couples getting married to use the resort for all of their wedding services, the Painted Paradise Resort and Spa is offering an all-inclusive discount of \$500.00. The availability of the discount to the guests must be evaluated in two steps. First, the discount can only be offered if the guest's credit score is at least 650. Secondly, the wedding party must use both the golf course and hotel as part of their event. Common logical functions can be used to evaluate if a wedding party is eligible for the all-inclusive discount. If the wedding party is eligible, they will receive a \$500 discount. If they are not eligible, the cell should display a zero.

E03.16



To Use the IF and the AND functions

- Click the **WeddingFinancing** worksheet, and then click cell **C10**.
- Type **=IF(** to begin the IF function and enter the logical_test argument.
The credit score of the guest is located in cell B2. The IF function will need to test for a value in this cell of greater than or equal to 650.
- Type **B2>=650**, to complete the logical_test argument and enter the value_if_true argument.
The IF function should return the text "Sufficient Credit Score" if the value in B2 is 650 or greater. If the value is less than 650 the text "Insufficient Credit Score" should be returned.
- Type **"Sufficient Credit Score","Insufficient Credit Score")** and then press **[Ctrl]+[Enter]** to complete the IF function. If necessary, use the AutoFit feature on column C.
Notice that since the value in B2 is 725, the text "Sufficient Credit Score" is returned by the IF function.
- Click cell **A18**, and then type **=IF(** to begin the IF function and enter the logical_test argument. Since the discount requires both golf services and hotel services to be used by the wedding party, the AND function will be used in the logical test of the IF function to evaluate this criteria.

SIDE NOTE

Using Quotes

Quotation marks must be used in an IF function to return text values. To return numeric data do not use quotation marks.

- f. Type **AND(A13="Yes";A15="Yes")**, to insert the AND function into the IF function and complete the logical_test argument.
The AND function will now return TRUE if cells A13 and A15 both contain the text "Yes". Otherwise it will return FALSE to the IF function.
- g. Type **500**, to complete the value_if_true argument.
If the AND function returns TRUE, the number 500 will be displayed in cell A18. This will give a \$500 discount to the wedding party.
- h. Type **0** to complete the value_if_false argument and complete the IF function.
If the AND function returns FALSE, the number 0 will be displayed in cell A18 and no discount will be given. Notice that no discount is currently given as cell A13 displays No.

IF function with a nested AND function

Result of the nested logical functions

1	Credit Score	725
2	Total Cost of Event	\$37,000.00
3	Down payment	\$ 3,500.00
4	Rate (Annualized)	4.00%
5	Term (in Years)	2
6	Percentage Discount	5.00%
7	Amount of Discount	\$ 1,850.00
8	Total amount borrowed	\$31,650.00
9	Monthly Payment	\$1,374.40
10		Sufficient Credit Score

0	0.00%
20000	1.00%
30000	5.00%
40000	7.50%
50000	11.00%

Figure 18 IF function with a nested AND function

- i. Click cell **A13**, type **Yes** and then press **Ctrl+Enter**.
Cell A18 now displays a discount as both cells A13 and A15 display Yes.
- j. **Save** your workbook.

IF functions can range from simple tests of a statement to complex, nested formulas. Table 14 shows four examples of IF functions with varying levels of complexity.

Context: Display the word "Good" if the exam score in J10 is better than or equal to the target goal of 80, which is in cell B2. If it is worse than 80, display the word "Bad".

Example: =IF(J10>=B\$2,"Good","Bad")

Interpretation: If the value of cell J10 is greater than or equal to the value in B2, the text "Good" is displayed. Otherwise, the text "Bad" is displayed.

Context: Display the status of an employee meeting his or her goal of getting a number of transactions, where transactions are listed in the range of A2:A30 and the target number of transactions are in cell C3.

Example: =IF(COUNT(A2:A30)>=C3,"Met Goal","")

Interpretation: If the count of transactions that are listed in range A2:A30 is greater than or equal to the value in C3 (the target goal for the employee), then the employee met his or her goal and the text "Met Goal" should be displayed. Otherwise, the goal was not met and no value should be displayed. This can be accomplished by supplying two quotation marks with no characters typed between them.

Context: For tracking any projects that have not been completed, check the text in H20, and if it does not say "Complete", assume the project is not complete and calculate how many months are left when A3 has today's date and A4 has the targeted completion date.

Example: =IF(H20<>"Complete",DATEDIF(A3,A4,"M"),0)

Interpretation: If H20 does not say "Complete" to represent a completed project, calculate the number of months left, based on dates in cells A3 and A4. Otherwise, show a zero.

Context: Determine salary by checking if the employee generated less revenue than their goal, listed in B2. If so, they simply get their base pay. If they do meet their goal or generate more revenue than their goal, they get a bonus, which is a percent of sales added to their base pay. Since this may result in a value that has more than two decimals, the result needs to be rounded to two decimals.

Example: =ROUND(IF(SUM(Sales<B2,Base,Base+BonusPercent*(Sum(Sales))),2)

Interpretation: The ROUND() function will round the result to two decimals. Inside the ROUND function, the SUM(Sales) functions will sum the range named Sales to give the total sales. The IF statement then indicates that IF the total Sales is less than the value in B2 (the sales goal), provide the value that is in the range called Base (Base pay). Otherwise, the total Sales must be greater than B2 and the pay would be calculated as the Base (Base pay) plus the value in the named range, BonusPercent times the total Sales.

Table 14 Examples of IF functions

CONSIDER THIS

What IF There Are Three Options?

An IF statement can handle just two results: true and false. Are most real-world situations that simple? How could you use an IF statement if there are more than two results? It is possible!

Troubleshooting Functions

Logical functions dramatically increase the value of a spreadsheet. However, on the path to learning how to use functions, and even as an experienced spreadsheet user, you will still make typing errors during the development of functions. Excel does an excellent job of incorporating cues to help you determine where you have gone astray with a function.

When you make a mistake with a function that prevents Excel from returning a viable result, Excel will provide an error message. While these may seem cryptic initially, they actually can be interpreted. Typically an error message will be prefaced with a number symbol (#). Examples would be #VALUE!, #N/A, #NAME?, or #REF!. Over time you will learn to recognize common issues that would cause these error messages.

QUICK REFERENCE

Common Error Messages

1. **#NAME?**—This error indicates that text in a formula is not recognized. Excel treats unrecognized text as a named range that does not exist. This is often due to missing quotes around a text string or mistyping the function or range name.
2. **#REF!**—This error indicates a reference that Excel cannot find. This is often due to changes like a deleted worksheet, column, row, or cell.
3. **#N/A**—This error indicates that a value is not available in one or more cells specified. Common causes occur in functions that try to find a value in a list but the value does not exist. Rather than returning an empty set—no value—Excel returns this error instead.
4. **#VALUE!**—This error occurs when the wrong type of argument or operand is being used, such as entering a text value when the formula requires a number. Common causes can be the wrong cell reference that contains a text value rather than a numeric value.
5. **#DIV/0!**—This is a division by 0 error and occurs when a number is divided by zero or by a cell that contains no value. While it can occur due to an actual error in the design of a formula, it also may occur simply due to the current conditions within the spreadsheet data. In other words, this is common when a spreadsheet model is still in the creation process and data has not yet been entered into the necessary cells. Once proper numeric data does exist, the error disappears.

There are numerous ways to troubleshoot erroneous functions in Excel. When you encounter an error, you can quickly check the cell references and arguments of the function by double-clicking the cell to edit the function. This is beneficial since, while a function is being edited, Excel will outline any cells or ranges included in the function and display the ScreenTip for the function.

On the Commission worksheet, Meda has set up a quick analysis that rewards the employee scheduling the event with a commission of the total cost of the event. The commission earned is then added to the base event pay for the employee. The base event pay is contingent upon the employee level. After setting up the worksheet, she noticed an error in one of the cells. Additionally, the table located in the Commission worksheet states that managers have a base event pay of \$1,250. However, the value shown for the manager in the worksheet is only \$750.

E03.17



To Troubleshoot a Function

- a. Click the **Commission** worksheet tab, and then click cell **B4**.
Notice the #N/A error being returned by the VLOOKUP function in the cell. Recall that this error commonly occurs because a value cannot be found on a list.
- b. Click the **Error Message** button  next to cell B4. Notice that the error message states a value is not available.

- c. Double-click cell **B4** to edit the formula.

Notice the outlines around the cells that are part of the VLOOKUP function. From this view you can verify that cell B3 is correctly referenced as the lookup value. Cells E4:F8 are correctly referenced as the table array. The column index number will return a value from column F if a value is found in column E.

Notice the `range_lookup` argument is set to `FALSE`. This means the lookup is performing an exact match. Since \$17,000 does not occur in the range E3:E7, the VLOOKUP will return a #N/A error.

- d. Place the insertion point at the end of the **range_lookup** argument, and then delete the text **FALSE**. Type **TRUE** and then press **Ctrl+Enter** to fix the formula. Notice that the value 5% now appears in cell B4.
- e. Double-click cell **B8** to edit the formula.
- Notice the `range_lookup` argument is set to `TRUE`. This means the lookup is performing an approximate match and is returning the incorrect base event pay rate.
- f. Place the insertion point at the end of the **range_lookup** argument, and then delete the text **TRUE**. Type **FALSE** and then press **Ctrl+Enter** to fix the formula. Notice that the value \$1,250 now appears in cell B8.
- g. Complete the Documentation worksheet, **save**  your workbook, and then **close**  Excel. Submit your work as directed by your instructor.

REAL WORLD ADVICE

Function Construction Guidelines

As you develop a spreadsheet, follow these guidelines for creating formulas and functions:

1. Use parentheses for grouping operations in calculations in order to get the correct order. However, do not overuse parentheses as it quickly adds to the complexity of the formula. For example, use `=SUM(Sales)` instead of `=(SUM(Sales))`.
2. When inserting numbers into a function, use formatting such as 10000. Do not enter 10,000 using a comma. The comma is a formatting element, and in Excel it is used to separate arguments. Best practice for functions and formulas dictates entering the 10,000 value in a cell and then using the cell address in the formula.
3. Insert currency as 4.34 instead of \$4.34 as this will get confusing with relative and absolute cell referencing. Then, format the cell that will contain the result as Accounting or Currency. Best practice for functions and formulas dictates entering the 4.34 value in a cell and then using the cell address in the formula.
4. Enter percentages as decimals, such as .04. Then, format the number as a percentage.
5. Logical conditions have three parts—two components to compare and the comparison sign. Do not type ">5" when there is no value to evaluate as being greater than 5.
6. Use the negative sign, such as -333 to indicate negative numbers in formulas as opposed to (333).
7. Always put quotes around text unless it is a named range. Numeric values do not require quotes unless the number will be used in a textual context and not for a mathematical equation, such as displaying a zip code or telephone number.
8. Avoid unneeded spaces in formulas. Excel will allow a function such as `=SUM( A2:A10 )`. Best practice dictates typing the function as `=SUM(A2:A10)` with no extra spaces.

Concept Check

1. Explain the three different types of cell referencing. p. 488
2. Why are named ranges useful? What limitations are there in creating the names for ranges? p. 496
3. Why is the syntax of an Excel function important? How can you distinguish between required and optional portions of a function? p. 501–502
4. In the math and statistical functions, what are the differences between the ROUND function and the INT function? Give a business example of when you would use each. p. 502–503
5. What is the difference between the TODAY() and NOW() functions? Why is this difference important? p. 509
6. What are common uses for text functions? Why is the Flash Fill feature useful on mobile devices? p. 511, 513
7. Explain the difference between the TRUE and FALSE parameters for the range_lookup argument of a VLOOKUP function. Give a business example of how you would use a VLOOKUP with a PMT function. p. 516
8. Give a business example where an IF function would be useful. How would using the AND or OR functions in the logical_test argument change the way the IF function works? p. 521

Key Terms

ABS function	502	Function	500	Name Manager	497
Absolute cell reference	488	Function arguments	503	Named range	496
AND function	520	IF function	520	NOW function	509
Argument	500	INT function	502	OR function	520
Cell reference	488	LEFT function	511	PMT function	518
COUNT function	507	Logical functions	520	Relative cell reference	488
COUNTA function	507	Lookup and reference functions	515	ROUND function	502
Date and time functions	508	MEDIAN function	507	Syntax	500
DATEDIF function	509	Mixed cell reference	488	Text functions	511
Financial functions	518	MODE function	507	TODAY function	509
FIND function	511	MODE.MULT function	507	VLOOKUP function	515
Flash Fill	513	MODE.SNGL function	507		

Insert a function using formula AutoComplete (p. 505)

Use statistical functions (p. 507)

Create and structure functions (p. 500)

Use the INT and ABS functions (p. 504)

Use and understand math and statistical functions (p. 502)

Use Flash Fill (p. 514)

Use and understand date and time functions (p. 508)

Use and understand text functions (p. 511)

Use date and time functions (p. 510)

Nest the FIND and LEFT functions (p. 512)

Use the PMT function (p. 519)

Use financial and lookup functions (p. 515)

Use the VLOOKUP function (p. 516)

Use the IF and the AND functions (p. 521)

Use logical functions and troubleshoot functions (p. 520)

Troubleshoot a function (p. 524)

The image displays three screenshots of Microsoft Excel, each illustrating a different function or feature. The top screenshot shows a spreadsheet titled 'e02ws03Wedding_LastFirst - Excel' with a formula bar containing '=COUNTA(A9:A39)'. The middle screenshot shows a spreadsheet titled 'e02ws03Wedding_LastFirst - Excel' with a formula bar containing '=NM'. The bottom screenshot shows a spreadsheet titled 'e02ws03Wedding_LastFirst - Excel' with a formula bar containing '=IF(B2>=650,"Sufficient Credit Score","Insufficient Credit Score")'. The bottom screenshot also shows a 'Financing Calculator' table with columns for 'Credit Score', 'Total Cost of Event', 'Down payment', 'Rate (Annualized)', 'Term (in Years)', 'Percentage Discount', 'Amount of Discount', 'Total amount borrowed', and 'Monthly Payment'. A table to the right of the calculator shows 'Percent Discount' values for different credit scores. The bottom screenshot also shows a table with columns for 'Guest Name', 'Date Of Birth', 'Age', 'First Name', 'Service Requested', 'City & State', 'City', and 'State'.

Create named ranges (p. 496)

Create a named range using the name box (p. 497)

Use absolute referencing to a formula (p. 492)

Use mixed cell referencing (p. 494)

Understand the types of cell references (p. 488)

Modify a named range (p. 497)

Use relative cell referencing (p. 490)

Created named ranges and apply the names to formulas (p. 499)

Use named ranges in a formula (p. 498)

Figure 19 Painted Paradise Resort and Spa Wedding Planning Complete

Practice 1

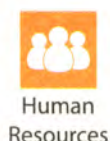
Student data file needed:

e02ws03Bonus.xlsx

You will save your file as:

e02ws03Bonus_LastFirst.xlsx

Massage Therapist Bonus Workbook



Meda Rodate has been constructing a workbook that would enable her to analyze the goals for massage therapists and calculate their pay. The massage therapists have a base pay and earn commission on massages along with a bonus. Meda has asked that you make some modifications to the workbook that she began to facilitate her analysis.

- Open **e02ws03Bonus**. Save it as **e02ws03Bonus_LastFirst** using your last and first name.
- Click the **Bonus** worksheet tab, and then click cell **J17**. Click in the **Name** box, type **Bonus** and then press **Enter**.
- Click the **FORMULAS** tab, and then in the Defined Names group, click **Name Manager**. Click **Christy** in the list of named ranges in the workbook.
- In the Refers to box, delete the existing range, and then type **=Bonus!\$B\$12:\$K\$12**. Click **Close**, and then click **Yes** to save changes.
- Click cell **B4**. Type **=B3**, and then press **F4** twice to create the mixed cell reference **B\$3**. Type ***A4** and then press **F4** three times to create the mixed cell reference **\$A4**. Press **Ctrl+Enter**.
- Click the **AutoFill** handle, and then drag down to copy the formula to cell **B8**. With the range **B4:B8** still selected, click the **AutoFill** handle, and then drag to the right to copy the formulas to the range **B4:K8**.
- Click cell **F19**, type **=SUM(Christy)**, and then press **Enter**. Repeat this process for cells **F20:F22**, replacing the named range in the SUM function with the name of the therapist in cells **A20:A22** respectively.
- Click cell **D25**, type **=C19*C25**, and then press **Ctrl+Enter**. Click the **AutoFill** handle, and then drag down to copy the formula to cell **D28**.

A bonus is earned if the therapist attains two goals. First, if the generated actual revenue for a therapist is greater than the goal for that therapist. Second, if the actual number of massages completed for a therapist was greater than or equal to the goal of that therapists. If the goal is met, cells D19:D22 and G19:G22 should display a 1; otherwise, they should display a 0.

- i. Click cell **D19**, type **=IF(C19>B19,1,0)** and then press **[Ctrl]+[Enter]**. Click the **AutoFill** handle, and then drag down to copy the formula to cell **D22**.
- j. Click cell **G19**, type **=IF(F19>=E19,1,0)** and then press **[Ctrl]+[Enter]**. Click the **AutoFill** handle, and then drag down to copy the formula to cell **G22**. If both goals are met, cells E25:E28 should display the bonus amount in cell J17; otherwise, they should display 0.
- k. Click cell **E25**, type **=IF(AND(D19=1,G19=1),Bonus,0)** and then press **[Ctrl]+[Enter]**. Click the **AutoFill** handle, and then drag down to copy the formula to cell **E28**.
- l. Click cell **F25**, type **=B25+D25+E25**, and then press **[Ctrl]+[Enter]**. Click the **AutoFill** handle, and then drag down to copy the formula to cell **F28**.
- m. On the **INSERT** tab, in the Text group, click **Header & Footer**. On the **HEADER & FOOTER TOOLS DESIGN** tab, in the Navigation group, click **Go to Footer**. Click in the **left footer** section, and then in the Header & Footer Elements group, click **File Name**.
- n. Click any cell on the spreadsheet to move out of the footer, and then press **[Ctrl]+[Home]**. On the **VIEW** tab, in the Workbook Views group, click **Normal**.
- o. Click the Documentation worksheet. Click cell **A6**, and then type in today's date. Click cell **B6**, and then type in your first and last name. Complete the remainder of the Documentation worksheet according to your instructor's direction.
- p. Click **Save**, close Excel, and then submit your files as directed by your instructor.

Problem Solve 1

MyITLab[®]
Grader
Homework 1



Production &
Operations

Student data file needed:

e02ws03CarRental.xlsx

You will save your file as:

e02ws03CarRental_LastFirst.xlsx

Express Car Rental

Jason Easton is a member of the support/decision team for the San Diego branch of Express Car Rental. He created a worksheet to keep track of weekly rentals in an attempt to identify trends in choices of rental vehicles, length of rental, and payment method. This spreadsheet is designed only for Jason and his supervisor to try and find weekly trends and possibly use this information when marketing and forecasting the type of cars needed on site. The data for the dates of rental, daily rates, payment method, and gas option have already been entered.

- a. Open **e02ws03CarRental**, and then save the file as **e02ws03CarRental_LastFirst** using your last and first name.
- b. On the RentalData worksheet, in cell **E6**, enter a date formula to determine the length of rental in days. Copy this formula to the range **E7:E32**.
- c. Name the range **A37:B40** **RentalRates**.
- d. In cell **G6**, use the appropriate lookup and reference function to retrieve the rental rate from the named range **RentalRates**. The function should look for an exact matching value from column A in the data. Copy the function down the column to cell **G32**.
- e. Name the range **B42** **Discount** and then name the range **B44** **GasCost**.
- f. In cell **H6**, enter a formula to determine any discount that should be applied. If the payment method was Express Miles or Rewards, the customer should receive the discount shown in B42. If no discount should be applied, the formula should return a zero. Use the named range for cell **B42**, not the cell address, in this formula. Copy the function down the column to cell **H32**.

- g. In cell **J6**, enter the correct formula to determine the cost of gas if the customer chose that option as indicated in column I. Use the named range for cell **B44** in this formula. Copy the function down the column to cell **J32**.
- h. In cell **K6**, enter the correct formula to determine the total cost of the rental by based on the daily rate, the number of days rented, the cost of gas, and any discount given to the customer. Copy the function down the column to cell **K32**.
- i. In cell **B46**, use the appropriate function to calculate the Median length of rental in days.
- j. In cell **B47**, use the appropriate function to count the number of rentals in the data.
- k. Complete the Documentation worksheet according to your instructor's direction. Insert the **filename** in the left custom footer section of the Header/Footer tab in the Page Setup dialog box on all worksheets in the workbook.
- j. Click Save, close Excel, and then submit your files as directed by your instructor.

Perform 1: Perform in Your Life

Student data file needed:

 e02ws03Grades.xlsx

You will save your file as:

 e02ws03Grades_LastFirst.xlsx



Calculate Your Grade

Using the e02ws03Grades workbook construct an evaluation of your grades in a class you are currently taking. The workbook provided has an example grading scale, though this can be modified to meet the requirements of the course you are taking.

- a. Open **e02ws03Grades**, and then save the file as **e02ws03Grades_LastFirst**.
- b. Create a basic structure for entering the names of assignments, the points possible on an assignment, and the current percentage grade of an assignment. Enter your assignments and respective grades in the worksheet.
- c. Create named ranges for the points possible, points earned, and the grading scale ranges. Use these named ranges in calculations as appropriate.
- d. In an adjacent column calculate your percentage grade on each assignment. Use the appropriate function to round the resulting percentage to two decimal places.
- e. In an adjacent column use the appropriate function to look up the letter grade on the assignment using the grading scale provided.
- f. Summarize the total points possible and your total points earned. Calculate your course grade as a percentage of the total points possible. Use the appropriate function to round the resulting percentage to two decimal places.
- g. Calculate your letter grade for the course using the appropriate function.
- h. Some courses provide extra credit. Create a cell that displays Yes if your course offers extra credit or No if it does not. Create another cell that displays the number of credits you have earned.
- i. Construct an IF function that adds the extra credit points earned into your course grade if extra credit for the course is available and the extra credit points earned is greater than zero.
- j. Complete the Documentation worksheet according to your instructor's direction. Insert the **filename** in the left custom footer section of the Header/Footer tab in the Page Setup dialog box on all worksheets in the workbook.
- k. Click Save, close Excel, and then submit your files as directed by your instructor.



Additional Workshop Cases are available on the companion website and in the instructor resources

Microsoft Office Excel 2013

Module 2 Conducting Business Analysis

WORKSHOP 4 | EFFECTIVE CHARTS

OBJECTIVES

1. Explore chart types, layouts, and styles p. 532
2. Explore the positioning of charts p. 536
3. Understand different chart types p. 539
4. Change chart data and styles for presentations p. 548
5. Edit and format charts to add emphasis p. 557
6. Use sparklines and data bars to emphasize data p. 561
7. Recognize and correct confusing charts p. 564

Prepare Case

Turquoise Oasis Spa Sales Reports

The Turquoise Oasis Spa managers, Irene Kai and Meda Rodate, are pleased with your work and would like to see you continue to improve the spa spreadsheets. They want to use charts to learn more about the spa. To do this, Meda has given you a spreadsheet with some data, and she would like you to develop some charts. Visualizing the data with charts will provide knowledge about the spa for decision-making purposes.



Sales &
Marketing



PhotoSG / Fotolia

REAL WORLD SUCCESS



"In my internship, I used a combo chart to analyze inventory trends over time, presenting inventory buildup or shrinkage on one axis and production levels on another. I was able to use this visual representation to better understand supply chain coordination throughout a quarter, providing my superiors with data to improve our operating efficiency. By combining these charts with charts presenting demand variance, our company was able to pinpoint sources of inventory buildup and higher operating costs."

- Steven, alumnus

Student data files needed for this workshop:



e02ws04SpaSales.xlsx



e02ws04TurquoiseOasis.jpg

You will save your file as:



e02ws04SpaSales_LastFirst.xlsx

Designing a Chart

With Excel you can organize data so it has context and meaning, converting data into meaningful information. **Data visualization** is the graphical presentation of data with a focus upon qualitative understanding. It is central to finding trends and supporting business decisions. Modern data visualization can include beautiful and elegant charts that include movement and convey information in real time. Even basic charts are at the heart of data visualization. Charts enlighten you as you compare, contrast, and examine how data changes over time. Learning how to work with charts means not only knowing how to create them but also realizing that different knowledge can be discovered or emphasized by each type of chart.

While it may seem simple to create a pie chart or bar chart, there are many considerations in creating your charts. Charts, as with pictures, are worth a thousand words. However, people interpret charts differently if the chart is not well developed. A well-developed chart should provide context for the information, without overshadowing key points. Finally, it is easy to confuse people with the choice and layout of a chart. You should create charts that use accurate, complete data, and your objective should be to provide a focused, clear message. In today's data-rich world, many interpretations or messages can be extracted from the data. There are three primary objectives businesses have in charting: data exploration, hypothesis testing, and argumentation.

Using the **data exploration objective**, you simply manipulate the data, and try to evaluate and prioritize all the interpretations or messages. There may be a need to create multiple charts, using a variety of data sources, layouts, and designs as you interpret the data. In this case, examine the data and let the charts tell a story.

Using the **hypothesis testing objective**, you may have some ideas or hypotheses about the data. Maybe you believe that a certain salesperson performs better than the others. Or maybe you believe that certain types of messages are more popular with particular types of customers. Charts can visually support or refute a hypothesis.

Using the **argumentation objective**, you have a position you want the data to visually support. You will need to select a specific and appropriate chart layout, use the necessary data, and design a chart that conveys your message clearly and unambiguously. Further, you have an ethical obligation to accurately represent the data. Misrepresenting data can result in lawsuits, loss of your job, or even cost lives.

Regardless of the objective, just a small set of data allows you to create a variety of charts, each offering a different understanding of the data. In this workshop, you will start with understanding the concepts for creating a chart in Excel, and understand which type of chart will depict the information in the best and most efficient manner.

Explore Chart Types, Layouts, and Styles

When you decide to represent data visually, you need to make some initial decisions about the basic design of the chart. These initial decisions include the location of the chart, the type of chart, the general layout and style, and what data you will be using. These elements can be set initially and modified later. Best practice dictates that you first consider and develop the basic design of the chart.

Regardless of the location or type of chart, the process of creating a chart starts with the organization of the data on the spreadsheet. The typical structure is to have labels across the top of the data, along the left side of the data, or both. While the labels do not have to be directly next to the data, it helps when selecting data and making your chart. The data may have been brought in from an external data source, like Access. The data may need to be filtered, calculated, or reorganized prior to creating a chart.

When you are ready to create a chart, select the cells that contain both the label headings and the data. People rarely create a perfect chart the first time. Initially, you

may start a chart, work with it for a while, and then realize a different chart type would better convey the information. Fortunately, Excel provides ample flexibility when designing charts. Thus, if you change your mind, you can modify the chart or simply start over.

Opening the Starting File

A chart in Excel is an object that sits above the worksheet. Clicking on the chart will allow you to modify aspects of the chart or even change the type of chart. You have been asked to review a pie chart that displays the use of portable massage tables by different therapists.

E04.00



To Open the SpaSales Worksheet

- Start **Excel**, click **Open Other Workbooks**, and browse to your student data files. Locate and select **e02ws04SpaSales**, and then click **Open**.
- Click the **FILE** tab, and then click **Save As**. Browse to the location where you are saving your files. In the File name box, type **e02ws04SpaSales_LastFirst**, using your last and first name, and then click **Save**.
- On the **INSERT** tab, in the **Text** group, click **Header & Footer**.
- On the **HEADER & FOOTER TOOLS DESIGN** tab, in the Navigation group, click **Go to Footer**. If necessary, click the **left section** of the footer, and then in the Header & Footer Elements group, click **File Name**.
- Click any **cell** on the worksheet to move out of the footer, press **[Ctrl] + [Home]**, and then on the status bar, click **Normal**

Modifying an Existing Chart

When you click an existing chart, you are activating the chart area. It will be highlighted on the border while the middle of the sides and the corners will have selection handles used to resize the chart. The chart border can also be used to move the entire chart to a new location within the spreadsheet. The Chart Tools contextual tab will appear on the Ribbon, and to the right of the chart three buttons will appear that provide quick access to common functions such as modifying chart elements, changing the chart layout, or filtering the chart data.

When a chart is selected, the data used in creating the chart will be highlighted in the worksheet, offering a visual clue of the associated data. In the TableUse worksheet you will see a pie chart describing the use of massage tables by individual therapists at the spa. A purple border surrounds the data that represents the legend labels. The range with a blue border is the data that represents the data series for the pie slices. A **data series** is a group of related data values to be charted. A **data point** is an individual data value in a data series. A chart may contain multiple data series or a single data series.

Subcomponents of the chart can also be selected, such as the background, various text elements, and even the individual chart elements themselves. Click components to make them active, and adjust specific items through either the Ribbon options or by right-clicking to display the shortcut menu to see available options. In this exercise, you will modify an existing pie chart on the TableUse worksheet.



First impressions are important with charts. You want the audience to receive the correct message during the initial moments. If the audience is distracted by the look and feel of the chart, they may stop looking for the message in the chart or extend the chaotic personality of the chart to the presenter. Thus, the chart can become a reflection upon you and your company.

MyITLab®

Workshop 4 Training

SIDE NOTE**Alternate Method**

Any action completed in the Chart Formatting Control can be completed through the Chart Tools contextual tab on the Ribbon.

E04.01**To Modify an Existing Chart**

- Click the **TableUse** worksheet tab. Notice the pie chart located below the data on this worksheet.
- Click the **chart border** of the chart to select the chart and display the **CHART TOOLS** contextual tabs.

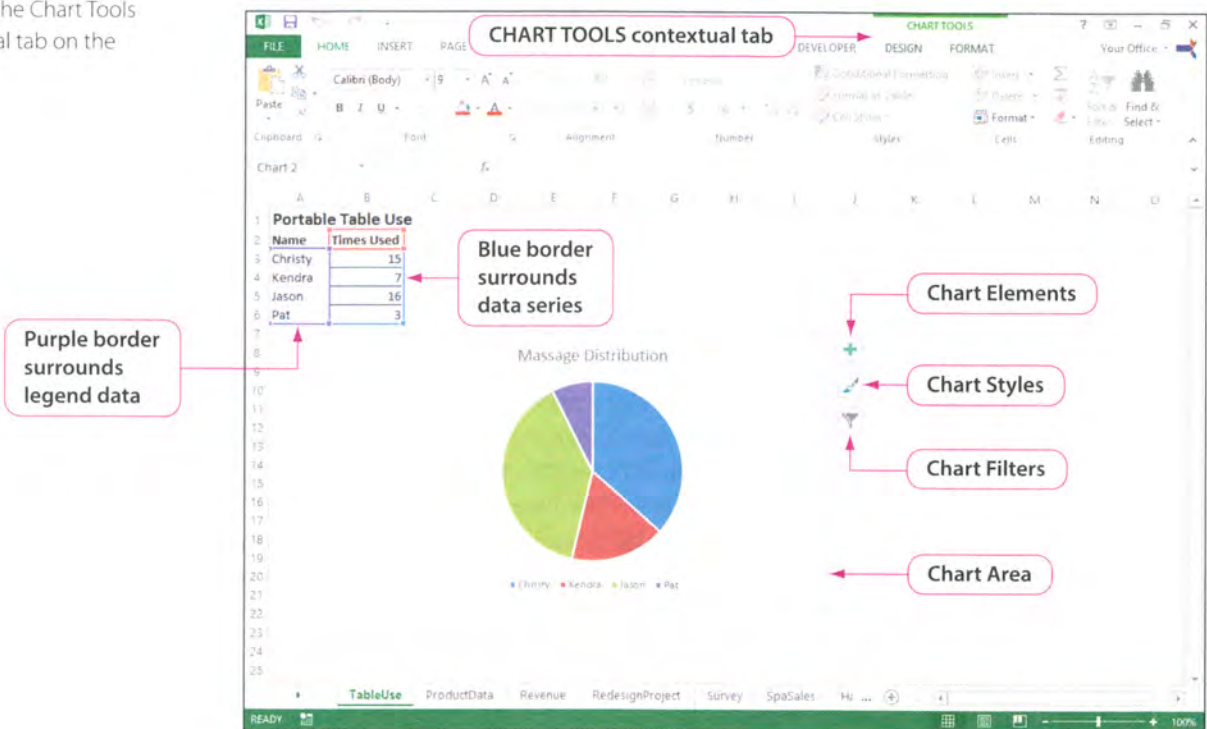


Figure 1 Selected pie chart

- To the right of the chart, click **Chart Elements** , and then click **Data Labels**. This will display the number of times each therapist used a portable message table in the corresponding slice of the pie chart.
- Click the **Data Labels** arrow, and then select **More Options**. This will open the Format Data Labels task pane.
- Under the **LABEL OPTIONS** group, click to deselect **Value**, and then click **Percentage**.

SIDE NOTE**Hover to See Icon Information**

When presented with a set of icons, hover the mouse over an icon, and a ScreenTip will appear offering descriptive information.

- f. Click the **chart border** of the chart, click **Chart Styles**, and then scroll down and point to **Style 7**. Notice the chart changes to display a live preview of the style. Click **Style 7**, and then click **Chart Styles** to close the control. This chart now displays the percent of portable table usage for each massage therapist at the spa.

Pie chart with new style and data labels

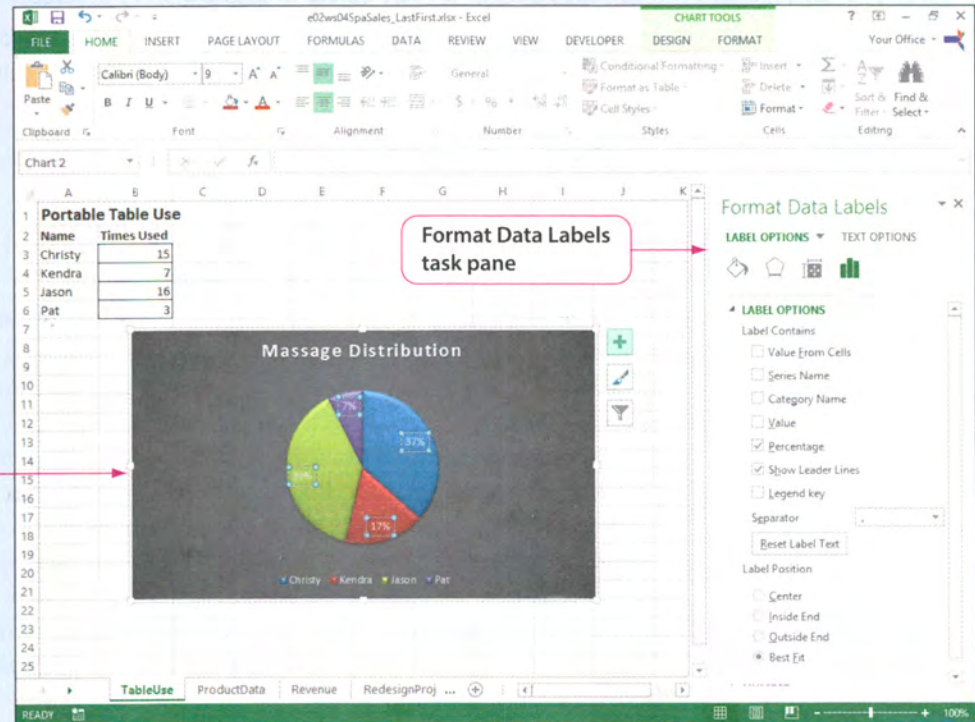


Figure 2 Modified chart

- g. Close the Format Data Labels task pane, and then click **Save**.

CONSIDER THIS | Misleading Charts

Charts are supposed to frame information. But, have you ever seen a chart in a newspaper, online article, or magazine that would lead the viewer to an incorrect assumption or conclusion? Look for a chart that is misleading, discuss the context and possible incorrect conclusions that could be made, and consider the ethical aspect for the creator of the chart.

QUICK REFERENCE

Working with Chart Objects

It is possible to navigate through a chart using some of these guidelines:

- Click the chart border to activate the Chart Tools contextual tabs.
- Click chart objects to select individual chart components.
- Click outside a chart object or press **[Esc]** to deselect an object.
- Under the Chart Tools contextual tabs, on the Format tab, in the Current Selection group, use the Chart Elements box to select specific chart objects.
- Use border corner handles to resize selected objects.
- Click the chart border, and drag to move a chart object.

Explore the Positioning of Charts

When developing a chart, consider the chart location, as this might affect the flexibility of moving and resizing your chart components. There are two general locations for a chart—either within an existing worksheet or on a separate worksheet, referred to as a chart sheet. A **chart sheet** is a special worksheet that is dedicated to displaying chart objects. Excel 2013 has several new features that allow you to quickly analyze data. Two of these are the Quick Analysis tool and the Recommended Charts feature. The **Quick Analysis** tool is a contextual tool that appears when you select data in a worksheet and offers single-click access to formatting, charts, formulas, PivotTables, and sparklines. The Recommended Charts feature is located on the Insert tab on the Ribbon. The **Recommended Charts** feature quickly analyzes a selection in a worksheet and recommends chart types that best fit your data. The Recommend Charts option also appears in the Quick Analysis tool under the Chart heading.

Creating Charts in an Existing Worksheet

Placing a chart within a worksheet can be very helpful, allowing you to display the chart beside the associated data source. When comparing charts side by side, placing the charts on the same worksheet can also be handy. Additionally, placing a chart within the worksheet may offer easy access to chart components when copying and pasting components into other applications.

Your manager, Irene, would like you to work with some data. Irene would like the data organized and presented in an effective graphical manner to aid in the analysis of the data so it is more informative. Specifically she would like to compare the total number of massages given over an eight-week period of time.

E04.02



To Create a Chart in an Existing Worksheet

- a. Click the **ProductData** worksheet tab, and then select the range **A2:B12** as the data to use for creating a chart. Notice that once the data is selected, the Quick Analysis tool is displayed below and to the right of cell B12.
- b. Click **Quick Analysis** , and then click **CHARTS**.
- c. Point to the **Clustered Column** chart suggestion. Notice that a live preview of the chart is displayed.

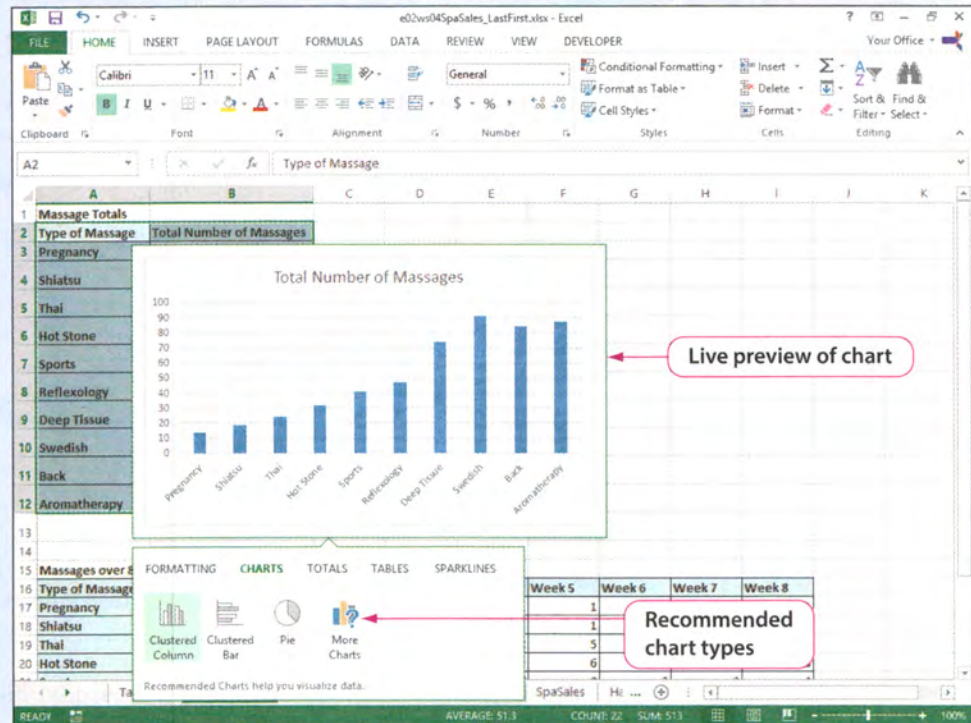


Figure 3 Quick Analysis tool with a suggested chart

- d. Click **Clustered Column** to insert the chart into the worksheet.
Notice the chart appears on the currently active worksheet and shows colored borders surrounding the associated data linked to the chart. This chart displays the total number of each type of massage offered by the Spa.
- e. Click the **chart border** when the pointer appears as a four-way arrow . Be careful not to click the corners or middle areas of the border that are designated by small handles and used for resizing the chart. Drag the **border** to move the chart to the right of the data so the top-left chart corner is approximately in cell D2.
- f. Click **Save** .

Modifying a Chart's Position Properties

Charts created within the worksheet will appear as objects that “float” on top of the worksheet. The default property settings resize the chart shape if any of the underlying rows or columns are changed or adjusted. Therefore if the width of a column that lies behind the chart is increased, the chart width will increase accordingly. It is possible to change this setting, locking the size and position of the chart so it does not resize or move when columns or rows are resized, inserted, or deleted.

For example, additional data may be added to the ProductData worksheet. This data may require underlying columns to be widened or new columns inserted. Without adjusting the default settings on the chart, it could become distorted when changes are made to the worksheet.

E04.03



To Modify the Chart Position on a Worksheet

- On the **ProductData** worksheet, right-click the **chart border**, and then click **Format Chart Area**. This will open the Format Chart Area task pane.
- In the Format Chart Area task pane, click **Size & Properties** , and then click the **PROPERTIES** arrow to expand the PROPERTIES group.
- Click **Move but don't size with cells**.

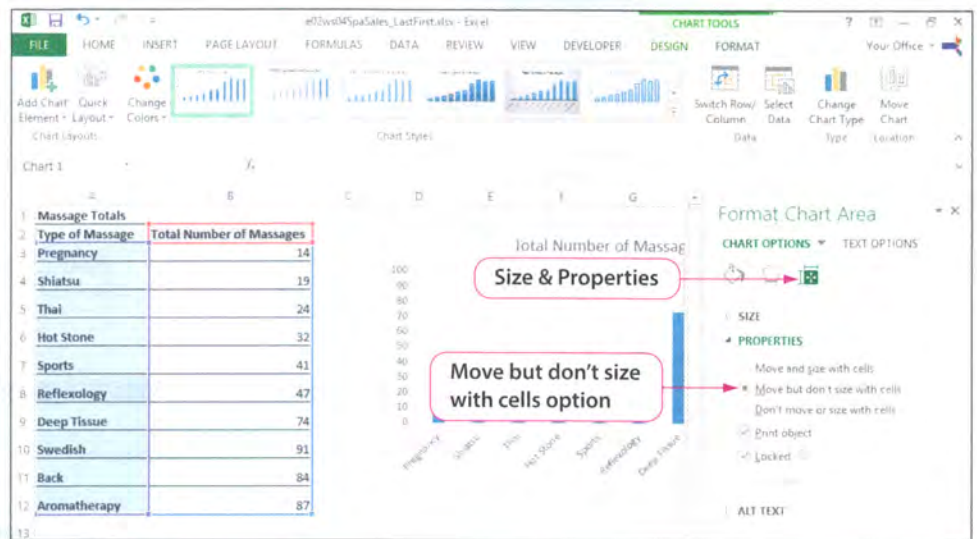


Figure 4 Format Chart Area task pane

- Close  the Format Chart Area task pane, and then click **Save** .

The chart size will not be resized if the width or height of the columns or rows underneath are changed or adjusted, but the chart will move along with the cells that it is sitting over. From here, you can easily move the chart by dragging the border, or you can resize the chart by clicking and dragging the corners.

Placing Charts on a Chart Sheet

As previously defined, a chart sheet is a worksheet that only contains chart objects. The familiar cell grid is replaced with the actual chart. Having the chart on a separate chart sheet can make it easier to isolate and print on a page. Chart sheets are also useful when you want to create a set of charts and easily navigate between them by worksheet names rather than looking for them on various worksheets. Due to the nature of chart sheets, the data associated with the chart will be on a different worksheet.

Irene has mentioned that she would like to use this chart in future presentations and would like to be able to easily isolate and print the chart. To facilitate this you will move the chart to a chart sheet.

SIDE NOTE**Moving a Chart**

The Move Chart button is a simple method for moving a chart from a worksheet to a chart sheet.

E04.04**To Move a Chart to a Chart Sheet**

- On the **ProductData** worksheet, select the **clustered column chart**.
- On the **CHART TOOLS DESIGN** tab, in the **Location** group, click **Move Chart**. The Move Chart dialog box is displayed.
- In the Move Chart dialog box, click the **New sheet** option. In the New sheet box, clear the **existing name**, and then type **TotalNumberOfMessages**. Click **OK**. Notice that you now have a new chart sheet tab in your workbook file. This chart sheet is exclusively for the chart and will not have the normal worksheet appearance.
- Applying a color to the worksheet tab will allow the chart sheet to be easily distinguished from the rest of the worksheets in the workbook. Right-click the **TotalNumberOfMessages** worksheet tab. Point to **Tab Color**, and then click **Blue, Accent 1** in the first row, fifth column as the tab color.



Figure 5 TotalNumberOfMessages chart sheet

- Click **Save**

Understand Different Chart Types

When creating a chart it is important to choose the correct type of chart to use. Each chart type conveys information differently. The chart type sets the tone for the basic format of the data and what kind of data is included. Thus, it helps to become familiar with the types of charts that are commonly used for business decision making and for presentations. Always consider which type is appropriate for the message you are trying to convey.

Creating Pie Charts

Pie charts are commonly used for depicting the relationships of the parts to the whole such as comparing staff performance within a department or comparing the number of transactions of each product category within a time period.

For a pie chart you need two data series—the labels and a set of corresponding values. This is similar to the data selection made in the TableUse sheet to indicate the percentage of times each person used the portable massage table. Note that the data can be described as a percentage of the whole as in the chart.

The questions you have will influence what textual data you will include in any chart. If you are exploring a use fee, then having the percentage would indicate which therapist would be contributing the most fees, and the actual numbers may not be a crucial element. When you create a chart, examine it to see if it answers your questions.

In this exercise, you will create a simple pie chart that shows the proportion of revenue each of four different massage types earned for the spa in the month of June.

E04.05



To Create a Pie Chart

- Click the **Revenue** worksheet tab, and then select the range **A1:E2**.
- Click **Quick Analysis** , click **CHARTS**, and then click **Pie**.
- Click the **chart border**, and then drag to move the chart to the upper left corner of cell **G4**. This will place the chart to the right of the data set.
- Point to the **bottom-right corner** of the chart until the pointer changes to , and then drag to resize the chart so the bottom-right corner is over cell **M17**. This chart displays the proportion of revenue generated by each massage type.

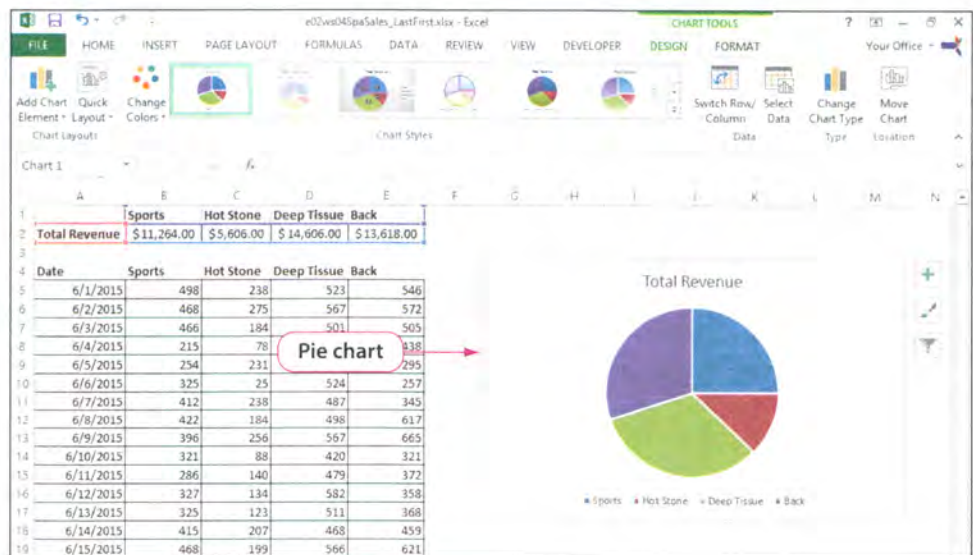


Figure 6 Total Revenue pie chart

- Click **Save** .

Even though all the data is used to show every massage type, you do not have to use all the data. If the goal is to examine the data and extract a portion of the information, like the fact that several massage types have low or high average ratings, it may be better to only show a few massage types rather than include too much information. Showing a subset of massage types may help to emphasize particular ratings.

In determining how to proceed once the data has been initially examined, start developing hypotheses and questions. For example, it may be that hot stone massages are very new and need to be marketed more as they currently represent a small portion of revenues. Develop questions, and then use the data to determine the validity of the questions and make strategic decisions.

Creating Line Charts

Line charts help convey change over a period of time. They are great for exploring how data in a business, such as sales or production, changes over time. Line charts help people to interpret why the data is changing and to make decisions about how to proceed. For example, when a doctor examines a heart rate on an electrocardiogram, he or she is looking at data over time to see what has been happening. The doctor wants to determine if there are issues, and then make decisions whether the patient should go home, be given medications, or have surgery.

To create a line chart you need to have at least one set of labels and at least one set of corresponding data. It is possible to have multiple data series, each series representing a line on the chart. You have been provided with data listing revenue generated by four different types of massages. The data is organized by day throughout the month of June. In this exercise, you will create a line chart displaying daily revenue by massage type in June. Each day will appear as a point on the line that is created. Each massage type would be a separate line on the chart.

E04.06



To Create a Line Chart

- a. On the **Revenue** worksheet, select cell **A4**, press **[Ctrl]**, and then press **[A]** to select the entire data set, including the labels.
- b. Click **Quick Analysis** , click **CHARTS**, and then click **Line**.
- c. On the **CHART TOOLS FORMAT** tab, in the Current Selection group, click the **Chart Elements** arrow, and then click **Chart Title**. Type **Revenue by Massage Type for June** and then press **[Enter]**.
- d. Click the **chart border**, and then drag to move the chart to place the top-left corner in cell **G20**. This will place the chart to the right of the data set.
- e. Point to the **bottom-right corner** of the chart until the pointer changes to , and then drag to resize the chart so the bottom-right corner is over cell **M33**. This chart displays the revenue generated by each type of massage through the month of June.

SIDE NOTE

Inserting a Chart

Charts can also be inserted by clicking the Insert tab, and then in the Charts group, clicking Recommended Charts.

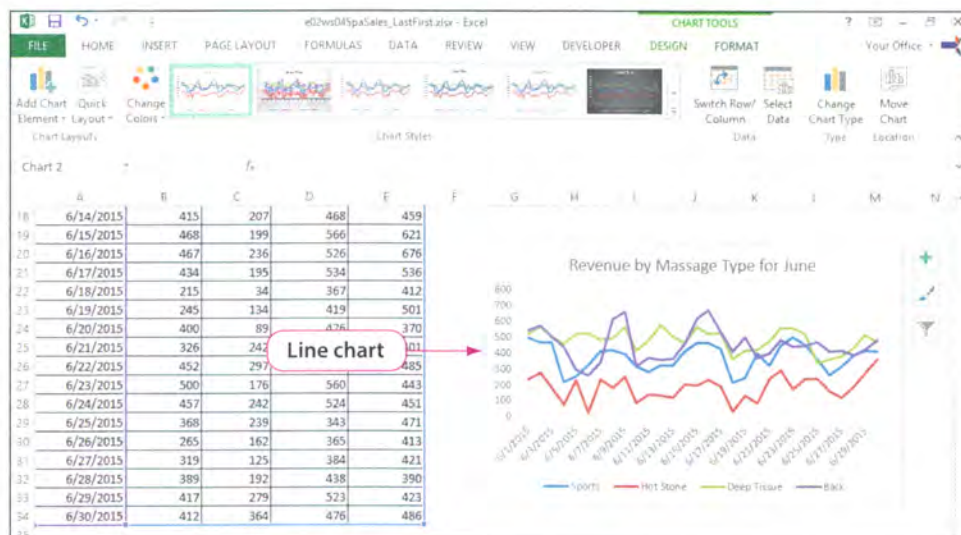


Figure 7 Revenue by Massage Type for June line chart

Troubleshooting

If you end up with a chart that looks dramatically different than what you would expect, check the colored borders around the linked data set. It is very common to select all the data in a table when the intention was to select just part of the data. If too much data was selected, you can delete the selected chart by pressing **Delete**. Alternatively, you could select the corner of a colored link data border and drag the border to adjust the set of data. The blue-border data is displayed in the chart. When that border is adjusted, the associated label data is automatically adjusted accordingly. The chart is also automatically adjusted so changes can be immediately seen.

f. Click **Save** .

Creating Column Charts

Column charts are useful for comparing data sets that are categorized, like departments, product categories, or survey results. Column charts are also useful for showing categories over time where each column represents a unit of time. Column charts are good for comparisons both individually, in groups, or stacked. Column chart data can easily allow for grouping of data so comparisons of the groups can occur.

In the TotalNumberOfMessages chart it is easy to interpret that pregnancy massages represent a small portion of the total massages provided. On the other hand, Swedish, aromatherapy, back, and deep tissue massages represent a large portion of the data.

Creating Bar Charts

Bar charts are useful for working with categorical data. Bar charts are similar to column charts except the bars are horizontal representations of the data rather than vertical. Like column charts, bar charts can depict a single piece of data, can be grouped data series, and can be stacked.

Because bar charts typically use groups and sum data, stacked bar charts can be useful when you want to see how the individual parts add up to create the entire length of each bar. For example, with the data on the ProductData worksheet, you may want to compare each type of massage, summing revenue or counting sales for each type of massage.

The x-axis would be number of massages or revenue. While it is the same data as used for the line chart, it conveys information about an output without the emphasis on time that is inherent with the line chart.

While bar charts are often viewed as simply being column charts turned on their sides, there is a particular bar chart that does use time values on the x-axis. It is a **Gantt chart**, which shows a project schedule where each bar represents a component or task within the project. The breakdown of tasks is useful for scheduling. Gantt charts are commonly used with project management. Gantt charts can be complex showing start times, end times, sequence of tasks, and people assigned to each task. A basic Gantt chart can be created that is informative and helps a team successfully complete a project. You have been asked to create a Gantt chart that will assist Irene and Meda visualize the timeline of a project to redesign the massage therapy rooms.

E04.07



To Create a Bar Chart

- a. Click the **RedesignProject** worksheet tab, and then select the range **A3:D8**.
- b. Click **Quick Analysis** , click **CHARTS**, and then click **More Charts**.
- c. In the Insert Chart dialog box, click the **All Charts** tab, and then click **Bar** from the list of chart types. Click **Stacked Bar** , and then click **OK**.
- d. Click the **Chart Title**, type **Project Schedule** and then press **Enter**.
- e. Click the **blue data bar** within the chart corresponding with the Series "Start Date" to select the data series. **Right-click** a blue data bar, and then select **Format Data Series**. In the Format Data Series task pane, click **Fill & Line** .
- f. Click the **FILL** arrow to expand the FILL group, and then click **No Fill**.
- g. Click the **BORDER** arrow to expand the BORDER group, and then click **No Line**.
- h. Click the **Vertical (category) Axis** corresponding to the project tasks. In the Format Axis task pane, click **Axis Options** , and then select **Categories in reverse order**.
- i. Click the **Horizontal (value) Axis** corresponding to the start dates above the plot area. In the Format Axis task pane, click **TEXT OPTIONS**, and then click **Textbox** . Click in the box for **Custom angle**, if necessary delete the existing value, and then type **45**. Press **Enter**.
- j. Click the **chart border**, and then drag so the top-left corner is over cell **A11**. This chart visually displays both the number of days completed and the number of days remaining for each project listed in the worksheet.

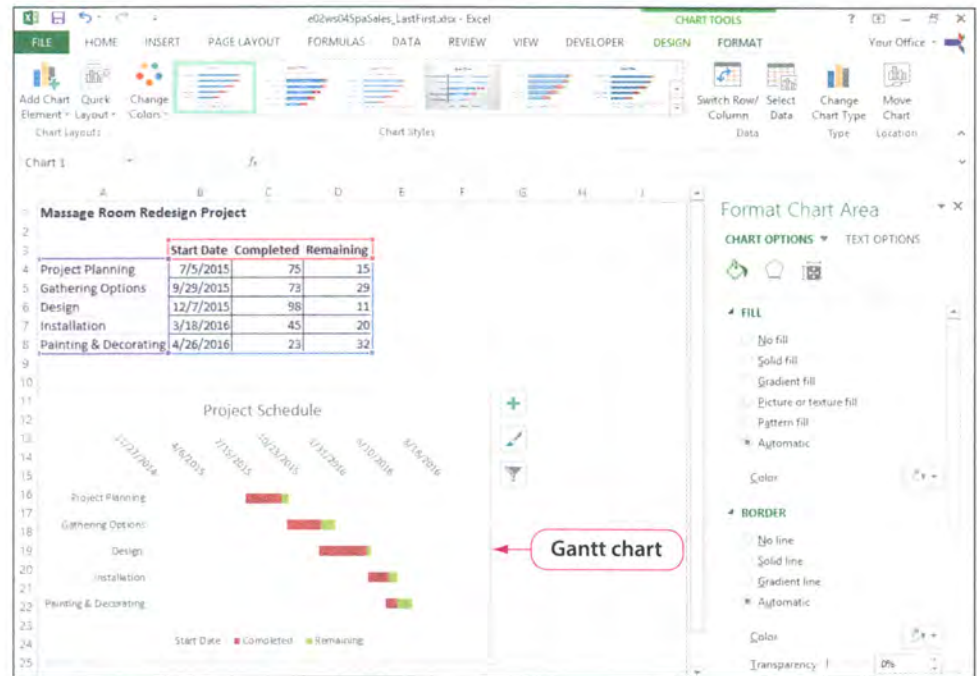


Figure 8 Completed Gantt chart

k. Close  the Format Chart Area task pane, and then click **Save** .

The resulting Gantt chart depicts the time for each task in the project. For each bar, the task is set up with the amount completed and the amount that is remaining. The tasks are staggered to show the relation of each task to the other.

Creating Scatter Charts

Scatter charts, also called scatter plots, are a particular type of chart that conveys the relationship between two numeric variables. This type of chart is very common as a statistical tool depicting the correlation between the two variables. The standard format is to have the x-axis data on the far-left column and the y-axis data in a column on the right side.

Irene and Meda have data from a survey showing the requested temperature of the room used for massages and the age of the customer. This data may reveal important information as to what temperature is typically requested by different age groups. They have asked you to create a scatter chart of the requested temperatures of rooms and ages of customers.

E04.08



To Create a Scatter Chart

- Click the **Survey** worksheet tab, and then select the range **A2:B53**. This will include the data and labels for Age and Temp.
- Click **Quick Analysis** , click **CHARTS**, and then select **Scatter**.
- Click the **chart border**, and then drag to move it to the right of the data so the top-left corner is over cell **E2**.
The default scale of the chart does not bring out any trends to the data. Adjusting the scaling of the y-axis will help display any trends in the data.
- Double-click the **Vertical (Value) Axis** corresponding to the temperature requested. In the Format Axis task pane, click **Axis Options** , click the **AXIS OPTIONS** arrow to expand the AXIS OPTIONS group, and then click in the box for **Minimum**.
- Select the existing number, type **65** and then press **Enter**.
Notice the resulting scatter plot has a slight upward trend as the age of the customer increases. This knowledge may lead to decisions that help provide better customer service.
- Click the **Chart Title**, type **Relationship Between Age and Temperature**, and then press **Enter**. This chart shows the relationship between increasing age and temperatures requested for massages.
- Close  the Format Chart Title task pane, and then click **Save** .

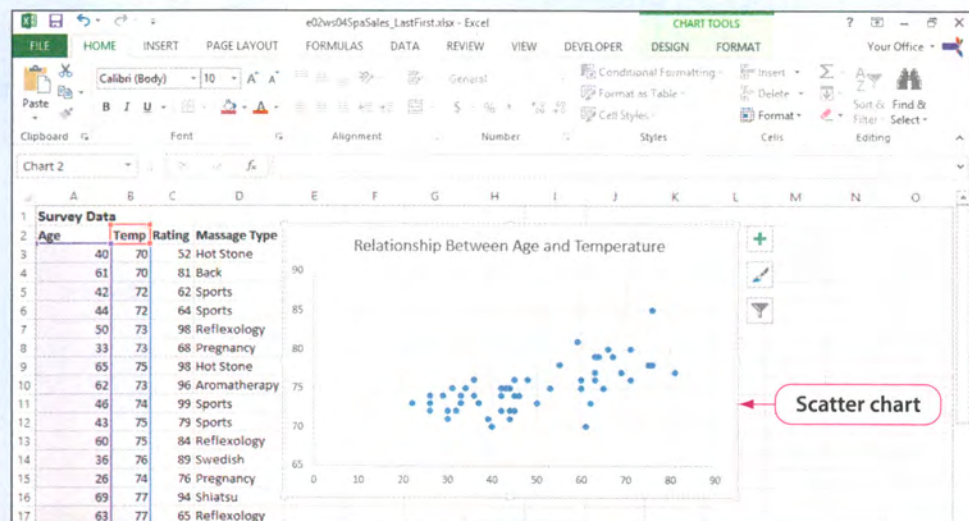


Figure 9 Scatter chart of temperature requested and age

Creating Area Charts

An **area chart** is a variation of a stacked line chart that emphasizes the magnitude of change over time and visually depicts a trend. The area chart stacks a set of data series and colors each area that is created. This type of chart has a nice visual characteristic because each colored layer changes, growing or shrinking, as it moves across time periods. Thus, with an area chart, the x-axis is typically a time sequence. The area chart could also use categories instead of time on the x-axis where each layer again is showing the individual contribution to the area; thus, it is a quantitative chart that shows growth or change in totals.

Irene has asked you to create a chart to further understand the differences in the types of messages given over the past eight weeks at the spa. You will create an area chart for this purpose.

E04.09



To Create an Area Chart

- Click the **ProductData** worksheet tab, and then select the range **A16:I26**.
- Click **Quick Analysis** , click **CHARTS**, and then select **Stacked Area**.
- Click the **Chart Title**, type **Message Types Over Past 8 Weeks** and then press **Enter**.
- Click the **chart border**, and then drag to move the chart so the top-left corner is over cell **D3**. This chart shows the total number of messages offered for each of the past eight weeks with emphasis placed on the different message types.

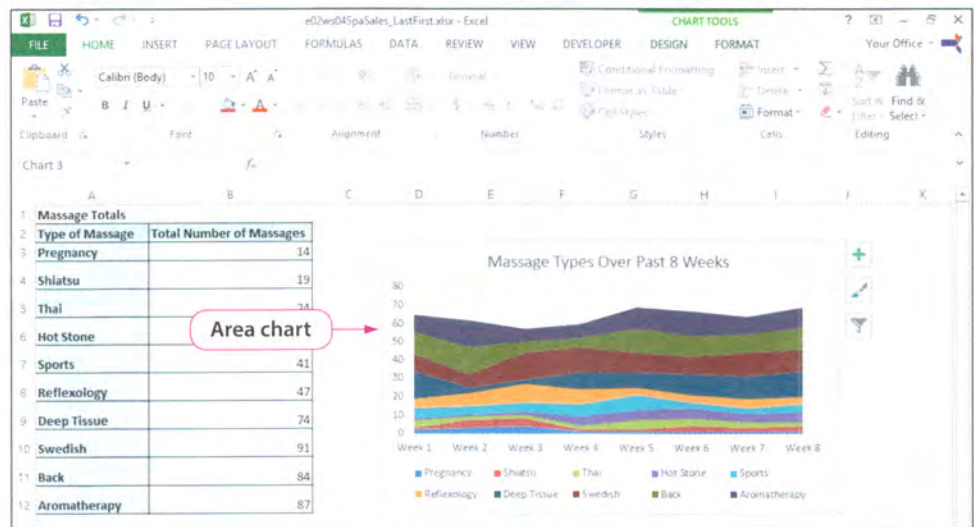


Figure 10 Area chart of message types over past 8 weeks

- Click **Save** .

QUICK REFERENCE

Chart Selection Guidelines

The common types of charts and their usage are listed below:

- Pie—Used for comparing the relationship of parts to a whole
- Line—Shows changes within a data series; often used with time on the x-axis
- Column—Compares data vertically; can incorporate a time element and groups
- Bar—Compares data horizontally; stacked bar can show progress, growth
- Scatter—Used for correlations, exploring the relationship between two variables
- Area—Used to highlight areas showing growth over time or for categories; a variation of a line chart list

Creating Combination Charts

A **combination chart** displays two different types of data by using multiple chart types in a single chart object. Combination charts can enhance the understanding of data when the scale of data needing to be charted varies greatly. For example, consider monitoring the number of items sold in the spa to customers over a 12-month span of time. To fully comprehend the data it would be helpful to explore both the number of items sold and the profit from items sold. However, a single item may cost hundreds of dollars. This makes creating a chart to compare these two pieces of data difficult. In prior versions of Excel, creating a combination chart was a difficult and time-consuming process. In Excel 2013, combination charts are a standard chart type.

Meda has asked that you analyze the quantities of spa products sold from the prior year's sales and compare that to the profits over the same time span. Currently, only data from January to November is available. Meda has asked that you proceed with creating a chart and add the December data when it becomes available.

E04.10



To Create a Combination Chart

- a. Click the **SpaSales** worksheet tab, and then select the range **A1:C12**.
- b. Click **Quick Analysis** , click **CHARTS**, and then select **More Charts**.
- c. In the Insert Chart dialog box, click the **All Charts** tab. From the list of charts, click **Combo**.
Before you insert the chart, you will have an opportunity to customize how the data will look. The default chart shows the month on the x-axis while using a line chart for profit—in red, and a clustered column chart for quantity sold—in blue.
- d. Next to **Profit**, click to select the **Secondary Axis** check box. This scales the line chart for profit on a separate axis from quantity, allowing the trend over time between the two to be compared. Click **OK**.
- e. Click the **Chart Title**, type **Quantity Sold and Profit** and then press **Enter**.
- f. Click the **chart border**, and then drag to move the chart so the top-left corner is over cell **E2**.

This chart compares the number of spa products sold and the profit from products sold in the same chart. Notice that in January the profit for items sold is lower than might be expected by the quantity sold.

Combination chart

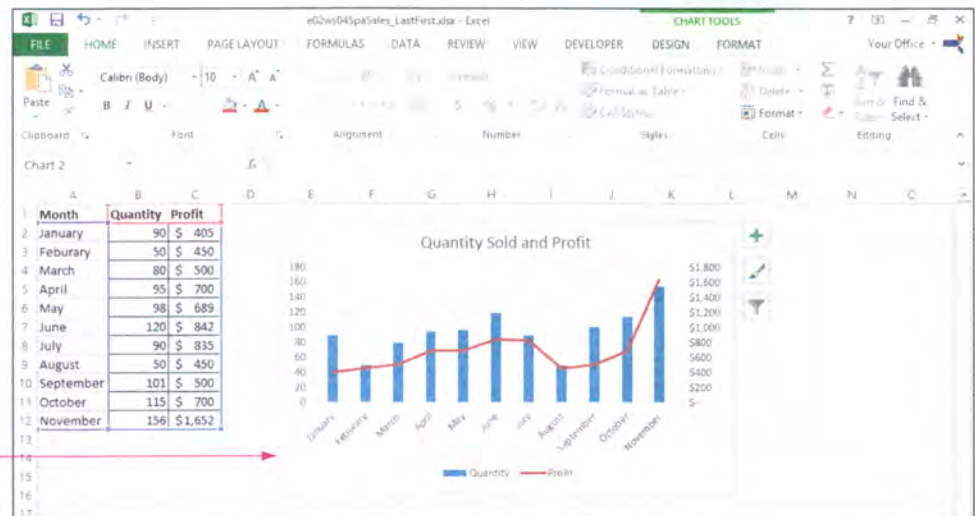


Figure 11 Combination chart of quantity sold and profit

g. Click **Save** .

Exploring Chart Layouts

As you have seen, a chart can help answer questions and may even generate more questions. This helps move toward the understanding of information, which can also lead to better decision making. Creating these initial charts to explore data is quick and efficient and informs the user.

When presenting a chart to others, the context of the chart is of utmost importance. Without context, your audience will try to guess the context. You need to provide meaning.

Providing context means providing textual guidance to the audience. The audience will see the pie chart, but you need to inform them more about the data. Thus, labels are another crucial element needed to provide context in charts. The labels include the chart title and axes titles, the legend, and the labels for the data. All these elements should work cohesively to convey a complete picture of what the chart is trying to convey to the audience. In this section, you will change the appearance of charts by altering their layout and color patterns. You will also add chart titles and modify the titles of the chart axis.

Change Chart Data and Styles for Presentations

While the default chart settings are pleasant visually, you can still improve the look and feel of the chart. The chart layouts are available under the Chart Tools contextual tabs, on the Design tab, in the Chart Layouts group. Excel provides many options for arranging the components on a chart. This includes placement of the titles and legend as well as the display of information such as the data point values.

Chart styles are a variation of chart layouts. Where chart layouts focus on location of components, styles focus more on the color coordination and effects of the components. Chart styles are located on the Chart Tools Design tab, in the Chart Styles group. For easier access, Excel 2013 displays the Chart Styles icon to the right side of any chart when it is selected. The choices mix color options with shadows and 3-D effects to create a variety of templates. You can also start with a template, and then adapt it to suit your tastes.

Chart data is the underlying data for the chart and labels. There can be many reasons for modifying data, and it can be accomplished through various methods. For example, if the data needs to be swapped between the data points and the axis data, you can use the Data group to switch rows and columns or select new data for a chart.

Changing the Appearance of a Chart

Because charts in Excel are connected to data on the worksheet, changes to the data are automatically reflected in the chart. This is extremely useful if you have a model that is using some calculations that are then used in a chart. You can do what-if analysis by changing data in a worksheet; the corresponding changes will appear on the chart.

Charts may need to be modified when the amount of data being charted needs to be changed. For example, a chart might have too much information included, making it difficult to get a clear picture. Conversely, a chart may need to be modified as new data becomes available. If the new data is adjacent to the existing data, it is a simple process to expand the existing data series. This is achieved by resizing the borders around the data series after activating the chart. Irene has just provided you with the December data for quantity and profit for the spa. You need to add this data to the SpaSales worksheet and adjust the combination chart accordingly. Additionally you will modify the appearance of the chart.

E04.11



To Modify the Layout and Data in an Existing Chart

- a. On the **SpaSales** worksheet, click cell **A13** to select it.
- b. Type **December** and then press **[Tab]**. Type **165** and then press **[Tab]**. Type **1701** and then press **[Ctrl] + [Enter]**.
- c. Click the **chart area** portion of the chart. Click the **sizing handle** on the lower edge between cells **A12** and **B12**, and then drag the sizing handle down one row so that the range **A2:C13** is now being charted. The chart will now display the quantity sold and profits for the month of December.
- d. On the **CHART TOOLS DESIGN** tab, in the Type group, click **Change Chart Type**.
- e. Near the bottom of the Change Chart Type dialog box, next to the Profit series, click the **Chart Type** arrow. Select **Area**, and then click **OK**.
- f. To the right of the chart, click **Chart Styles** , scroll down, and then click **Style 6**. Click **Chart Styles**  to close the style gallery.
- g. On the **CHART TOOLS DESIGN** tab, in the Chart Layouts group, click **Quick Layout**. In the displayed gallery, click **Layout 9**. Notice that the new layout added labels for the x- and y-axis on the chart. These axis titles will be revised at a later point.

Combination chart with modified style and labels



Figure 12 Modified combination chart

h. Click **Save** .

Inserting Objects

If you work for a company, it would be useful to insert the company logo into any chart that is used outside the company. After all, marketing occurs everywhere. It may also be useful to use images to help convey the tone of the presentation. This can be accomplished with an image inserted into the chart. Irene mentioned she would be using the chart sheet in the workbook in a variety of presentations. Given this, you will modify the appearance of the chart by inserting the Turquoise Oasis Spa logo and a shape object containing the title of the chart.

E04.12



To Insert Objects into a Chart

- Click the **TotalNumberOfMessages** chart worksheet tab, and then select the **chart**, if necessary.
- Click the **INSERT** tab, and then in the Illustrations group, click **Pictures**. In the left pane of the Insert Picture dialog box, navigate to the location where you store your student data files, and then click **e02ws04TurquoiseOasis**. Click **Insert**.
- On the **PICTURE TOOLS FORMAT** tab, in the Size group, click the **Shape Height**  box. Clear any existing text, type **0.9** and then press **Enter**.
- Click in the **Chart Area**. On the **CHART TOOLS DESIGN** tab, in the **Chart Layouts** group, click **Quick Layout**. In the gallery that appears, click **Layout 4**. Notice that the new layout added labels for the x-axis on the chart.
- Click any of the **columns** in the chart. On the **CHART TOOLS FORMAT** tab, in the **Shape Styles** group, click the **More** arrow, and then click **Subtle Effect - Orange, Accent 6** in the fourth row, seventh column.
- Click the **INSERT** tab, and then in the Illustrations group, click **Shapes**. In the displayed gallery, in the Rectangles group, click **Rounded Rectangle**—the second option. Click to place the **rectangle** below the Turquoise Oasis Spa logo.

- g. Type **Number of Massage Services by Type**. On the **DRAWING TOOLS FORMAT** tab, in the Size group, click the **Shape Height**  box, type **0.8** and then press **Enter**. In the **Shape Width**  box, type **2.2** and then press **Enter**.
- h. In the Shape Styles group, click the **More** arrow, and then select **Subtle Effect - Orange, Accent 6** in the fourth row, seventh column.
- i. Click the **HOME** tab, and then in the Font group, click the **Font Size** arrow, and then select **16**.

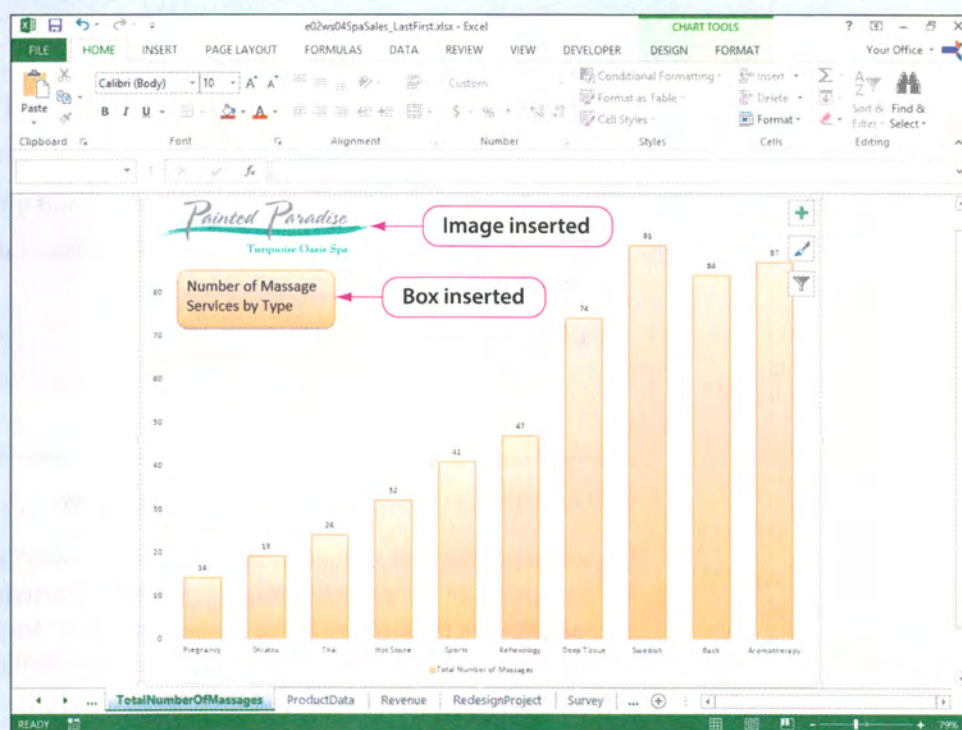


Figure 13 Picture and shape inserted into a chart

- j. Click **Save** .

Exploring Titles for the Chart and Axes

Chart and axes titles are added easily under the Chart Tools Format tab or with the Chart Elements button that appears on the right side of charts in Excel 2013. Chart titles can be added within the chart or they can reference cells on the spreadsheet for easy updating. You have been asked by Meda to alter the title of the Gantt chart on the RedesignProject worksheet to match the text in cell A1. She has also asked you to clarify the horizontal and vertical axis labels on the combination chart in the SpaSales worksheet.

E04.13



To Modify Chart Titles and Axis Labels

- a. Click the **RedesignProject** worksheet tab, and then click the **chart border** of the Gantt chart.
- b. Click the **chart title** at the top of the chart, and then click the **formula bar**. Type **=** and then click cell **A1**.
- c. Press **Enter**.
Notice the title of the chart now matches the contents of cell A1. If the text in cell A1 is changed, the chart title will be updated automatically.
- d. Click the **SpaSales** worksheet tab, and then click the **chart border** of the combination chart. Click the **Horizontal (Category) Axis Title** box, and then press **Delete**.
- e. Click the **Vertical (Value) Axis Title**, type **Quantity** and then press **Enter**.
- f. On the **CHART TOOLS DESIGN** tab, in the Chart Layouts group, click **Add Chart Element**.
- g. Point to **Axis Titles**, and then select **Secondary Vertical**. Type **Profit** and then press **Enter**.
- h. Click **Save**

CONSIDER THIS

The Unit of Analysis

You are presented with a chart titled “2013 Sales Report” and the x-axis is showing 20, 30, 40, and so on for the scale. What is this report depicting? Is it the number of sales transactions—number sold—or the revenue for 2013? Are the 20, 30, and 40 the actual numbers or in hundreds or thousands? What context should there be to make certain the audience knows the meaning of the chart?

Working with the Legend and Labeling the Data

The legend is an index within a chart that provides information about the data. With some charts the legend is added automatically. With other charts, such as pie charts, it is possible to incorporate the same information beside each pie slice as labels.

When the parts are labeled on the chart, the legend is not needed and can be removed. Labels can also be added alongside the data on the chart. This is quite informative as it moves the information from a legend to the data. This can be a visually useful addition.

The data labels can be added, moved, or removed through the Chart Elements button that appears to the right of a selected chart or through the Chart Tools Design tab.

E04.14



To Work with Legends and Data Labels

- a. Click the **Revenue** worksheet tab, and then click the **chart border** of the line chart.
- b. To the right of the chart, click **Chart Elements** , move the pointer over **Legend** and click the **Legend** arrow, and then click **Right**.
- c. Click the **chart border** of the pie chart. To the right of the chart, click **Chart Elements** , and then click to select the **Data Labels** check box. Click the arrow next to **Data Labels**, and then select **Data Callout**.
- d. Click **Legend** to clear the check box. This will remove the legend from the pie chart.
- e. Click **Chart Elements**  again to close it, and then click **Save** .

Troubleshooting

Adding and removing chart elements may alter the position of other elements of your chart. You may need to reposition existing or new elements in the chart to clarify the meaning of the chart.

SIDE NOTE

Deleting Chart Elements

Chart elements can be easily removed by selecting them in the chart and pressing **Delete**.

Modifying Axes

The x-axis and y-axis scales are automatically created through a mathematical algorithm within Excel. However, sometimes the scale needs to be modified as you have already seen. For example, when the scale of numbers is large, a significant gap can exist from 0 to the first data point. In this case, you can modify the scale to start at a more appropriate number instead of 0—the standard minimum value for Excel. When you need to compare two or more charts, the scales must be consistent. Any time you put charts side by side, you need to also make sure your x-axis and y-axis scales are the same. Your audience may not realize otherwise and make incorrect assumptions or decisions. The axis data may also be too crowded, making it difficult to read. In this situation, you would be able to modify the layout of the scale by adjusting the alignment of the data. The data on the axis can be vertical, horizontal, or even placed at an angle.

The Format Axis task pane is used to manually set the axis options for consistency between a set of charts. Under the Axis Options, the default Excel scale minimum and maximums are set automatically based on data. This setting can be changed to allow for customized minimum and maximum values to be applied to the chart. If the source data for the chart is changed, the scale will remain fixed and will not automatically be updated; therefore, any fixed values may also need to be reevaluated as source data changes.

SIDE NOTE

Format Task Pane

If the Formatting task pane is open, click an element within the chart to activate the corresponding options within the pane.

E04.15



To Modify a Chart Axis

- Click the **RedesignProject** worksheet tab, and then click the **chart border** of the Gantt Chart.
- Double-click **Horizontal (Value) Axis** at the top of the chart. This will open the Format Axis task pane to the Axis Options group. Click the **Minimum** box. The value displayed is the Excel serial number for the date 12/27/2014.
- Delete the existing value, type **7/1/2015** and then press **Enter**. Excel will recognize that you have typed a date into the field and translate this into the serial number 42186.
- Close the Format Axis task pane.

Troubleshooting

If the value you type in any of the Axis Options boxes does not work for your chart, click the Reset button to the right of the box to change the value back to the chart default.

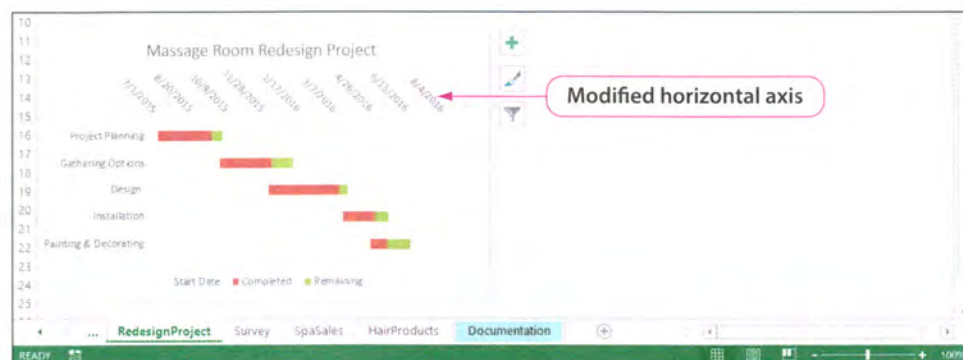


Figure 14 Gantt chart with a modified axis

- Click **Save** .

Changing Gridlines

Gridlines are the lines that go across charts to help gauge the size of the bars, columns, or data lines. In Excel, the default is to display the major gridlines—the gridlines at the designated label values, and not to display the minor gridlines—the gridlines between the label values. If the chart is a line or column chart it puts in the horizontal major gridlines while the bar chart puts in vertical major gridlines. The default is a good starting point, but personal preferences can dictate which lines to display. The Format Major Gridlines task pane allows for the customization of gridlines in a chart.

E04.16



To Modify Gridlines on a Chart

- Click the **Revenue** worksheet tab, and then click the **chart border** of the line chart.
- To the right of the chart, click **Chart Elements** , move the pointer over **Gridlines** and click the **Gridlines** arrow, and then select **Primary Major Vertical**.
- Click **Chart Elements**  again to close it.

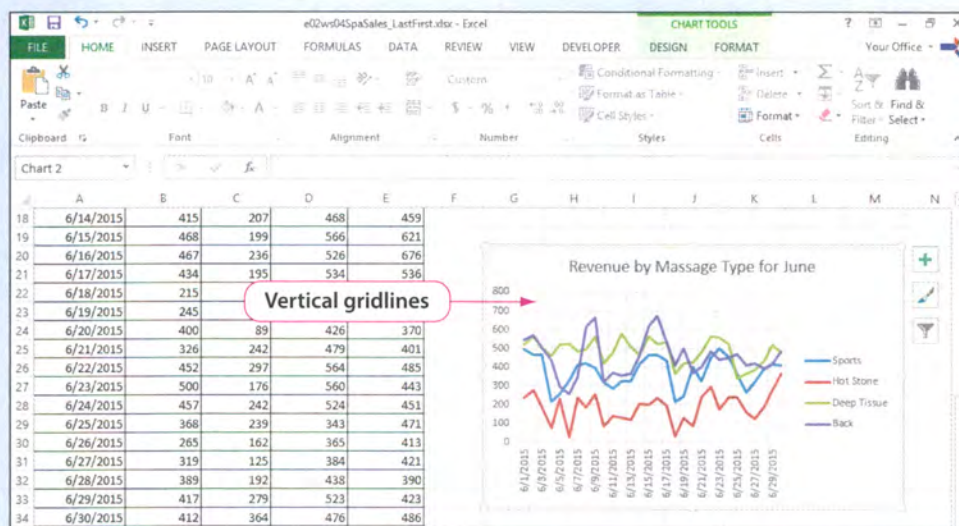


Figure 15 Vertical gridlines added to a line chart

- Click **Save** .

Analyzing with Trendlines

A common analysis tool to use within a chart is the trendline. A **trendline** is a line that uses current data to show a trend or general direction of the data. Data, however, can have a variety of patterns. For scatter plots that explore how two variables interact, a linear trend may be seen. If data fluctuates or varies a great deal, it may be more desirable to use a moving average trendline. Instead of creating a straight line based on all the current data, the moving average trendline uses the average of small subsets of data to set short trend segments over time. The moving average trendline will curve and adjust as the data moves up or down.

The trend or pattern of the data may suggest or predict what will happen in the future. For linear trends, the predicted data can be charted using a linear trendline added to a scatter chart and the current trend of the data.

Adding a trendline for the scatter chart on the Survey worksheet data may help confirm the hypothesis that older customers desire a warmer room than younger customers. This may lead the staff to adjust the room temperature prior to a customer arriving. The staff could predict the desired temperature based on the age of the customer. This could help improve customer satisfaction. Again, you may want to consider other demographics—characteristics—of the customers that allow for providing a customized and personalized service that will build customer loyalty and repeat business. It is easier to retain existing customers than find new customers.

For example, the scatter chart on the Survey worksheet shows that as the age of the customer increases so does the temperature of the room they request. Adding a trendline to this chart will further illustrate this relationship.

E04.17



To Insert a Trendline

- Click the **Survey** worksheet tab, and then click the **chart border** of the scatter chart.
- To the right of the chart, click **Chart Elements** , and then click **Trendline**.
- Click the **Trendline** arrow, and then click **More Options**. In the Format Trendline task pane, click **Fill & Line** .
- Click the **Dash type** arrow, and then click **Solid** (the first option). Close  the Format Trendline task pane.

SIDE NOTE

Types of Trendlines

Different types of trendlines can be added to a chart using the Chart Elements button.

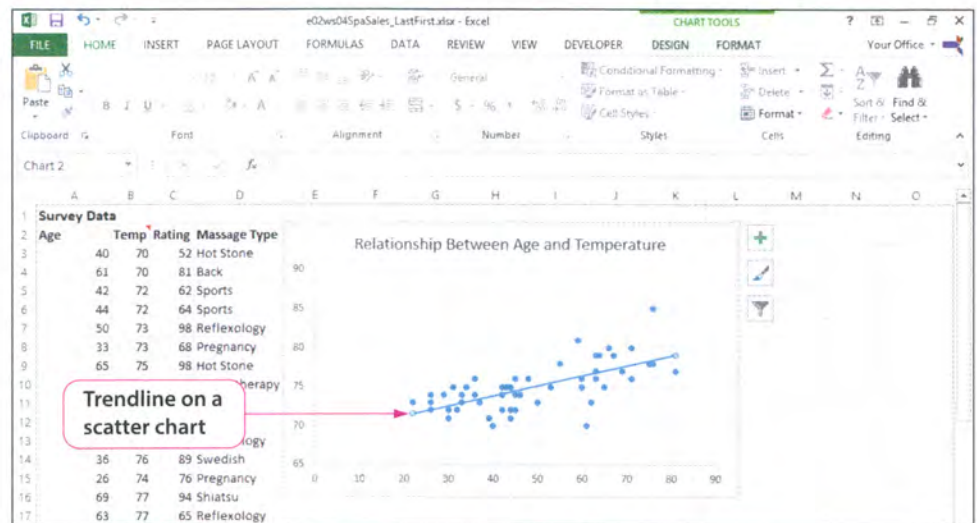


Figure 16 Scatter chart of age and temperature

- Click **Save** .

QUICK REFERENCE

Chart Trendlines

The following is a listing of the types of trendlines available within Excel:

- Linear trendline—Adds/sets a linear trendline for the selected chart series
- Exponential trendline—Adds/sets an exponential trendline for the selected chart series
- Linear Forecast trendline—Adds/sets a linear trendline with a two-period forecast for the selected chart series
- Two-Period Moving Average trendline—Adds/sets a two-period moving average trendline for the selected chart series

REAL WORLD ADVICE**The Timing of Trends**

Trends show patterns over time. When looking at hourly sales at a restaurant, it becomes important to look at more than one day's worth of hourly sales to obtain a better understanding of the trend. Charting multiple days reveals any trends and consistent patterns. For example, maybe it is discovered that on Friday and Saturday, hourly sales are consistently higher than other days of the week. This would suggest a need for scheduling more people to work on those days. If only one day had been charted, or even just one week, the overall weekly trends may have been missed or interpreted incorrectly.

Edit and Format Charts to Add Emphasis

When formatting a chart, it is important to have a plan in mind as to the overall layout and look and feel. With a well-thought-out plan, it will be easy to apply the desired adjustments to the components with regard to position, color, and emphasis. Typically, you can either create a unique layout or modify one of Excel's many layouts. Either way, being able to make formatting changes is easy and a very useful and powerful way to convey information. In this section, you will explore various ways to format a chart.

Adding Color to Chart Objects

Working some color into charts can be helpful from a marketing perspective. Excel offers options that allow changing the interior color as well as the border color. Chart colors can be added to match a company's color scheme or to highlight certain important aspects of the data. Remember, while it is possible to add value to charts with color, it is also possible to overdo it. Irene has mentioned to you that she will be using the pie chart on the Revenue worksheet in a presentation. She would like for you to enhance the visual appeal of the chart before her presentation.

E04.18**To Change the Coloring of a Chart**

- a. Click the **Revenue** worksheet tab, and then click the **chart border** of the pie chart.
- b. On the **CHART TOOLS DESIGN** tab, in the Chart Styles group, click **Change Colors**, and then in the gallery that appears, select **Color 4** (the fourth option).
- c. On the **CHART TOOLS FORMAT** tab, in the Shape Styles group, click **Shape Fill**, and then select **Orange, Accent 6, Lighter 40%**.

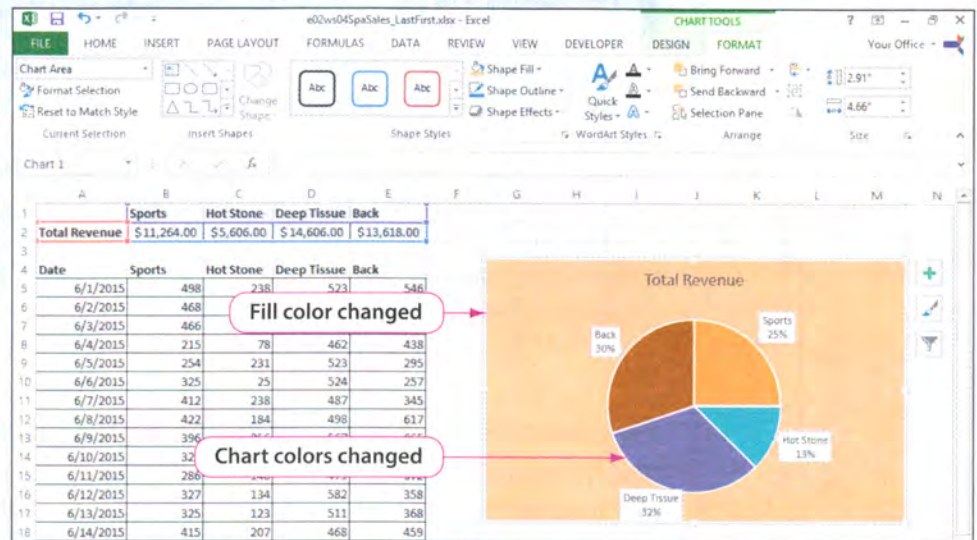


Figure 17 Pie chart with added color

d. Click **Save** .

Working with Text

Whether the text is in a box, title, legend, or axis scale, you can change the formatting of text and the backgrounds of the text objects in charts. The text can be formatted as WordArt, and shapes can be modified to common Shape Styles. The pie chart that was modified with a new color scheme now has a title that is difficult to read. Increasing the font size and bolding the font in the chart title box will address this problem.

E04.19



To Format Text Within a Chart

- On the **Revenue** worksheet, if necessary click the **chart border** of the pie chart.
- Click the **Chart Title**, and then on the **HOME** tab, in the Font group, click **Bold** . In the Font group, click the **Font Size**  arrow, and then select **16**.
- Click **Save** .

Exploding Pie Charts

The traditional pie chart is a pie with all the slices together. Preset options offer a pie chart with a slice pulled slightly away from the main pie, or you can manually move a slice outward creating an exploded pie chart. This technique allows for highlighting a particular piece of the pie. As part of her presentation, Irene wants to emphasize the hot stone massage type as it represents the least amount of revenue in the data series. Visual emphasis on this point can be easily created by exploding the slice of the pie chart representing the revenue percentage of hot stone massages.

E04.20



To Create an Exploding Pie Chart

- On the **Revenue** worksheet, if necessary click the **chart border** of the pie chart.
- Click the **plot area**. Notice that the entire pie is selected.
- Click the **Hot Stone** slice of the pie, and then drag the **slice** slightly to the right.

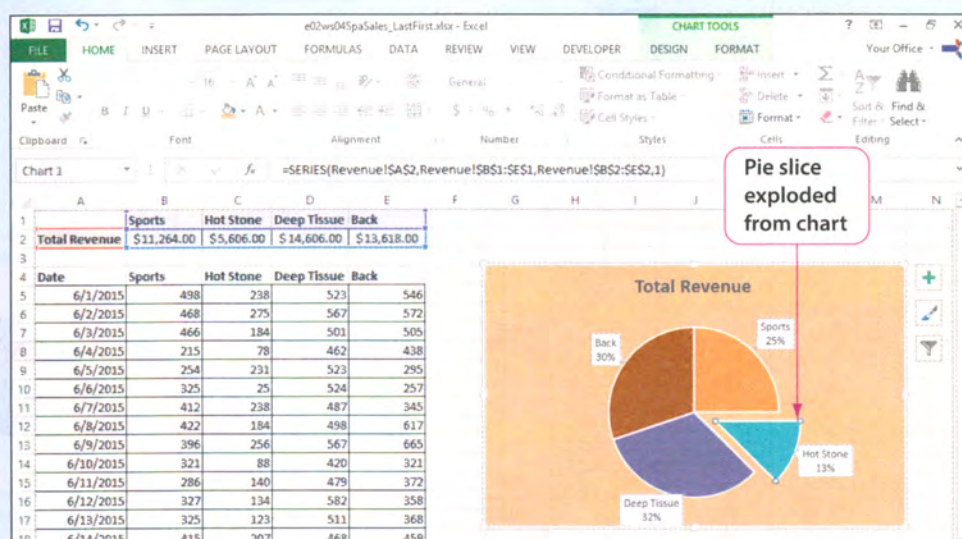


Figure 18 Exploded pie chart

- Click **Save**.

Changing 3-D Charts and Rotation of Charts

The 3-D effect and rotation of charts is something that should be used conservatively. The effect can be done well, or it can be overused, resulting in a chart that goes overboard and distracts from the intended message. You can choose the 3-D effect when starting to develop a chart. Additionally, options are available to rotate the 3-D effect, giving the chart a crisp distinctive look. The 3-D format can be applied to a variety of objects. The 3-D Rotation setting is intended for the chart area only. The pie chart showing the total revenue by massage type can be enhanced with 3-D effects and rotation.

E04.21



To Change the Chart Type to 3-D

- On the **Revenue** worksheet, if necessary click the **chart border** of the pie chart.
- On the **CHART TOOLS DESIGN** tab, in the Type group, click **Change Chart Type**.
- In the Change Chart Type dialog box, click the **All Charts** tab, click **3-D Pie**, and then click **OK**.
- Double-click the **chart area** to open the Format Chart Area task pane. Click **Effects**, and then click the **3-D ROTATION** arrow to expand the 3-D ROTATION group.

- e. Click in the box for **Y Rotation**, delete the existing value, and then type **50**. Click in the box for **Perspective**, delete the existing value, and then type **30**.
- f. Click the **3-D FORMAT** arrow to expand the 3-D FORMAT group. Click the **Top Bevel** arrow, and then select **Cool Slant** in the first row, fourth column. Close  the Format Chart Area task pane.

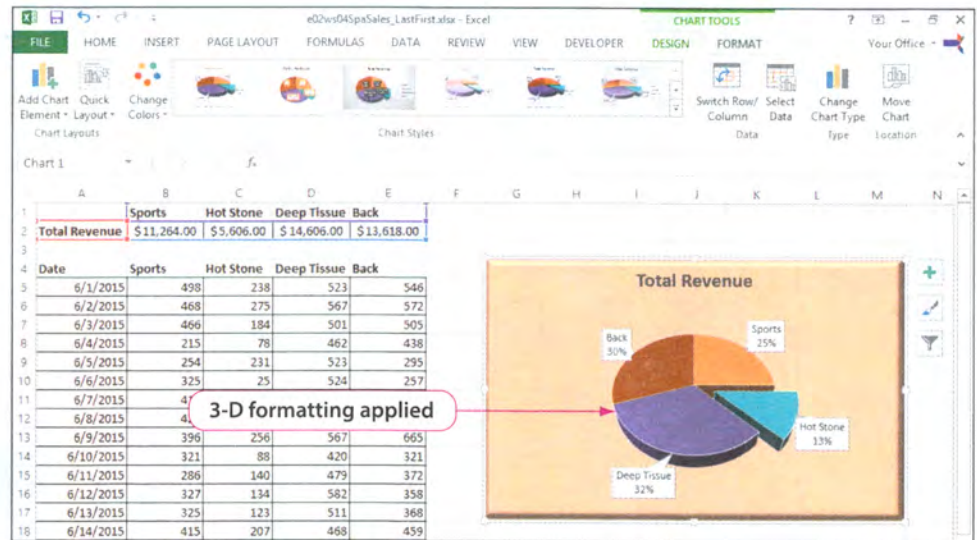


Figure 19 Pie chart with 3-D formatting applied

- g. Click **Save** .

QUICK REFERENCE

Formatting Options for Chart Objects

Below are format options for charts and their descriptions:

- Number—Format data as currency, date, time, and so on.
- Fill—Fill the background of a component with a color, picture, or pattern.
- Border Color—Set the color of the border for a component.
- Border Styles—Set the thickness and type of border for a component.
- Shadow—Add shadowing effect to a component.
- Glow and Soft Edges—Add glow and edge effects to a component.
- 3-D Format—Add 3-D effects to component.
- Alignment—Align text direction for a component, such as left, top, vertical, or horizontal.

Effectively Using Charts

The effectiveness of a chart is dependent on the chart type, the layout, and the formatting of the data. Charts should provide clarity and expand the understanding of the data. Charts used in a presentation should support the ideas you want to convey. The charts should highlight key components about an issue or topic being addressed in the presentation. Providing too much information on a chart can confuse or hide the issue being discussed. It can be difficult to get a point across if the chart is confusing, cluttered, or packed with too much information. In this section, you will use sparklines and data bars to emphasize data. You will also recognize and correct confusing charts.

Use Sparklines and Data Bars to Emphasize Data

The same data can be viewed through various perspectives, emphasizing different parts of information. Charts typically do three things:

- Support or refute assertions
- Clarify information
- Help the audience understand trends

Sparklines and data bars are tools in Excel that can accomplish these three goals.

Emphasizing Data

As with any set of data, you can reasonably expect to find multiple ideas that could be emphasized in a chart. Typically within a business, one to three key issues might be chosen for discussion. The idea is to eliminate any extraneous data from the chart that does not pertain to the issues being emphasized. Common methods can be employed to emphasize the idea in the chart. When using a single chart, highlight a particular data set within the chart to help focus attention to a key point. Depending on the chart type, the emphasis may be depicted differently as shown in Table 1.

Single Chart Types	Common Emphasis Methods
Pie chart	Explode a pie slice
Bar/Column	Use an emphasizing color on the bar/column
Line	Line color, weight, and marker size
Scatter	Adding a trendline

Table 1 Emphasis methods for single chart types

Exploring Sparklines

Sparklines are small charts that are embedded into the cells in a worksheet, usually beside the data, to facilitate quick analysis of trends. A sparkline can be used within a worksheet to give an immediate visual trend analysis, and it adjusts as the source data changes. The sparkline can graphically depict the data over time through either a line chart or a bar chart that accumulates the data. Sparklines can also depict data points in the series as a win/loss chart. The default setting is for values above 0 to be a win, while values below 0 are a loss. This value can be modified under the Format tab using the Sparkline Axis button.

Irene and Meda would like to better examine sales of hair products at the spa. They have collected some data for you to analyze from the last eight weeks. Adding sparklines adjacent to the data will emphasize the trend in products over time.

E04.22



To Insert Sparklines

SIDE NOTE

Alternate Method

Sparklines can also be inserted to the right of any data using the Quick Analysis tool.

- Click the **HairProducts** worksheet tab, and then select the range **A3:A7**.
- Click the **INSERT** tab, in the Sparklines group, click **Line**. In the Create Sparklines dialog box, in the **Data Range** box, type **C3:N7** and then click **OK**.
- On the **SPARKLINE TOOLS DESIGN** tab, in the Style group, click the **More** arrow, and then select **Sparkline Style Accent 2, Darker 50%** (first row, second column). The sparklines show the changes in hair products sold over the 12 months represented by the data.
- Click cell **A1** to deselect the sparklines.

Sparklines inserted into the worksheet

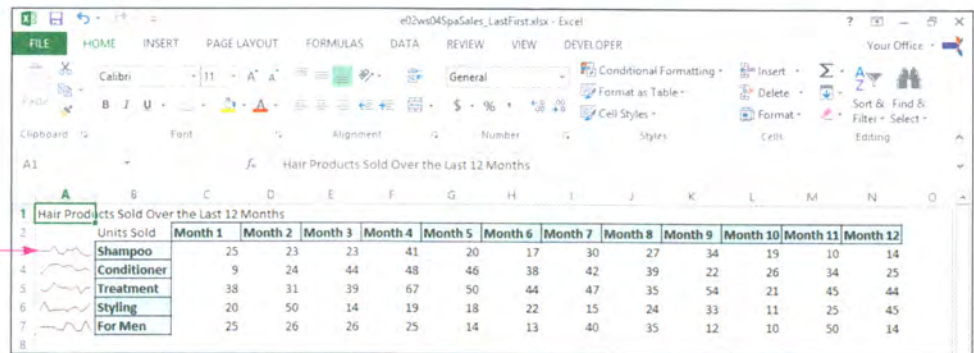


Figure 20 Sparklines applied to hair products data

- Click **Save**.

The sparklines show the trend in units of hair products sold over a 12-month time frame by type of product. For example, notice that the sales of the For Men products were steady until Month 7 when they spiked, came back down in month 9, and then spiked again in Month 11. This is very easy to visualize with sparklines next to the data.

QUICK REFERENCE

Working with Sparklines

Using the following process will help in the development of sparklines:

- Select any cell within the added sparklines to display the Sparkline Tools contextual tabs.
- Ungroup sparklines using the Ungroup button on the Sparkline Tools Design tab.
- Group sparklines again using the Group button on the Design tab.
- Change colors and styles using the options available in the Style group.
- Choose to show high or low points using the options in the Show group.

Inserting Data Bars

Data bars are graphic components that are overlaid onto data in worksheet cells. The graphic component is added to a cell and interprets a set of data in a range adjusting the bar and, if necessary, the bar color to help a spreadsheet user gain a quick understanding of the data. Data bars can be applied as a one-color solid fill or a gradient fill from left to right as the numerical value gets bigger.

Data bars are components of the Conditional Formatting feature. This technique can be employed with scores, ratings, or other data where the user would want to do a visual inspection to see a relative scale on the data. Irene and Meda have requested one more enhancement to the hair products analysis you have already begun. They would like a small visual cue added to a list of profits by hair product type. Adding data bars to the profits of all hair products sold at the spa over the past 12 months will provide emphasis on which products were and were not profitable.

SIDE NOTE

Alternate Method

Data bars can also be inserted from the Quick Analysis tool. The default color is blue if this method is used.

E04.23



To Insert Data Bars

- On the **HairProducts** worksheet, select the range **C10:C14**.
- Click the **HOME** tab, and then in the Styles group, click **Conditional Formatting**, and then point to **Data Bars**.
- Under Gradient Fill, select **Green Data Bar** (row one, second option). The inserted data bars clearly show that Conditioner is the highest grossing product while For Men is the lowest grossing product.
- Click cell **A1** to deselect the data bars.

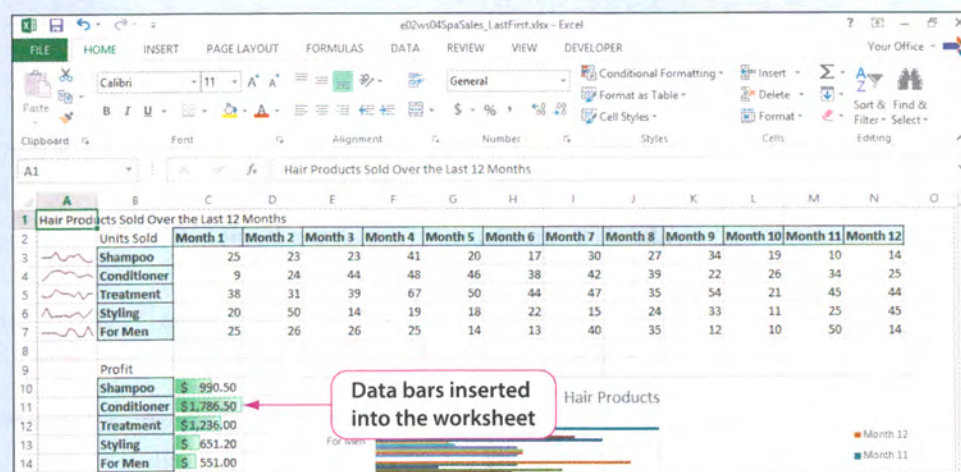


Figure 21 Data bars inserted

- Click **Save** .

Recognize and Correct Confusing Charts

The process of working with and creating visually appealing charts with clear messages involves recognizing when you have a confusing chart. It is possible to have too much information or ambiguous information. This could include missing labels or legends, or textual information on a chart that is not clear. Additionally, a commonly made error is to use the incorrect chart type when analyzing data.

Correcting a Confusing Chart

Irene has pointed out that on the **HairProducts** sheet, a clustered bar chart was created that is difficult to interpret. The chart is based on the same data from which you created sparklines. Irene would like to be able to use the chart to compare different lines of product. The chart that was created shows the number of units sold as the bars, with each product having a different bar for each month in the data.

E04.24



To Correct a Confusing Chart

- On the **HairProducts** worksheet, click the **chart border** of the clustered column chart.
- On the **CHART TOOLS DESIGN** tab, in the Type group, click **Change Chart Type**. In the Change Chart Type dialog box, on the **All Charts** tab, click **Line**, and then click **OK**.
- In the **Data** group, click **Switch Row/Column**. Since the data being charted is time sensitive, the time element should be shown on the x-axis.

Troubleshooting

Depending on your data, Excel may suggest a chart with the x- and y-axis already switched, saving you a step.

- Double-click the **Horizontal (Category) Axis** to open the Format Axis task pane. Click **TEXT OPTIONS**, and then click **Textbox**
- Click in the **Custom angle** box, if necessary delete the existing value, and type **45**. Close the Format Axis task pane.
- Click the **Chart Title**, click the **formula bar**, and then type **=**. Click cell **A1**, and then press **Enter**.
- To the right of the chart, click **Chart Filters** , and then under **SERIES**, click **Select All** to deselect all of the product options. Then click only the check boxes for **Shampoo** and **Conditioner**.

Troubleshooting

If the Chart Elements, Chart Styles, and Chart Filter buttons do not automatically appear to the right of the selected chart, use the horizontal scroll bar to create more space to the right of the selected chart. The buttons will only appear if there is enough space beside the chart.

- Click **Apply**, and then click **Chart Filters** again to close it. Notice that the lines for these two products do not show similar trends as might be expected.

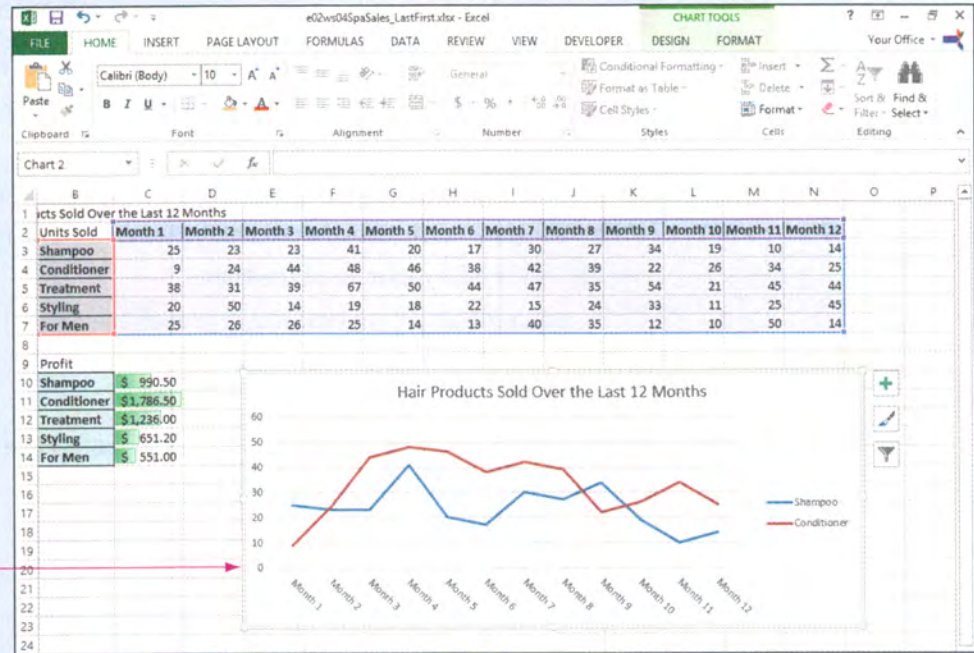


Figure 22 Corrected line chart

Troubleshooting

If you click the chart to see the source data associated with the chart and only see some of the data selected with a blue border, a chart component might have been clicked by mistake instead of the full chart area. To get the data set associated with the entire chart, under Chart Tools, click the Format tab. In the Current Selection group, change the Chart Element to Chart Area. Data associated with the selected component will be highlighted with a colored border.

i. Click **Save** .

Preparing to Print a Chart

Printing charts uses essentially the same process as printing a worksheet. When printing a chart sheet, select the chart sheet, go through the normal printing process, and adjust print options as you would for a worksheet. The chart will be a full-page display. If the chart is on a regular worksheet, it will be printed if you choose to print everything on the worksheet. In this case, the chart will be the size you developed on the worksheet. This is convenient when you want to print some tables or other data along with the chart. Finally, if you want to print just the chart on the worksheet, select the chart first, then choose the Print Selected Chart print option to print only the current chart.

Another useful technique when exploring data through charts is the ability to create static copies of the chart that can be used to compare with later versions. You can, in essence, take a picture of a chart that will not retain the underlying data. In this manner, subsequent versions of the chart can be made into images for comparisons. The process of creating a picture of the chart is to select the chart, copy it, then use the Paste Special option and paste it as a picture. When pasting as a picture, there are multiple picture format options such as a PNG, JPEG, or GIF files.

QUICK REFERENCE

Common Charting Issues

These are common issues you should try to avoid in the development of charts.

- Not enough context; users do not understand the chart.
 - Add titles to horizontal and vertical axis.
 - Add a chart title that conveys context of time and scope.
 - Add data labels to show percentages or values of chart elements.
- Too much information is on the chart.
 - Use a subset of the data, rather than all the data.
 - Summarize the data so it is consolidated.
- Incorrect chart type is used.
 - Choose a type more appropriate, such as a line chart for trends.
- Chart has issues with readability.
 - Check the color scheme to ensure text is readable.
 - Check font characteristics such as font type or font size.
 - Move data labels, and remove excess information.
 - Resize the overall chart to provide more area to work.
 - Check the color scheme and formatting so it is professional and does not hide chart information or text.
- Information or labeling is misleading.
 - Check the scaling to ensure it is appropriate and labeled for the correct units.
 - Consider the following wording: Does “Sales” mean the number of transactions or the total revenue?

E04.25



To Print a Chart

- On the **HairProducts** worksheet, click the **chart border** of the line chart.
- On the **FILE** tab, click **Print**. Notice that under Settings, the option for Print Selected Chart is selected by default.
- Verify that the selected chart fits within the orientation of the page. If necessary, change the orientation of the page to **Landscape Orientation**.
- Verify that the correct printer—as directed by your instructor—appears on the Printer button. Choices may vary depending on the computer you are using. If the correct printer is not displayed, click the **Printer** button arrow, and then click to choose the correct or preferred printer from the list of available printers. If your instructor asks you to print the document, click the **Print** button.
- Complete the Documentation worksheet and submit your workbook as directed by your instructor. Click **Save** , and then close  Excel.

Concept Check

1. What are some important items to consider when choosing the design and layout of a chart? p. 532
2. What are the two possible locations for a chart in Excel? Why would you choose one over the other? p. 536
3. Compare the purpose of a column chart and a pie chart. Give an example scenario for using the two different types of charts. p. 539–542
4. Why is it important to add elements and styles to charts such as titles, legends, and labels? p. 548
5. List two possible ways to add emphasis to an existing chart. p. 557
6. How are sparklines and data bars different from other chart objects in Excel? What are they commonly used for? p. 561–563
7. What are common mistakes that can be made when designing charts? Why is it important to correct these mistakes in existing charts? p. 564

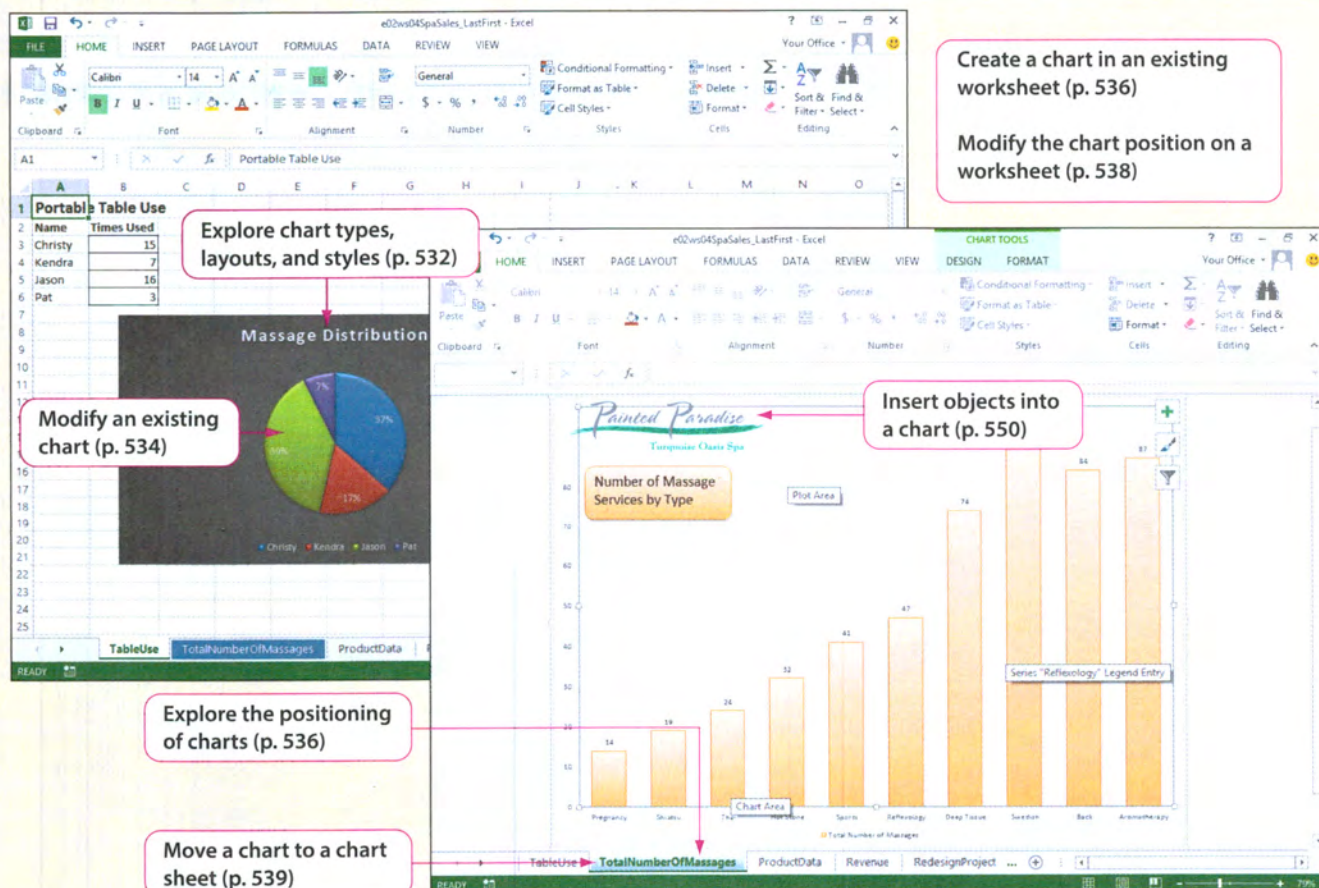
Key Terms

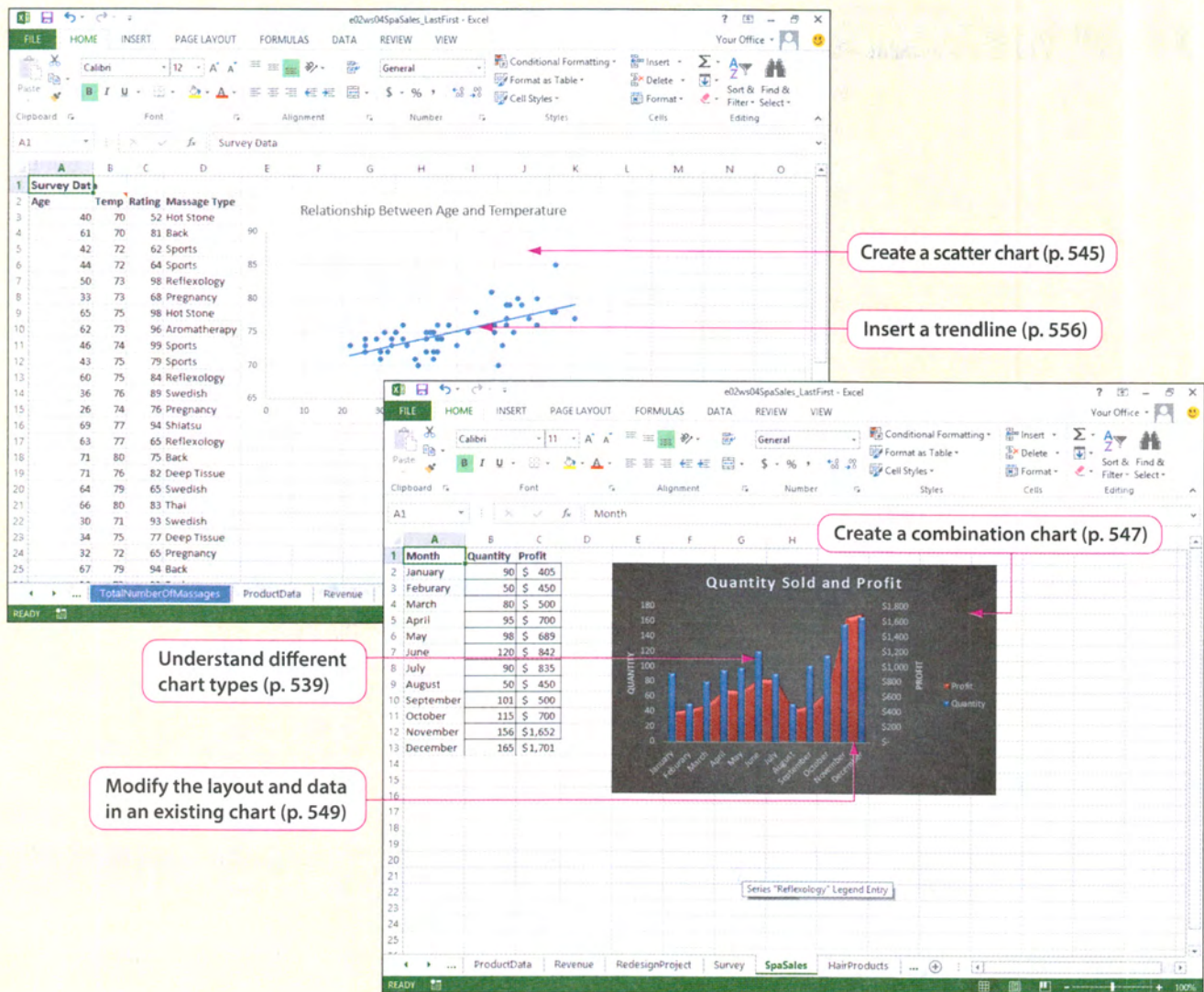
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 Argumentation objective 532
 Bar chart 542
 Chart sheet 536
 Column chart 542
 Combination chart 547
 Data bars 563

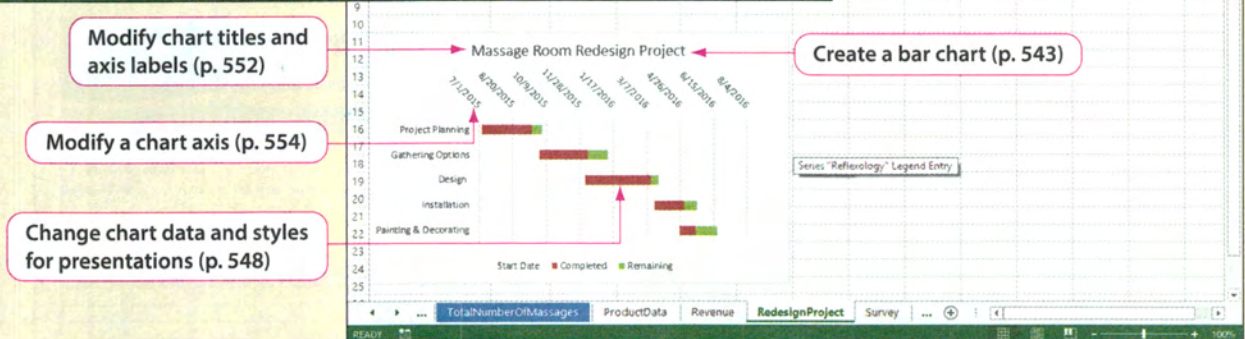
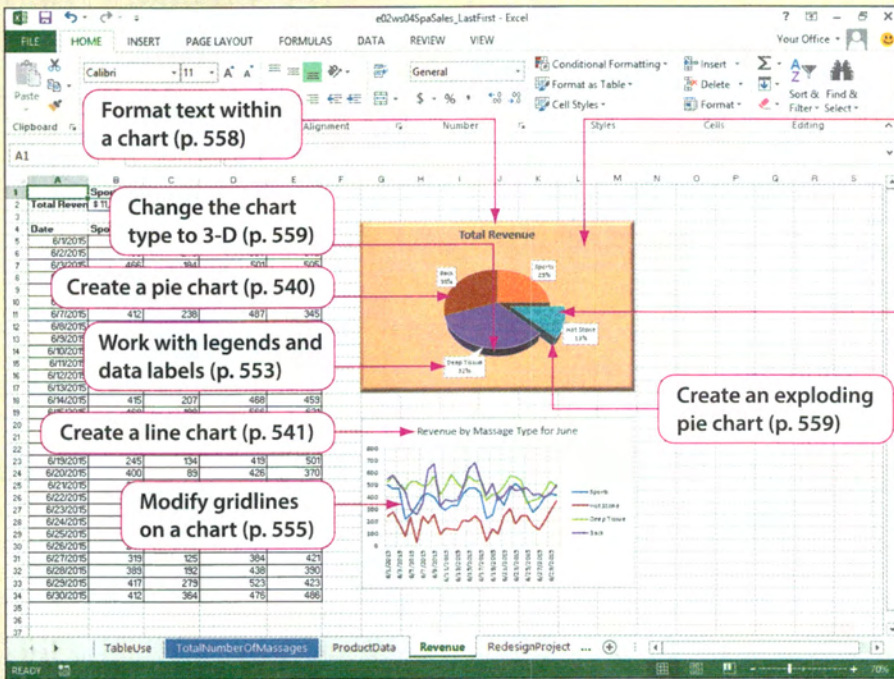
Data exploration objective 532
 Data point 533
 Data series 533
 Data visualization 532
 Gantt chart 543
 Hypothesis testing objective 532
 Line chart 541

Pie chart 540
 Quick Analysis 536
 Recommended Charts 536
 Scatter chart 544
 Sparkline 561
 Trendline 555

Visual Summary







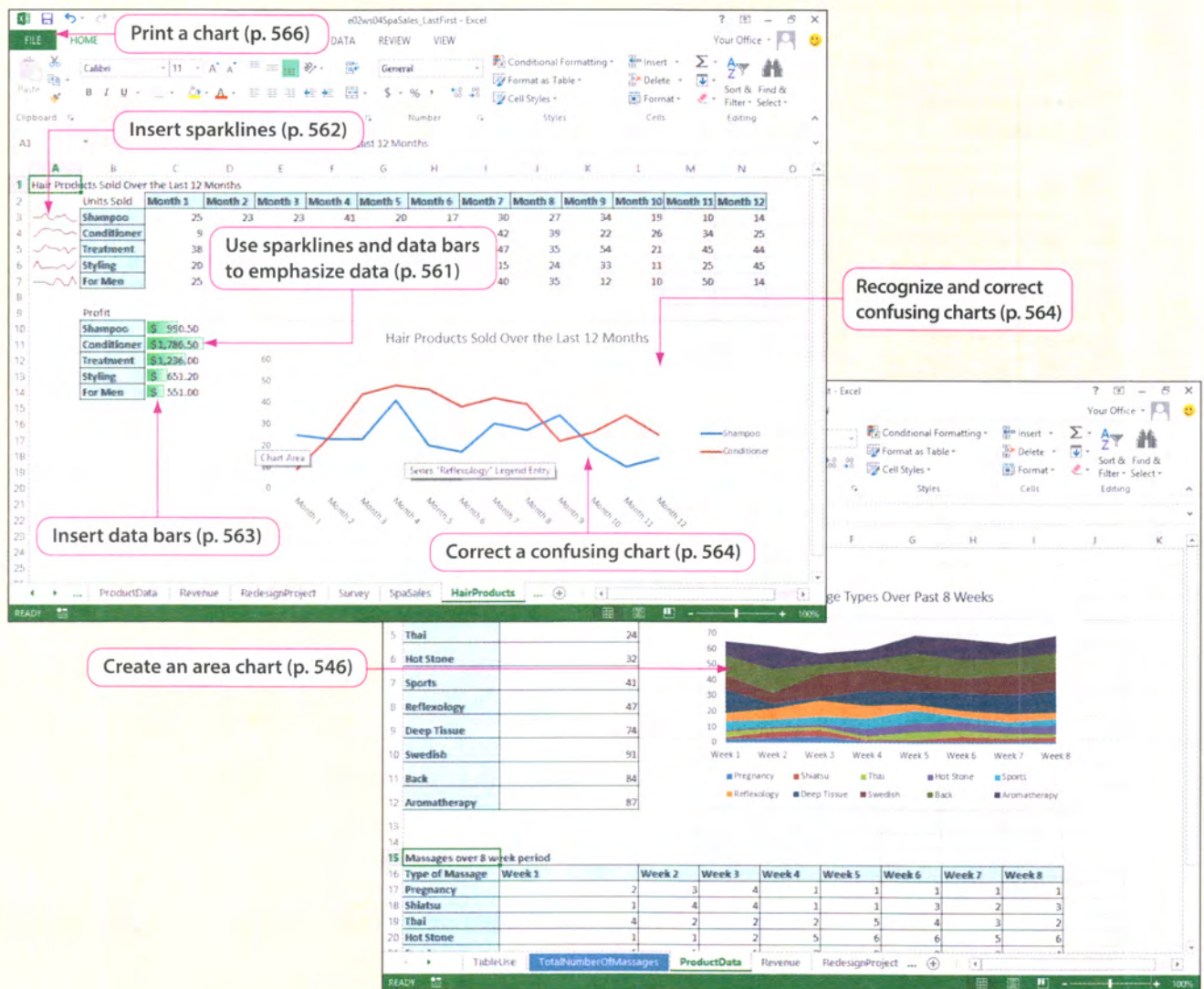


Figure 23 Turquoise Oasis Spa Sales Reports Final Document

Practice 1

Student data file needed:

e02ws04Summary.xlsx

You will save your file as:

e02ws04Summary_LastFirst.xlsx

Product Sales Report



Irene Kai and Meda Rodate have pulled together data pertaining to sales by the spa's massage therapists. In addition to massages, the therapists should also promote skin care, health care, and other products. With the monthly data, the managers want a few charts developed that will enable them to look at trends, compare sales, and provide feedback to the therapists. You are to help them create the charts.

- Open the **e02ws04Summary** workbook. Save its as **e02ws04Summary_LastFirst** using your last and first.
- Click the **Projections** worksheet tab, and then select the range **A4:B12**. Click **Quick Analysis**, click **CHARTS**, and then click **Clustered Column**. Click the **chart border**, and position the chart so that the top-left corner is over cell **D4**.
- Click the **Chart Title**, and then click in the **formula bar**. Type **= Projections!\$A\$1** and then press **Enter**.

- d. To the right of the chart, click **Chart Styles**, and then select **Style 6** from the list. Click Chart Styles again to close the gallery.
- e. Double-click the **Vertical (Value) Axis** to open the Format Axis task pane. Click in the **Minimum** box, clear the existing text, and then type **100**. Close the Format Axis task pane.
- f. Click the **Transactions** worksheet tab. Select the range **B5:J5**, press and hold **[Ctrl]**, and then select the range **B10:J10**. On the **INSERT** tab, in the **Charts** group, click the **Insert Pie or Doughnut Chart** arrow. Click **Pie**, the first option under 2-D Pie. Click the **chart border** of the chart, and position the chart so that the top-left corner is over cell **C12**.
- g. Click the **Chart Title**, type **Total Transactions by Therapist**, and then press **[Enter]**.
- h. To the right of the chart, click **Chart Elements**. Click the **Data Labels** arrow, and then click **More Options**. In the Format Data Labels task pane, under LABEL OPTIONS, under Label Contains, select **Percentage**. Under Label Position, select **Outside End**. Close the Format Data Labels task pane.
- i. To the right of the chart, click **Chart Elements**. Click the **Legend** arrow, and then click **Right**.
- j. Click the **Pie**—be careful not to click the label text. Click once again on the **red pie slice** for Meda that has the associated label 15, 6%. Drag the slice slightly **to the right** so it is exploded from the rest of the pie.
- k. Click the **Revenue** worksheet tab, and then select the range **B10:J10**. Click the **INSERT** tab, and then in the Sparklines group, click **Line** to add sparklines to the worksheet. In the **Data Range** box, type **B6:J9** and then click **OK**. Click any **cell** outside of the sparklines to deselect the sparklines.
- l. On the **INSERT** tab, in the Text group, click **Header & Footer**. Under **HEADER & FOOTER TOOLS**, on the **DESIGN** tab, in the **Navigation** group, click **Go to Footer**. Click in the **left footer section**, and then in the **Header & Footer Elements** group, click **File Name**.
- m. Click any **cell** on the worksheet to move out of the footer, and then press **[Ctrl] + [Home]**. On the status bar, click **Normal**.
- n. Click the **Documentation** worksheet. Click cell **A6**, and then type in **today's date**. Click cell **B6**, and then type in **your first and last name**. Complete the remainder of the **Documentation** worksheet according to your instructor's direction.
- o. Click **Save**, close Excel, and then submit your file as directed by your instructor.

Problem Solve 1

MyITLab[®]
Grader
Homework 1



Student data file needed:

e02ws04Express.xlsx

You will save your file as:

e02ws04Express_LastFirst.xlsx

Express Car Rental

Thomas Reynolds is the corporate buyer for vehicles put into service by Express Car Rental. Tom has the option to buy several lots of vehicles from another rental agency that is downsizing. He wants to get a better idea of the number of rentals nationwide by vehicle type. The corporate accountant has forwarded Tom a worksheet containing rental data for last year. Tom wants to use this summarized data but feels that embedding charts will provide a quicker analysis in a more visual manner for the chief financial officer at their meeting next week.

- a. Open **e02ws04Express**, and then save the file as **e02ws04Express_LastFirst**. Replace LastFirst with your actual name.

- b. Use the data on the **AnnualData** worksheet, and create a **3-D Pie** chart of the number of annual rentals for the six car types. Reposition the chart below the monthly data.
- c. On the 3-D pie chart, change the title to **Annual Rentals**. Change the font of the title to **Arial Black, 16 pt, and bold**. Adjust the data labels on the pie chart to include the **category name** and **percentage** only. Position the label information outside of the chart. Change the font size of the labels to **8** and apply **bold**. Delete the legend.
- d. On the pie chart, explode the slice of the chart that represents the auto type with the **lowest percentage of annual rentals**.
- e. Increase the data used in the column chart to include the months of **July, August, and September**.
- f. Select the **clustered column** chart located below the monthly data. Change the chart type to **Line with Markers**. Switch the row and column data so that the months **July to December** are represented on the x-axis.
- g. Change the chart style to **Style 6**. On the line chart, add **primary major vertical grid lines**. Change the chart title to **Rentals by Auto Type for July to December**.
- h. Create a **3-D clustered column** chart using the data for the **Semi-Annual Totals** for all auto types on the AnnualData worksheet. The primary horizontal axis should be the auto types.
- i. Move the 3-D column chart from the AnnualData worksheet to a chart sheet, and then name that sheet **SemiAnnualReport**. If necessary, add the chart title **Semi-Annual Total** to the chart. Adjust the 3-D Rotation of the chart to the following.
 - X Rotation of **20**
 - Y Rotation of **15**
 - Perspective of **15**
- j. Reposition the **SemiAnnualReport** worksheet after the AnnualData worksheet.
- k. Complete the **Documentation** worksheet according to your instructor's direction. Insert the **filename** in the left custom footer section of the Header/Footer tab in the Page Setup dialog box on all worksheets in the workbook.
- l. Click Save, close Excel, and then submit the file as directed by your instructor.

Perform 1: Perform in Your Career

Student data file needed:

 e02ws04Costume.xlsx

You will save your file as:

 e02ws04Costume_LastFirst.xlsx

Costume Sales



Sales &
Marketing

You work for a costume store. The store has recently compiled a summary of units sold and profit over the past year. Adding some charts to the worksheet would help them to better understand their customer demands and sales trends. The store would like you to visually represent the monthly units sold and the profit so the managers can visually identify any instances where units sold and profit do not correspond.

- a. Open **e02ws04Costume**, and then save the file as **e02ws04Costume_LastFirst**. Replace LastFirst with your actual name.
- b. Create a combination chart to the right of the monthly sales data. Represent the number of costumes sold as a column chart and profit as a line chart. Plot the profit data on a secondary axis.
- c. Apply a **style** to the chart, and then add an appropriate chart title. Include a legend to describe the data being charted.

- d. Adjust the primary vertical axis to have a minimum of 170 and the secondary vertical axis to have a minimum of 3000.
- e. Create an appropriate chart under the combination chart that visually depicts the percentage of the number of costumes sold by each costume type. Apply **3-D** formatting to the chart and label appropriately.
- f. Superhero costumes should be the largest percentage of sales in the data. Emphasize this in the chart by changing the presentation of the chart item that represents Superhero costumes sold.
- g. Apply data bars to the Profit data for Costume Type to visualize the profit by costume type. Choose any gradient fill color.
- h. Complete the **Documentation** worksheet according to your instructor's direction. Insert the **filename** in the left custom footer section of the Header/Footer tab in the Page Setup dialog box on all worksheets in the workbook.
- i. Click Save, close Excel, and then submit the file as directed by your instructor.



Additional
Cases

Additional Workshop Cases are available on the companion website and in the instructor resources.

MODULE CAPSTONE

More Practice 1

Student data file needed:

 e02mpSales.xlsx

You will save your file as:

 e02mpSales_LastFirst.xlsx



Sales &
Marketing

Restaurant Marketing Analysis

The accounting system at the Indigo5 Restaurant tracks data on a daily basis that can be used for analysis to gauge its performance and determine needed changes. The restaurant is considering entering into a long-term agreement with a poultry company and getting a new refrigeration unit to store the chicken. If Indigo5 enters the agreement, the poultry company agrees to give Indigo5 a substantial discount for a specified period of time. Management would like to stimulate sales for the lowest revenue producing chicken item and any chicken items not meeting a sale performance threshold. Thus, some of this savings will be passed to the guests by placing these chicken items on sale.

- Start **Excel**, and then open **e02mpSales**.
- Save the file as **e02mpSales_LastFirst**, using your last and first name.
- Click the **Indigo5ChickenSales** worksheet, and then click cell **D2**. Type **=TODAY()** and then press **[Enter]**.

Notice the data on the worksheet. The range A13:E18 contains four months of actual sales quantities for each menu item. Whereas, the range A22:E27 contains the sales projections that Indigo5 made for the same four months prior to the start of each month.

- Click cell **B4**, type **=SUM(B22:E22)** and then press **[Ctrl] + [Enter]**. In cell **B4**, double-click the **AutoFill** handle to automatically fill cell range **B4:B9**. The range now returns the total quantity projection over the four months for each item.
- Click cell **C4**, type **=SUM(B13:E13)** and then press **[Ctrl] + [Enter]**. In cell **C4**, double-click the **AutoFill** handle to automatically fill cell range **C4:C9**. The range now returns the total quantity of actual sales over the four months for each item.
- Click cell **D4**, type **=AVERAGE(B13:E13)** and then press **[Ctrl] + [Enter]**. In cell **D4**, double-click the **AutoFill** handle to automatically fill cell range **D4:D9**. The range now returns the average monthly quantity for actual sales over the four months for each item.
- Now you need to determine the price for each item to use in revenue calculations. Notice a list of menu prices is in cells A30:B44. Select the range **A30:B44**. Click the **Name** box, type **Prices** and then press **[Enter]**. The price listing is now named **Prices** to use in later calculations.
- Click cell **E4**, type **=VLOOKUP(A4,Prices,2,FALSE)** and then press **[Ctrl] + [Enter]**. In cell **E4**, double-click the **AutoFill** handle to automatically fill the cell range **E4:E9**. The range now returns the price of each item by looking up the item and exactly matching the item name in the **Prices** list.
- Click cell **F4**, type **=E4*C4** and then press **[Ctrl] + [Enter]**. In cell **F4**, double-click the **AutoFill** handle to automatically fill cell range **F4:F9**. The range now returns the total revenue for each item.
- Now you need to determine whether the item fell short or exceeded the sales projection.

Click cell **G4**, type `=ROUND(C4/B4,2)` and then press **Ctrl**+**Enter**. In cell **G4**, double-click the **AutoFill** handle to automatically fill cell range **G4:G9**. The range now returns a projection percentage. An item that fell short of the sales projection will be under 100%. An item that exceeded the sales projection will be over 100%.

- k. Now you need to determine what item has the highest revenue. Click cell **H4**, type `=IF(F4=MAX($F$4:$F$9),"Best Item","")` and then press **Ctrl**+**Enter**. In cell **H4**, double-click the **AutoFill** handle to automatically fill cell range **H4:H9**. The range now returns a blank for all items except the one with the highest sales revenue—which returns Best Item.

- l. Now you need to determine which items to put on sale to stimulate sales. An item should be put on sale if its % of Projection is less than the Sale Threshold in cell L4. An item should also be put on sale if its sales revenue is the lowest. Click cell **I4**, type `=IF(OR(G4<$L$4,G4=MIN($F$4:$F$9)),"Put on Sale","")` and then press **Ctrl**+**Enter**. In cell **I4**, double-click the **AutoFill** handle to automatically fill cell range **I4:I9**.

The range now returns Put on Sale for two items—the item with the lowest sales revenue and two items with a % of Projection less than 95%. All other items return a blank.

- m. Now you need to know how many days the sale will last based on dates given by the poultry company. Click cell **L7**, type `=DATEDIF(L5,L6,"d")` and then press **Ctrl**+**Enter**.
- n. Select the range **B13:E18**. Click the **INSERT** tab, and then in the Sparklines group, click **Line**. Select the location range **F13:F18**, and then click **OK**. Click the **DESIGN** tab, and then in the Show group, click the **Markers** check box.

- o. Now you need to create a chart comparing the percentage of all sales each item represents.

Select the range **A3:A9**. Press and hold **Ctrl**, and then select the range **F3:F9**.

- Click the **INSERT** tab, and then in the Charts group, click the **arrow** next to the Insert Pie or Doughnut Chart button. Select the first option for a **Pie Chart**.
 - Click the **chart border**, and then drag to move the chart so the top-left corner is over the top-left corner of cell **G10**. Click on the **right resizing handle**, and then drag the right chart border to the border between columns **L** and **M**. Click the **bottom resizing handle**, and then move the bottom of the chart to the border between rows **22** and **23**.
 - On the **DESIGN** tab, in the Chart Styles group, select **Style 3**.
 - Click the chart title, **Total Revenue**. Click a second time on **Total Revenue** to place your cursor into the title. Erase "Total Revenue", and then type **Chicken Sales Revenue by Menu Item**.
- p. Now you need to look at loan options for the new refrigeration unit. Click the **Poultry Loan** worksheet tab.
- q. You need to look at a quarterly payment as it varies for different numbers of payments—or terms in years—and the annual interest rate. Indigo5 would like to make quarterly payments—four payments per year. Click cell **C12**, and type `=PMT($B12/4,C$11*4,$C$6)` and then press **Ctrl**+**Enter**. In cell **C12**, double-click the **AutoFill** handle to automatically fill cell range **C12:C14**. With **C12:C14** selected, drag the **AutoFill** handle to column **E** to fill the range **C12:E14**.
- Notice that the mixed cell addressing of the \$ before the B will make the B stay the same and not change when copied—same for the \$ before the 11. Notice that when copied, the formula will always contain \$C\$6 since it has an absolute reference of a \$ before both the column and the row.
- r. Indigo5 would like to use the option that keeps the payment under \$2,000, has the shortest term, and the lowest interest rate. Click cell **D12**, and then click the **Bold** button to indicate that option as the best.

- s. Click the **Indigo5ChickenSales** worksheet tab. Click the **PAGE LAYOUT** tab, and then in the Page Setup group, click the **Page Setup Dialog Box Launcher**. Click the **Header/Footer** tab. Click **Custom Footer**, then click the **Insert File Name** button to place the file name in the left section of the footer. Click **OK** twice. Repeat this step for the **PoultryLoan** worksheet.
- t. Click the **Documentation** worksheet. Click cell **A6**, and then type in today's date. Click cell **B6**, and then type in your first and last name. Complete the remainder of the **Documentation** worksheet according to your instructor's direction.
- u. Click **Save**, close Excel, and then submit your file as directed by your instructor.

Problem Solve 1

MyITLab
Grader
Homework 1



Human
Resources

Student data file needed:

 e02ps1Raises.xlsx

You will save your file as:

 e02ps1Raises_LastFirst.xlsx

Employee Raise Evaluation

Painted Paradise Resort & Spa evaluates employee performance yearly and determines raises. You have been asked to assist with compiling and analyzing the data. Upper management also started the workbook. You are to finish the document and keep the data confidential.

- a. Start **Excel**, and then open **e02ps1Raises**. Save the file as **e02ps1Raises_LastFirst**.
- b. The **Addresses** worksheet includes data from the payroll database. You need to cleanse the data so this worksheet can be used in a mail merge to create salary notice letters. Add the following.
 - In column **E**, extra spaces and a dash were left in the data by the database in case the zip code had an extension. In cells **F7:F14**, enter a **LEFT** function to return the **ZipCode** without the unnecessary “-”.
 - In column **G**, the database did not export the formatting for the phone numbers. In cells **H7:H14**, use **Flash Fill** to add formatting back to the phone number. If done correctly, cell **H7** will return **(505) 555-1812**. Hint: There is only one space between the “)” and the 5.
- c. The **Evaluations** worksheet includes evaluation data collated from various managers. Managers rated employees both quantitatively—numerically—and qualitatively—written notes. The number scores and notes support the raise recommendation made by the manager. Add the following.
 - In cells **I3:I10**, calculate the average numerical ratings for each employee. Only managers get evaluated by the Leadership rank in column **H**. Column **C** indicates whether the employee is a manager. Thus, the average calculation should only include the values in column **H** if the employee is a manager. Even if a rating is given to a non-manager employee in column **H**, that number should not be included in the average in column **I**. Hint: This calculation requires the use of an **IF** statement.
 - In cells **B13:B20**, exported data from the rating system combines the manager's raise recommendation of High, Standard, or Low followed by the manager's notes. In cells **J3:J10**, use a combination of text functions to return just the manager's raise recommendation—High, Standard, or Low. The values returned should not have extra spaces before or after the word. Hint: The names in **A3:A10** are in the same order as **A13:A20**. Also, notice the text pattern is always the recommendation followed by a space.
 - For use later, give the range **A3:J10** the name **evaluations**.

- d. On the **Payroll** worksheet, there is an analysis for raises you need to finish. First, you need to get all the applicable data to making the raise determination on this worksheet. Add the following.
 - In cell **F1**, enter a formula to always return the current date.
 - In cells **E6:E13**, add a DATEDIF function that will calculate the years employed based on today's date in cell F1 and the HireDate in column B.
 - In cells **F6:F13**, add a VLOOKUP function that returns the raise recommendation—High, Standard, or Low—for each employee by exactly matching the Name in column A in the range you named **evaluations**.
 - In cells **G6:G13**, add a VLOOKUP function that returns the starting raise percentage based on the ranges in the Standard Raise table in cells **A16:B19** and the number of years employed in column E.
- e. On the **Payroll** worksheet, you now need to begin determining the employee's final raise. Add the following.
 - In cells **H6:H13**, add an IF function that will award anyone with a Raise Recommend of High an extra bonus listed in cell **F2**. All other employees get zero bonus.
 - In cells **I6:I13**, add an IF function that will give anyone with a Raise Recommend of Low a deduction listed in cell **F3**. All other employees get zero deduction.
 - In cells **J6:J13**, add a calculation that returns the final raise amount with the value—not just formatted—rounded to the hundreds position. For example, a final raise of \$1,625 rounded to the hundreds returns a value of \$1,600. The final raise amount is the salary multiplied by the Standard Raise % and then adding any bonus and subtracting any deduction. Hint: The num_digits argument will need to be negative.
 - In cells **K6:K13**, add a calculation that returns the Final % Increase. The final increase is determined by dividing the Raise Amt by the Salary.
 - In cells **L6:L13**, add a calculation that returns the New Salary by adding the Salary and Raise Amt.
- f. On the **Payroll** worksheet, you now need to add a few summary measures for upper management. Add the following.
 - In cell **J1**, add a function that calculates the Net Payroll Increase based on the Raise Amt in cells **J6:J13**.
 - In cell **J2**, add a function that calculates the Average Raise % based on the Final % Increase in cells **K6:K13**.
 - Based on the data in cells **A5:A13** and **K5:K13**, add a **3-D Clustered Column**. Hint: Use **Ctrl** to select noncontiguous ranges for the chart.
 - Under chart styles, set the chart to **Style 3**. Change the vertical axis to start at a lower bound of **0.01**—for 1%. Then, change the title to read **Final % Increase Comparison**.
 - Move and resize the chart so the upper-left corner is in cell **F14** and the lower-right corner is in cell **L22**. Set the chart title to **11** pt font. Set the vertical and horizontal axis labels to **9** pt font.
- g. Complete the **Documentation** worksheet according to your instructor's direction. Insert the filename in the left custom footer section of the Header/Footer tab in the Page Setup dialog box on all worksheets in the workbook.
- h. Click Save, close Excel, and then submit the file as directed by your instructor.

Problem Solve 2

MyITLab
Grader
Homework 2



Sales &
Marketing

Student data file needed:

 e02ps2Advertising.xlsx

You will save your file as:

 e02ps2Advertising_LastFirst.xlsx

Advertising Review

The Painted Paradise Resort & Spa has been investing in advertising using different advertising media. When guests check in, the employee asks the guest how they heard about Painted Paradise Resort & Spa. Based on the customer's response, the employee then notes in the system either magazine, radio, television, Internet, word of mouth, or other. Since almost every guest is asked, the number surveyed represents a significant portion of the actual guests. The past year's data is located on the GuestData worksheet. Every time a guest answers an advertising source—such as a magazine—as how he or she heard about the resort, it is considered a guest result. Ideally, the resort wants to purchase advertising at a low cost but then see as many guest results as possible.

Every year, upper management sets the advertising budget before the beginning of the fiscal year—July 1 start. For this next year, upper management gave you more television budget because of a new video marketing campaign. Also, the advertising contracts get negotiated every year, as the media vendors require a one-year commitment. The contracts are negotiated after the budget is set. You will develop charts for an upcoming presentation that will discuss a marketing strategy, potential changes to the budget given the new media prices, anticipated monthly guest results, and prospects of hiring a marketing consulting company with a high retainer that would require a loan.

- a. Start Excel, and then open **e02ps2Advertise**. Save the file as **e02ps2Advertise_LastFirst**.
- b. On the **GuestData** worksheet in the cells **A6:J17**, the data indicates the number of guests responding that he or she heard of the resort from the listed method—Guest Results. Add the following.
 - In cell **H2**, add a COUNTA function to determine the number of months listed in cells **A6:A17**.
 - In cell **J2**, add a DATEDIF to calculate the survey duration in years using the 2014 Fiscal Start date and 2015 Fiscal Start date.
 - In cells **B6:B17**, use Flash Fill to return the three character code for the month—JUL for July.
 - Select cells **L6:M17**, and then name the range **season**.
 - In cells **C6:C17**, add a VLOOKUP that will exactly match the month in column **B** to return the correct season—Low, Mid, or High—based off the named range **season**.
 - In cells **D19:J19**, calculate the averages for each column with a rounded value—not just formatted—to zero decimal places.
 - For later use, create the following named ranges.

Cell	Name
D19	AvgMagazine
E19	AvgRadio
F19	AvgTelevision
G19	AvgInternet

- c. On the **AdvertisingPlan** worksheet, an analysis of past Guest Results and the new budget has been started. First, you need to finish out the past year analysis. Add the following.
 - In cell **F2**, enter a function that will return the current date.
 - Set the following cells to these formulas.

Cell	Name
D6	=AvgMagazine
D7	=AvgRadio
D8	=AvgTelevision
D9	=AvgInternet
* Note that these are monthly averages. Thus all calculations on this worksheet are estimates based on the monthly average.	

- In cells **E6:E9**, calculate the Amount Spent—this is a monthly figure—by multiplying the Cost Per Ad and the Ads Placed.
 - In cells **F6:F9**, calculate the Cost per Guest Result by dividing the Amount Spent by the Past Guest Results.
 - In cells **C10:F10**, calculate the appropriate totals for each column.
- d. On the **AdvertisingPlan** worksheet, you need to finish out the new budget year analysis. Add the following.
- In cells **I6:I9**, calculate the Number of Ads that can be purchased based off the New Budget and the New Cost Per Ad in columns **G** and **H**. Hint: A partial ad cannot be purchased. Further, \$324 would not be enough to purchase one radio ad since the cost per ad is \$325.
 - In cells **J6:J9**, calculate the Amount to Spend—this is a monthly figure—by multiplying the New Cost Per Ad and the Ads to Place.
 - In cells **G10** and **I10:J10**, calculate the appropriate totals for each column. If necessary, change the format for cell **I10** to general.
 - In cell **H11**, calculate the amount of the budget remaining by subtracting the Amount to Spend total from the New Budget total. Note, the totals are in row 10. A negative number indicates the new plan is over budget. A positive number indicates the new plan is under budget and has excess spendable funds.
 - In cells **K6:K9**, add a formula that will return **Increase?** if the Ads to Place is equal to zero or if the New Cost Per Ad is less than or equal to the Budget +/- in cell **H11**. Any others should return **Decrease?**. This column now indicates the media types for which the resort may want to consider an increase or decrease to the Ads to Place—along with any necessary budget adjustment.
 - In cells **L6:L9**, calculate the Anticipated Guest Results by dividing the Amount to Spend by the Cost per Guest Result—column **F**. The resulting value—not the just the format—should be rounded to zero decimals.
 - In cell **L10** calculate the appropriate total for Anticipated Guest Results.
 - In cell **L11**, calculate the amount of anticipated guest results compared to the past by subtracting the Past Guest Results total from the Anticipated Guest Results total. Note, the totals are in row 10. A negative number indicates an anticipated decrease in Guest Results. A positive number indicates an anticipated increase in Guest Results.
 - Evaluate the statements in cells **H15:L18**. Bold any false statements.
- e. Starting on the **AdvertisingPlan** worksheet, you need to make two charts for your presentation. Create the following two charts.
- Based on the data in cells **A5:A9**, **D5:D9**, and **L5:L9**, add a **3-D Clustered Column** chart. Hint: Use **Ctrl** to select noncontiguous ranges for the chart.
 - Under chart styles, set the chart to **Style 6**. Then, change the title to read **PAST V. ANTICIPATED MONTHLY GUEST RESULTS**.
 - Move and resize the chart so the upper-left corner is in cell **A11** and the lower-right corner is in cell **F22**. Set the chart title to 12 pt font.

- Based on the data in cells **A5:A9**, **D5:D9**, and **E5:E9**, add a **Clustered Column - Line on Secondary Axis Combo Chart**. Hint: Use **Ctrl** to select noncontiguous ranges for the chart. Make this chart appear on its own worksheet—chart sheet—named **GuestResultsBySpending**.
 - Under chart styles, set the chart to **Style 6**. Then, change the title to read **Past Advertising Amount Spent compared to # of Guest Results Experienced, monthly**.
 - Set the chart title to **16** pt font, set all axis data labels to **18** pt font, and then set all legend text to **12** pt font.
- f. On the **MarketingConsultants** worksheet, a monthly loan payment analysis has been started. The resort is considering hiring marketing consultants. However, they require a large up-front retainer fee. The resort would need to take out a loan to cover the cost. The resort needs an analysis of the loan payment by varying interest rate and down payment amount. Add the following.
- In cells **D10:H13**, add a **PMT** function to calculate the monthly payment. Enter one formula that can be entered in cell **D10** and filled to the remaining cells. Hint: Think carefully about where \$ signs are needed for mixed and absolute cell addressing. Also, the down payment can be subtracted from the Retainer—or Principal—Amount in the third argument of the PMT function.
- g. Complete the **Documentation** worksheet according to your instructor's direction. Insert the **filename** in the left custom footer section of the Header/Footer tab in the Page Setup dialog box on all worksheets in the workbook.
- h. Click Save, close Excel, and then submit the file as directed by your instructor.

Perform 1: Perform in Your Life

Student data file needed:



Blank Excel workbook

You will save your file as:



e02pf1Ideal_LastFirst.xlsx



Human
Resources

Your Ideal Career Start

Even if this is your first semester, you have probably already begun to think about the type of job or career you want. Further, when you are studying long hours, it can be fun to imagine the new car you might buy at your ideal career start after graduation. For this project, pretend—if you need to—that you are graduating this semester. In this project, you need to find currently available jobs and establish criteria to help you pick your most desired position. Then, you will find the ideal new car to purchase, but your new position's salary must be able to afford the monthly payment.

- Open a blank Excel workbook. Save the workbook as **e02pf1Ideal_LastFirst**. Apply a **Theme**, and then use cell styles where appropriate. Keep the workbook professional, but feel free to optionally add elements such as a picture of your ideal career start or new car.
- Create a worksheet named **JobData**. Go to the Internet, and then find five or more jobs that interest you. You can grab positions from multiple websites or just one website—from the same website will be easiest. Copy and paste that data into the **JobData**. On the JobData worksheet, accomplish the following.
 - The goal is to get separate columns of data listed below by copying from the Internet and separating—or cleaning—the data using Excel's Flash Fill feature and/or text functions. Depending on how you copy and paste from the web, this will be harder or easier. You can gather more data than listed below if it is relevant for you to picking the ideal job. At a minimum, you must have the following.

Data (no extra characters in or around the data)	Description
Company Name	Full name as you would address a letter to the company
Job Title	Full job title and needs to be descriptive of the position. For example, "Entry Level" is not a sufficient title. "Application Support Analyst— Entry Level" is a sufficient title.
State	State position is located in. State should be in a column by itself, not in combination with the city or address.
Pay or Pay Range	Salary or hourly rate. If a pay range is provided, separate out the low and high end of the range separately. Hint: Try not to mix pay types. For example, if you are looking for a salary position, choose all salary positions.

Table 1 Required minimum job position data

- Add headers, comments, and/or notes to make clear to your instructor what Excel steps you took to get to the final job data. Leave all formulas you create in the worksheet—show your work, and don't delete it. Indicate where Flash Fill was used. Keep your work organized.
 - Indicate on the worksheet the website you used to find the job posting, for example Monster.com or CareerBuilder.com. Also, indicate the date and your full name on the worksheet somewhere.
- c. Create another worksheet called **JobAnalysis**. In an organized fashion, copy onto the worksheet only the clean copies of data that you intend to use. Add the following elements to this worksheet.
- Use an IF statement in combination with any other Excel formulas/functions to indicate whether a job is in a state you find desirable. You should indicate a minimum of two states as desirable.
 - Create a table that establishes pay range categories for Below Expected, Expected, and Above Expected based on your personal job expectations. Use this table in a VLOOKUP to determine which category for each of the positions you are evaluating.
 - Add any other additional formulas and functions to help you determine the most desirable position.
 - The worksheet must ultimately indicate one final **Most Desired** job position.
- d. Create another worksheet called **MyNewCar**. Add the following elements to this worksheet.
- Cells that indicate the following information about the car you would like: Manufacturer, Model, Year, Price, and URL to a webpage that provides this information. You may pick a preowned car if you indicate that on the worksheet.
 - A loan analysis for a monthly payment. Your monthly payment will vary by the price of the car, down payment, term or number of payments, and annual interest rate. Research realistic current interest rates for the type of car you wish to purchase. Your analysis should evaluate various options for two of the following: interest rate, term, or down payment.
 - Somewhere on the worksheet, calculate or input the monthly income from your Most Desired job on the JobAnalysis worksheet.
 - You need to be able to afford the car you pick. The amount you will be able to afford will vary greatly on individual circumstances—such as marital status, credit card debt, and homeowner status. For the purposes of this project, the car you pick cannot have a monthly payment greater than 10% of your gross—pretaxes or deductions—salary for your Most Desired job. Create an analysis of the percentage your loan payment represents of your monthly salary. Bold or otherwise indicate feasible loan options. If none of the loan options are under 10%, you will have to do one or a combination of the following: pick a new car, increase your down payment, extend your term, or find a lower interest rate.

- e. Build at least one meaningful chart on either the JobAnalysis or MyNewCar worksheet. Include at least a one-sentence explanation near the chart explaining the chart's significance.
- f. Complete the **Documentation** worksheet according to your instructor's direction. Insert the **filename** in the left custom footer section of the Header/Footer tab in the Page Setup dialog box on all worksheets in the workbook.
- g. Save your work, and then close Excel. Submit the file as directed by your instructor.

Perform 2: Perform in Your Career

Student data file needed:

 e02pf2Investment.xlsx

You will save your file as:

 e02pf2Investment_LastFirst.xlsx



Finance &
Accounting

Investment Portfolios

You have started working as an investment intern for a financial company that helps clients invest in the stock market. Your manager gives you a spreadsheet detailing some periodic investments in Nobel Energy, Inc. (NBL) made by one of the clients. The client would like a report and charts on the NBL investment and the stock's performance. Your manager has asked you to finish this report.

- a. Open workbook **e02pf2Investment**. Save the workbook as **e02pf2Investment_LastFirst**. Apply a **theme**, and then use cell styles where appropriate for a professional looking spreadsheet.
- b. On the NBLInvestment worksheet, add the following calculations.
 - In column **F**, a formula to calculate total value was already entered by your manager. Update the formula to return a value of only two decimals. Hint: The cell value needs to change, which is different than merely formatting to two decimals.
 - In column **G**, starting in the second row—cell **G22**—enter a formula to sum up the quarterly investments as of the date in column **A** to provide a cumulative total. For example, cell **G22** should return the sum of the Quarterly investments on 1/2/2013 and 4/1/2013. Next, cell **G23** should return the sum of the Quarterly investments on 1/2/2013, 4/1/2013, and 7/1/2013. Thus, column **G** returns a running total of investments so that the last cell—**G33**—reflects the total of all investments from 1/2/2013 thru 1/3/2016.
 - In column **H**, calculate the total growth. If total value is more than 0, then total growth is total value – total investment. Otherwise, the total growth is either 0 or a negative value. A negative value means that the investment shrunk instead of grew.
 - In column **I**, calculate the total growth %: if total value is more than 0, then total growth % is total growth / total investment; otherwise, the total growth % is 0.
 - In column **J**, calculate the quarterly growth: if total value is more than 0, then quarterly growth is total growth—total growth from the previous quarter; otherwise, quarterly growth is 0.
 - In column **K**, calculate quarterly growth %: if total value is more than 0, then quarterly growth % is quarterly growth / total investment; otherwise, quarterly growth % is 0.
- c. Create a **combo chart** for Total Portfolio Performance that displays the Total Value, Total Investment and Total Growth % over time. Hint: You will need to show a secondary axis for Total Growth %.
- d. Create a **combo chart** for Quarterly Performance that displays the Quarterly Growth and the Quarterly Growth % over time. Hint: You will need to show a secondary axis for Quarterly Total Growth %.

- e. Complete the **Documentation** worksheet according to your instructor's direction. Insert the **filename** in the left custom footer section of the Header/Footer tab in the Page Setup dialog box on all worksheets in the workbook.
- f. Save your work, and then close Excel. Submit the file as directed by your instructor.

Perform 3: Perform in Your Team

Student data file needed:

 e02pf3WhirlyWind.xlsx

You will save your file as:

 e02pf3WhirlyWind_TeamName.xlsx



Production &
Operations

Theme Park Expansion

You work for Whirly Wind Theme Park—a preeminent amusement park next to a large lake. Whirly Wind is primarily a thrill and roller-coaster park. While Whirly Wind has a water section in the park, it is small and outdated. Your manager assigned you to a team to help with the analysis for an expansion of the park's water area and overall capacity. Your manager needs help looking at past sales, sales trends, loan options, and project management. Your manager has provided you with a starting workbook that needs work and elaboration.

- a. Select one team member to set up the document by completing Steps b–d.
- b. Open your browser and navigate to either **<https://www.skydrive.live.com>**, **<https://www.drive.google.com>**, or any other instructor assigned location. Be sure all members of the team have an account on the chosen system—such as a Microsoft or Google account.
- c. Open **e02pf3WhirlyWind**, and then save the file as **e02pf3WhirlyWind_TeamName** replacing TeamName with the name assigned to your team by your instructor.
- d. Share the spreadsheet with the other members of your team. Make sure that each team member has the appropriate permission to edit the document.
- e. Hold a team meeting and discuss the requirements of the remaining steps. Make an action and communication plan. Consider which steps can be done independently and which steps require completion of prior steps before starting.
- f. On the **RevenueHistory** worksheet, you will find data about past revenue—earned income before any costs. Whirly Wind is only open from the first of April until the end of October every year. Whirly Wind is located in the Midwest of the United States with typical Midwest weather. Whirly Wind offers discounted season passes during the month of April and October every year. Below is a description of the provided data.

Data	Description
Month	The first day of the month for the data in that row.
Monthly Revenue	All revenue from all sources for that month—April through October.
Attendance	The number of guests that entered the park that month. The guests may have been paid guests or season pass/comp guests who did not have to pay. Attendance is not reflective of time spent in the park. If a guest leaves and comes back into the park, the guest is still only counted once. The Max Monthly Capacity is also listed in cell J4.
Ticket Sales (Any Kind)	All ticket sales that month. This includes single day, multiple day, and all variations of a season pass. If a guest buys a season pass in April, the revenue is accounted for in April. However, the guest can still enter the park from May to October of that year without adding any money to the monthly ticket sales.
Food & Merch Sales	All other revenue besides ticket sales. This is primarily food and merchandise. However, it also includes a few other things such as parking.
Avg Temp (Degrees)	The average temperature for the park that particular month.

Table 2 Whirly Wind revenue data

- g. The data on the **RevenueHistory** worksheet could be analyzed in several ways. At a minimum, add the following to the worksheet.
- Calculations for appropriate averages, mode for attendance, and average ticket cost per guest in attendance that month.
 - Each team member should independently create 1–2 charts about the data on this worksheet.
 - The team should meet and decide which charts to include in the final file. The final file should have a minimum of four charts and a maximum of six charts. The team should pick the charts that provide insight into the sales trends of the park.
- h. On the **Loan** worksheet, you will find the basic information about three loan options to finance Whirly Wind's expansion. Make the following updates to the loan worksheet.
- In column **F**, calculate the loan—or funding—needed to do the expansion.
 - In column **G**, calculate the cost per extra capacity—or amount per extra guest attendance based off the total cost in column **D**.
 - In column **H**, research and provide current interest rates applicable to these three loan options.
 - Below row **7**, add a loan analysis to provide the monthly payment amount for the three loan options. Whirly Wind is considering a term of 2, 3, or 5 years only.
 - Below row **7**, add an analysis indicating which loan options are Ideal or Not Preferred. If the loan meets Whirly Wind's Preferences in columns **J:L**, the loan is Ideal. Any loan not meeting all of those preferences is Not Preferred.
 - Add any other calculations your team feels is relevant to determining the best loan for Whirly Wind.
- i. On the **TimeLine** worksheet, you will see the applicable dates and project days needed to complete each state of the expansion project. On this worksheet, add the following.
- In column **E**, add a calculation to determine the number of Total Needed days based on the Start Date and Projected End Date.
 - In column **D**, add a calculation to determine the number of days remaining based on the Total Needed and Completed.
 - On the worksheet somewhere, calculate the total project duration in months.
 - On the worksheet somewhere, calculate the current project date with the **TODAY** function.
 - Add a Gantt chart for the project timeline.
- j. Apply a **Theme**, and then use **cell styles** where appropriate and to make professional.
- k. As a team, answer the questions on the **TeamComments** worksheet.
- l. Complete the **Documentation** worksheet according to your instructor's direction. Minimally, include enough detail to identify which parts of the worksheets/workbook each team member completed.
- m. Insert the **filename** in the left custom footer section of the Header/Footer tab in the Page Setup dialog box on all worksheets in the workbook. In a custom header section, include the **names** of the students in your team—spread the names evenly across each of the three header sections: left section, center section, and right section.
- n. Save your work, and then close Excel. Submit the file as directed by your instructor.

Perform 4: How Others Perform

Student data file needed:

 e02pf4Fit.xlsx

You will save your file as:

 e02pf4Fit_LastFirst.xlsx


BMI Health Analysis

A state health agency wants to examine health data on college students starting with the body mass index (BMI). You recently started as an intern to the school's grant-funded initiative, Fit School. Fit School works with the state health agency and counsels student clients on improving health. The agency gave your manager this file with historical data from 1952 through 2011, current data from your school, and a health counselor's tool to help analyze a client's health condition. Your manager thought the file was confusing and had errors. Your manager asked you to look at the data, correct the errors, and create some new components on the spreadsheet.

You calculate BMI using a person's height (in inches) and weight (in pounds). The formula for BMI is as follows:

$\text{Weight/Height}^2 * 703$ (the notation in Excel to square height is Height^2)

For example, if a client weighs 120 pounds and is 5 feet 6 inches tall, their BMI is as follows:
 $120/66^2 * 703 = 19.37$

The BMI has categories as follows.

- Underweight: less than 18.5
- Normal: 18.5 or greater and less than 25
- Overweight: 25 or greater and less than 30
- Obese: 30 or greater

- a. Start Excel, and then open **e02pf4Fit**. Save the file as **e02pf4Fit_LastFirst**.
- b. Throughout the workbook, **cell styles** should be applied to appropriate headings and titles using an appropriate **theme**. Also, BMI calculations do not have many decimals. Change BMI values—not just the format—to be rounded to two decimals except those on the Historical worksheet.
- c. The **Historical** worksheet shows average BMI numbers for males and females from 1952 to 2011. The agency wants to see the trend of average BMI index numbers for males and females over the entire time period. The current chart is confusing. Update the chart as follows.
 - The chart should be a more appropriate chart type.
 - The chart should have a more descriptive title and clean, understandable x-axis and y-axis labels.
 - The chart should have a professional, business look so it can be used by the state agency in a presentation.
 - Adjust the scales and create gridlines that help convey the context as appropriate.
- d. The **CurrentData** worksheet has data for students at your school. This worksheet has errors and needs some additions. Update this worksheet as follows.
 - The Weight Category in column F looks up the BMI Category from a table located on the BMICategories worksheet with the range named BMICategory. This calculation is not working correctly and produces erroneous #N/A errors. Fix errors in this workbook that cause this formula to not work correctly. Hint: Look carefully at the construction of the BMICategory look up table values and name range definition.

- The Female and Male BMIs are being separated in columns G and F. This separation will allow separate averages for male and female to be calculated. The formulas are returning male results for females and female results for males. Update the formulas so the correct values are showing.
 - Add averages appropriately to the bottom of the data set.
- e. The **HealthAnalysis** worksheet is a tool for counselors to help clients assess their current health and set goals. This worksheet has errors and needs additions. Update this worksheet as follows.
- The BMI Calculation in cell B6 will return an error if height—B4—and weight—B5—are blank. Modify cell **B6** to return a blank value if either height or weight is blank.
 - In the prior step, you fixed the BMI category lookup on the CurrentData worksheet to work correctly. Cell B7 uses the same name range for the table—BMICategory. Cell B7 contains a different error causing it to work incorrectly. Find and fix the error. Then, modify cell B7 to return a blank value if cell B6 is blank.
 - Cell C7 contains a formula that should return the words “At Risk BMI” for Overweight and Obese clients. For all other clients, cell C7 should return a blank. Even after fixing cell B7, this formula returns incorrect results. Find and fix the error.
 - Cell B11 should calculate the client’s age. This formula is returning an error. Find and fix the error. Then, modify cell **B11** to return a blank value if cell B10 is blank.
 - The worksheet coloring should be professional and help indicate to the counselor which cells should be modified or changed when meeting with a client.
- f. The **BMIEstimateTable** is for counselors to print out and give to clients for future estimation of BMI as the client’s weight changes. This worksheet is not working properly. Update this worksheet as follows.
- The formulas in cells **C4:Q21** are not returning the correct results. Fix the formulas.
 - The worksheet does not print well. Update the **settings** and **coloring** to look professional when printed in black and white ink.
- g. Insert the **filename** in the left custom footer section of the Header/Footer tab in the Page Setup dialog box on all worksheets in the workbook. Complete the **Documentation** worksheet according to your instructor’s direction.
- h. Save your work, and then close Excel. Submit the file as directed by your instructor.

Microsoft Office Access 2013

Module 1

Understanding and Using a Relational Database

WORKSHOP 1 | THE FOUR MAIN DATABASE OBJECTS

OBJECTIVES

1. Understand what Access is p. 588
2. Maneuver in the Navigation Pane p. 592
3. Understand what a table is p. 595
4. Manually navigate a database p. 601
5. Understand what a query is p. 604
6. Understand what a form is p. 611
7. Understand what a report is p. 613
8. Back up a database p. 617
9. Compact a database p. 618

Prepare Case

Red Bluff Golf Club Puts for Paws Charity Tournament

The Red Bluff Golf Club is sponsoring a charity tournament, Puts for Paws, to raise money for the Santa Fe Animal Center. An intern created a database to help run the tournament but did not finish it before leaving. You have been asked to finish the database to track the participants who enter the tournament, the orders they have placed, and the items they have purchased.



Production & Operations



Kati Molin / Shutterstock

REAL WORLD SUCCESS



"I used Access to create *ad hoc* reports for managers. My ability to quickly provide data has made me their 'go to' person."

- Art, alumnus, materials analyst

Student data files needed for this workshop:



a01ws01Puts.accdb



a01ws01Participant.accdb



a01ws01Puts_LastFirst.accdb

You will save your file as:

Understanding Database Basics and Tables

Businesses keep records about everything they do. If a business sells products, it keeps records about its products. It keeps records of its customers, the products it sells to each customer, and each sale. It keeps records about its employees, the hours they work, and their benefits. These records are collected and used for decision making, for sales and marketing, and for reporting purposes. A **database** is a collection of these records. The purpose of a database is to store, manage, and provide access to these business records.

In the past, many databases were paper based. Paper records were stored in files in file cabinets. Each file would be labeled and put in a drawer in a file cabinet. Elaborate filing schemes were developed so that one record could be located quickly. This was highly labor intensive and error-prone. Today, while most businesses use automated databases to store their records, you still see the occasional paper-based system. For example, your doctor's office may still use paper files for patient records.

Data are facts about people, events, things, or ideas, and they are an important asset to any organization as data allows companies to make better business decisions after converting it into useful information. **Information** is data that has been manipulated and processed to make it meaningful. For example, if you saw the number 2,000 out of context, the number has no meaning. If you are told that 2,000 represents the amount of an order in dollars, that piece of data becomes meaningful information. Businesses can leverage meaningful information to gain a competitive advantage, such as by providing discounts to those who order more expensive items. An automated database management system, such as Microsoft Access 2013, makes that possible.

Databases are used for two major purposes: for operational processing and for analytical purposes. In operational or transaction-based databases, each sale or transaction that a business makes is tracked. The information is used to keep the business running. Analytical databases are used for extracting data for decision making. The data in these databases are summarized and classified to make information available to the decision makers in the firms.

Automated databases provide many advantages over paper databases. The information in the databases is much easier to find in automated form. The information can be manipulated and processed more rapidly. Automated databases can be used to enforce accuracy and other quality standards. In today's fast-paced world, a business needs to manipulate information quickly and accurately to make decisions. Without today's automated databases, a business cannot compete. In this section, you will learn what Access is and learn about the four main object types in an Access database.

Understand What Access Is

Access is a relational database management system (DBMS) program created by Microsoft. It provides a tool for you to organize, store, and manipulate data, as well as to select and report on data.

Access stores data in tables. Similar data are stored in the same table. For example, if you are storing data about participants in an event, you would include all the participants' names, addresses, and telephone numbers in one table.

The power of a database system comes with the ability to link tables together. A separate table of purchases for the tournament can be linked with the participant table. This allows users to easily combine the two tables; for example, the tournament manager would be able to print out the participants with a record of their tournament purchases.

REAL WORLD ADVICE**What Advantage Does Using Access Give You?**

There are many database management system (DBMS) software packages available. Why should you use Access?

- Access is an easily available DBMS. It is included with many Microsoft Office suites, which makes Access very attractive to businesses.
- Access is a relational DBMS. What you learn about Access is transferable to other relational DBMSs.
- Access allows for easy interaction with other products in the Office suite. You can export data and reports into Word, PowerPoint, or Excel. You can also import from Excel and Word into Access.
- Access is often used as a stand-alone DBMS, meaning a DBMS used by a single user. Even if a company uses another DBMS for many users, you can easily link to that database with Access. You can use Access queries to output the data you need to interact with other Office applications to perform tasks such as mail merges.
- Access allows you to create an app database and either give it to others or put it on the Windows App Store.

Understanding the Four Main Objects in a Database

Access has four main database **objects**: tables, queries, forms, and reports. A **table** is the database object that stores data organized in an arrangement of columns and rows. A **query** object retrieves specific data from other database objects and then displays only the data that you specify. Queries allow you to ask questions about the data in your tables. You can use a **form** object to enter new records into a table, edit or delete existing records in a table, or display existing records. The **report** object summarizes the fields and records from a table or query in an easy-to-read format suitable for printing.

QUICK REFERENCE**Access Object Types**

There are four main database object types:

1. Table objects store data. Each row is a person, place, or thing. Each column is a field.
2. Query objects allow you to ask questions about your data. You can select, summarize, and sort data in a query.
3. Form objects give you a formatted way to add, modify, or delete data in your tables. They can also be used to display data.
4. Report objects provide an easy-to-read view of your data that is suitable for business purposes. Data in reports can be grouped, sorted, and totaled.

Access objects have several views. Each **view** gives you a different perspective on the objects and different capabilities. For example, the **Datasheet view** of a table shows the data contents within a table. Figure 1 shows Datasheet view of a participant table. **Design view** shows how fields are defined. Depending on the object, other views may exist. Figure 1 shows a toggle button you can use to switch between Datasheet view and Design view. Figure 2 shows how a participant table would appear in Design view.

In Datasheet view, you see the actual participants and their related information. In Design view, you see how the information is defined and structured. Figure 1 shows the charity event participant table. Each row contains corresponding pieces of data about the participant listed in that row. Each row in Access is called a **record**. A record is all of the data pertaining to one person, place, thing, or event. There are 17 participant records in the table. The second participant is John Trujillo.

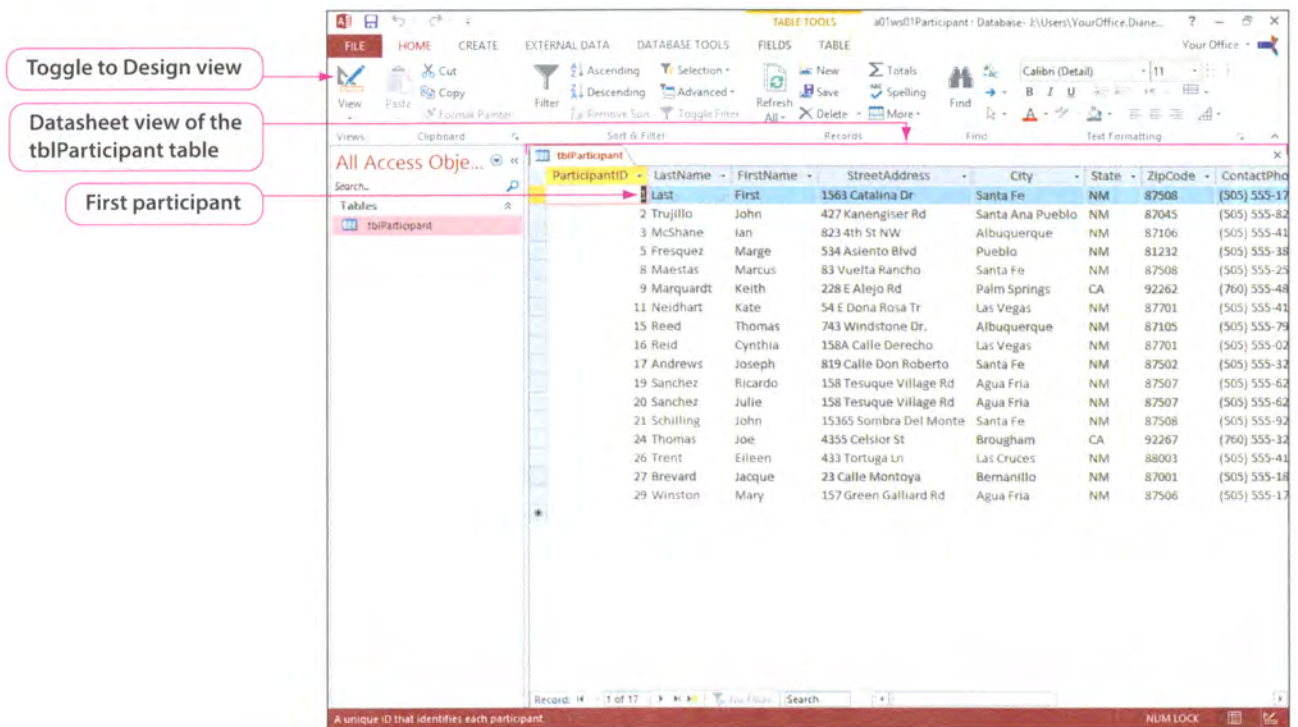


Figure 1 Datasheet view of the tblParticipant table

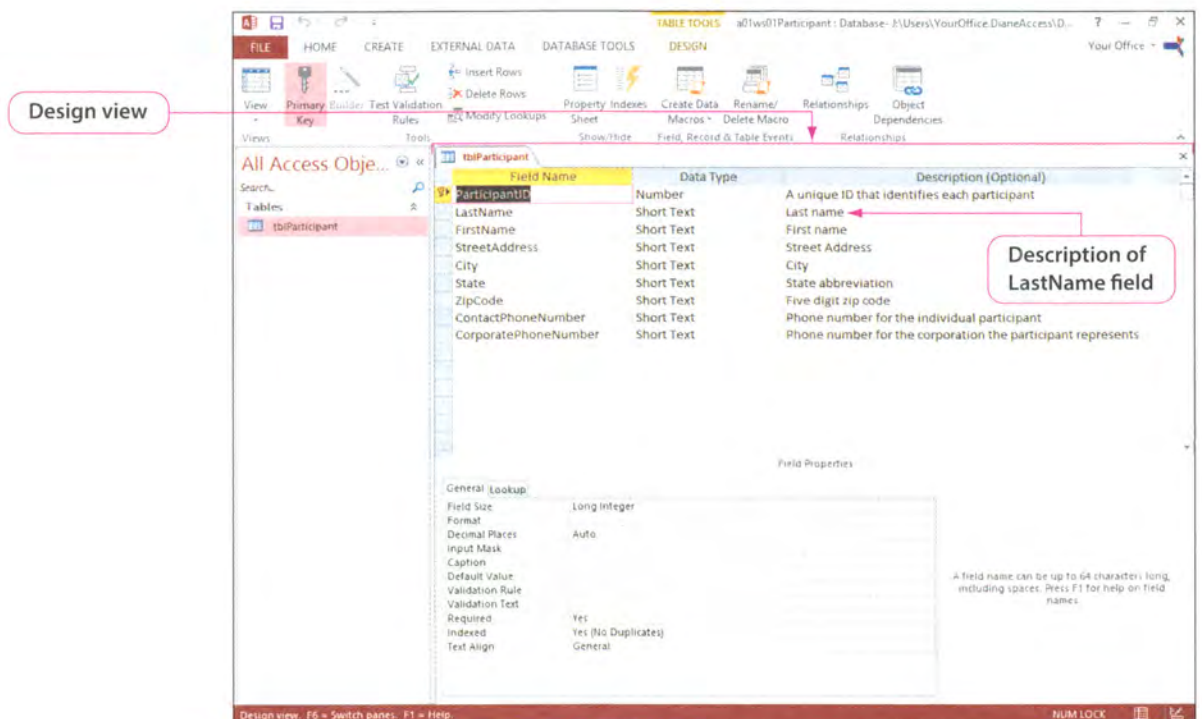


Figure 2 Design view of the tblParticipant table

Each column in Access is called a **field**. A field is a specific piece of information that is stored in every record. LastName is a field that shows the participant's last name. As you go across the table rows, you will see fields that represent the participant's first name and address.

Creating a New Database and Templates

When you create a new database, you can design it yourself starting with an empty database. If you take this approach, you develop the tables, fields, and the relationships—or links—between the tables. This requires you to decide what information you want to keep in your database, how this information should be grouped into tables, what relationships you need, and what queries and reports you need.

The other option in creating a new database is to start with a prebuilt template. A **template** is a structure of a database with tables, fields, forms, queries, and reports. Templates are professionally designed databases that you can either use as is or adapt to suit your needs. You can download a wide variety of templates from Microsoft's website Office.com. Microsoft provides sample database templates used for managing assets, contacts, issues, projects, and tasks.

Templates are created by Microsoft employees or other users. Microsoft then allows users to rate the template so you can see what others have found useful. You can also download sample databases to experiment with. The difference between a template and a sample database is that a sample database has presupplied data, whereas a template is empty except for the structure and definitions. One of the popular sample databases among Access users is Microsoft's Northwind database, which has sales, customer, and employee data for a fictitious company named Northwind Traders.

For the tournament, the intern created a new database and defined tables specifically for Putts for Paws. You will work with the database that has already been created. You need to start Access and open the database to get started.

SIDE NOTE

Do Not Confuse a DBMS with a Database

Access is DBMS software while a database is a collection of data. You could use paper files to manage your database, but you choose to use Access DBMS software instead.

A01.00



To Start Access and Open a Database

- a. From the Windows Start screen or desktop, point to the **bottom-right corner** of the screen. The Charms will be displayed on the right side of the screen.
- b. Note the labels underneath each of the charms. Click the **Search** charm.
- c. Click inside the **search** box at the top of the page. Type **Access**.
- d. Click **Microsoft Access 2013** in the search results.
- e. Click **Open Other Files** on the Access Start Screen, and then click **Computer**. Navigate to your student data files, click **a01ws01Putts**, and then click the **Open** button.
- f. Click the **FILE** tab, and then click **Save As**. Under **File Types**, make sure **Save Database As** is selected. Under **Save Database As**, make sure **Access Database** is selected. Click **Save As**, and then navigate to the location where you are saving your files. In the **File name** box, type **a01ws01Putts_LastFirst**, using your last and first name. Click **Save**.
- g. If the Security Warning message appears, click the **Enable Content** button.

REAL WORLD ADVICE

Why Does Access Give You a Security Warning About Your Database?

Access databases can contain dangerous code that can infect your computer with a virus. Therefore, Access displays a security warning asking you whether you trust the content of the database. Until you tell Access that you trust this content, Access disables features that might allow the virus to infect your computer.

- Make sure you run a virus scan on any file before you say it should be trusted. You do not want to trust content that you are unsure about.
- You can trust the content for a single use. Click Enable Content to say that you trust the file.
- To trust a database permanently, you can store it in a trusted location. Depending on your computer and operating system, certain locations are predefined as trusted. Click the File tab, click Options, and then select Trust Center for the Access Trust Center, where you can add other locations to the trusted locations.

Maneuver in the Navigation Pane

When you open a database, Access displays the **Navigation Pane** on the left side as shown in Figure 3. This pane allows you to view the objects in the database. The standard view in the Navigation Pane shows all objects in the database organized by object type. You can see that the database has three tables: tblItem, tblOrder, and tblOrderLine. There is one query, one form, and one report.

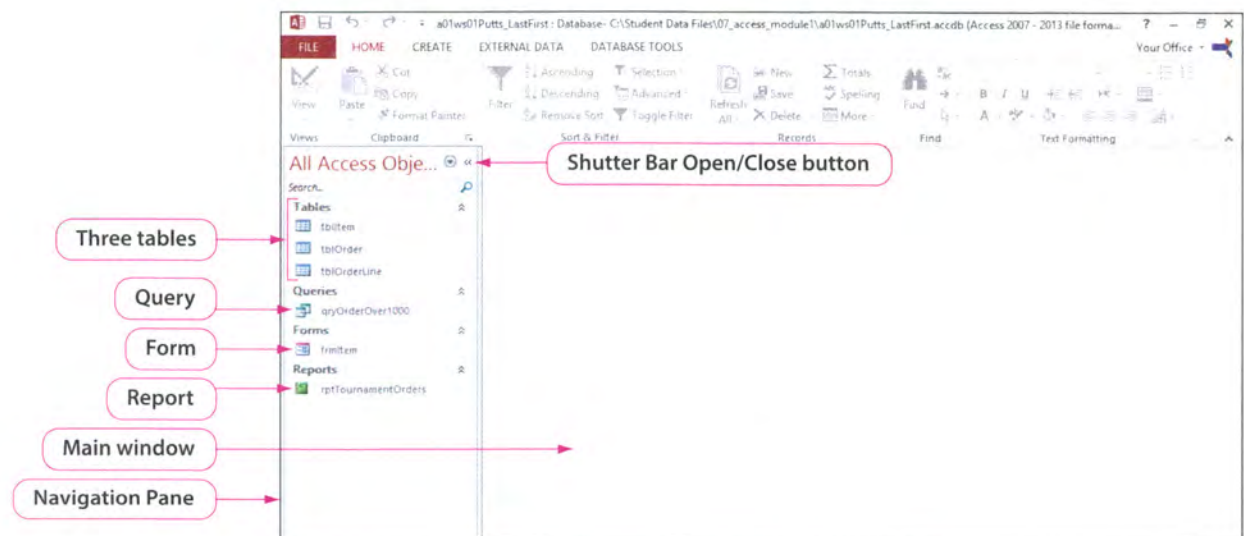


Figure 3 Opening screen for a01ws01Putts_LastFirst

Opening and Closing the Shutter Bar

You can work in Access with the Navigation Pane open or closed. The Shutter Bar Open/Close button at the top of the pane opens and closes the pane.

A01.01



To Open and Close the Navigation Pane

- Click the **Shutter Bar Close** button to close the Navigation Pane. Access closes the pane, allowing for a larger workspace in the database, but it leaves the Navigation Pane on the side of the window for when you need it.
- Click the **Shutter Bar Open** button to open the pane again.

Customizing the Navigation Pane

While the default view of the Navigation Pane shows all objects such as tables, queries, forms, and reports, organized by object type, you have several choices of views.

A01.02



To Customize the Navigation Pane

- Click the **Navigation Pane** arrow to display the Navigation Pane view options. The default view is displayed, which is Object Type and All Access Objects.

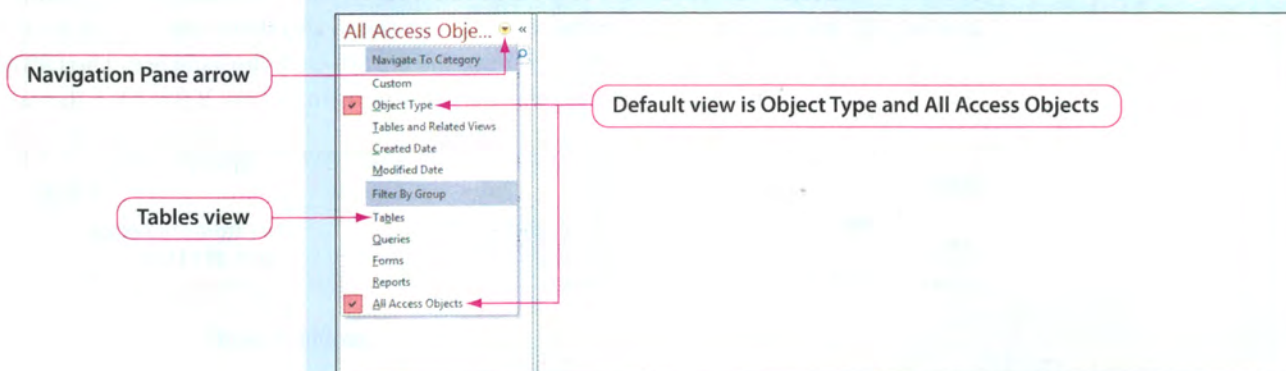


Figure 4 Navigation Pane options—default view

- Click **Tables**.
Only the three tables are displayed in the Navigation Pane. When you have many objects in a database, it helps to restrict objects that are shown in the Navigation Pane.
- Click the **Navigation Pane** arrow again, and then click **Tables and Related Views**.
The objects are organized by tables. Any query, report, or form related to a table is listed with that table.

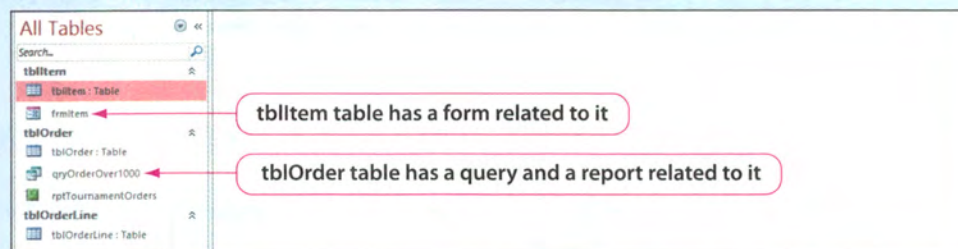


Figure 5 Tables and related views in Navigation Pane

Using the Search Box

Currently, there are only a few objects in your database. However, as you work with a database, more objects may be added as you develop reports and queries. As a result, to help you find objects, Access provides a Search box.

A01.03



To Search for an Object

- In the **Search** box at the top of the **Navigation Pane**, type **Order**. Access searches for and displays all objects with the word **Order** in their name.
- Click the **Clear Search String** button to see all objects again.
- Click the **Navigation Pane** arrow , click **Object Type**, click the **Navigation Pane** arrow again, and then select **All Access Objects**. This returns you to the default view, which is what will be used throughout this text.

Understanding File Extensions in Access

A file extension is the suffix on all file names that helps Windows understand what information is in a file and what program should open the file. However, Windows automatically hides these extensions so you often do not notice them. The file name in Figure 6 shows the file name and location followed by its extension “.accdb”. Access 2013 uses the same file extension that was used in Access 2010 and Access 2007. This “.accdb” extension indicates that databases created in the three versions are compatible with one another. The file name at the top of the window in Figure 6 also shows that the file version is Access 2007-2013. Be careful not to confuse the DBMS with the database. The DBMS software you are using is Access 2013, but the database is in Access 2007-2013 format.

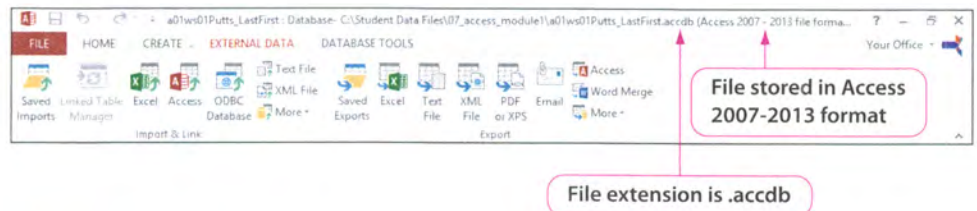


Figure 6 Title bar showing file extension

QUICK REFERENCE		Access File Extensions	
Extension	Description	Version of Access	Compatibility
ACCDB	Access database files	2007-2013	Cannot be opened in Access 2002-2003
ACCDE	Access database files that are in “execute only” mode Visual Basic for Applications (VBA) source code is hidden.	2007-2013	Cannot be opened in Access 2002-2003
ACCDT	Access database templates	2007-2013	Cannot be opened in Access 2002-2003
MDB	Access 2002-2003 database files	2002-2003	Can be opened in Access 2007-2013 Access 2007-2013 can save files in this format.
MDE	Access database files that are in “execute only” mode Visual Basic for Applications (VBA) source code is hidden.	2002-2003	Can be opened in Access 2007-2013 Access 2007-2013 can save files in this format.

Understand What a Table Is

Tables store data organized in an arrangement of columns and rows. For illustration, think about the charity event, Putts for Paws. There are many ways participants and companies can participate in the event and help the charity. For example, a participant can play in the event, a company can pay for a foursome to play in the event, or the company can sponsor various items such as a cart, hole, or flag. As a result, Painted Paradise needs to keep a record of the available options and what corporations or participants have purchased, as shown in Table 1.

Item ID	Item Description	Quantity Available	Amount To Be Charged	Notes
G1	Golfer—one	100	\$200.00	
TEAM	Golfers—team of four	10	\$550.00	
CTEAM	Golfers—corporate team of four	10	\$850.00	Includes hole sponsorship
CART	Cart sponsor	40	\$2,000.00	Logo or brand displayed on cart
HOLE	Hole sponsor	18	\$500.00	Logo or brand displayed on hole
FLAG	Flag sponsor	18	\$500.00	Logo or brand displayed on flagstick

Table 1 Data in the tblItem table

As mentioned previously, the power of a **relational database** comes when you link tables. A relational database is a database where data is stored in tables with relationships between the tables. The tblItem table shown in Table 1 contains information about items that a participant or corporation can buy to support the charity, including the items available, a description, the quantity available to be sold, the amount that will be charged for the item, and notes about the item. However, you cannot see who has ordered these items. That additional information becomes available when you use relationships to look at other tables.

Importing a Table

Recently, a colleague compiled a list of participants in the charity event in an Access table in another database. You will begin your work for Putts for Paws by importing this participant table from the Participant database into your database. **Importing** is the process of copying data from another file, such as a Word file or Excel workbook, into a separate file, such as an Access database.

A01.04



To Import an Access Object

- a. Click the **EXTERNAL DATA** tab, and then in the Import & Link group, click **Access**. The Get External Data - Access Database dialog box is displayed.

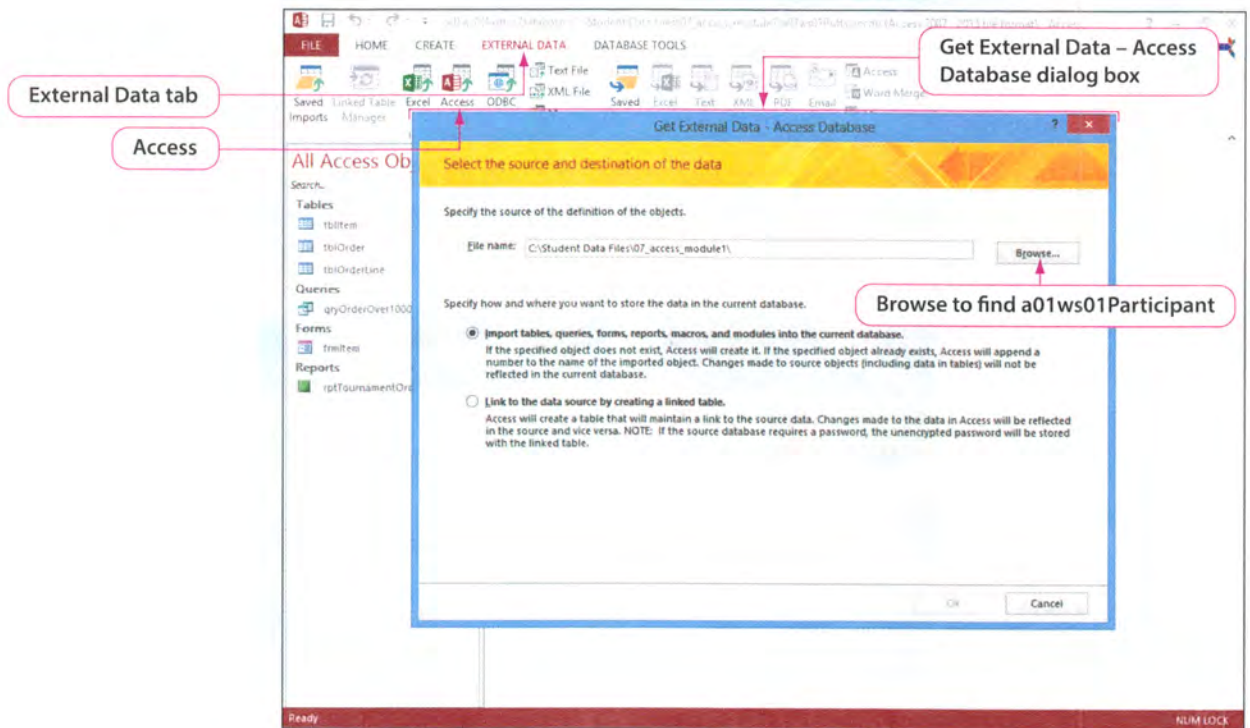


Figure 7 Get External Data – Access Database dialog box

- b. Click **Browse**, navigate to your student data folder, and then select the **a01ws01Participant** database. Click **Open**, and then click **OK**. Access opens the Import Objects dialog box.

Troubleshooting

If you do not see the Import Objects dialog box, you may have chosen Access from the Export group on the Ribbon rather than from the Import & Link group.

- c. If necessary, click the **Tables** tab. Click **tblParticipant**, and then click **OK**. Access displays the message: All objects were imported successfully.
- d. Click **Close** at the bottom of the dialog box.
- e. Double-click **tblParticipant** in the Navigation Pane.

Access opens the table. You may not see exactly the same number of columns and rows in your table because how much of the table is visible is dependent on how large your Access window is. You can change the size of the Access window by using your mouse to resize it or by clicking the Maximize button  to maximize the Access window.

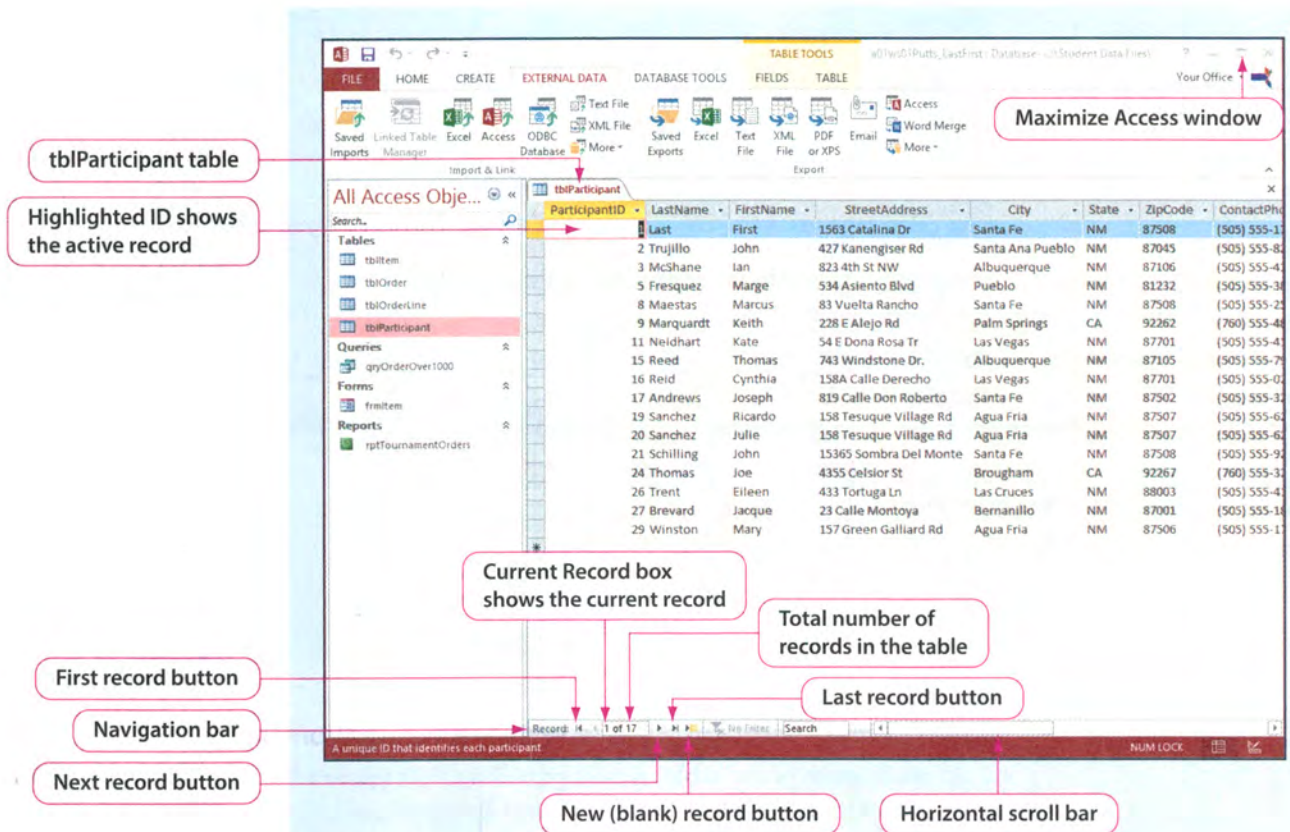


Figure 8 Imported tblParticipant table

REAL WORLD ADVICE

What Should You Name Your Tables?

If other people use the database and cannot find the right table, how useful is your database? Thus, you want to use names that are easy to understand. While Access allows you to give any name you want to a table, the name "tblParticipant" follows a standard naming convention:

- Use a name that starts with "tbl". That allows you to distinguish tables from queries at a glance.
- Follow with a name that is descriptive. You want it to be easy to remember what is in the table.
- Make the name short enough that it is easy to see in the Navigation Pane.
- You can use spaces in table names (e.g., tbl Participant), but avid Access users avoid them because it makes advanced tasks more difficult.
- You can use special characters in names. Some people use underscores where a space would otherwise be, such as tbl_Participant.

Navigating Through a Table

Carefully examine the tblParticipant table. Each row of data contains information about the participant listed in the LastName field. There are 17 participant records in the table, with the second record being John Trujillo. You will change the name in the record for the first participant to your name.

A01.05



To Change the First Record to Your Name

- If necessary, click the **First record** button to return to the first participant.
- Press **Tab** to move to the LastName field.
- Replace **Last** in the first record of the LastName field with your last name.
- Press **Tab** to move to the next field, and then replace **First** in the FirstName field with your first name.

Replace Last with
your last name

Replace First with
your first name

ParticipantID	LastName	FirstName	StreetAddress	City	State	ZipCode	ContactPho
1	Last	First	1563 Catalina Dr	Santa Fe	NM	87508	(505) 555-12
2	Trujillo	John	427 Kanengiser Rd	Santa Ana Pueblo	NM	87045	(505) 555-82
3	McShane	Ian	823 4th St NW	Albuquerque	NM	87106	(505) 555-41
5	Fresquez	Marge	534 Asiento Blvd	Pueblo	NM	81232	(505) 555-38
8	Maestas	Marcus	83 Vuelta Rancho	Santa Fe	NM	87508	(505) 555-25
9	Marquardt	Keith	228 E Alejo Rd	Palm Springs	CA	92262	(760) 555-48
11	Neidhart	Kate	54 E Dona Rosa Tr	Las Vegas	NM	87701	(505) 555-41

Figure 9 Replace Last and First with your name

Navigating Through a Table with the Navigation Bar

At the bottom of the table, Access provides a **Navigation bar** that allows you to move through the table. You can move record by record, skip to the end, or if you know a specific record number, you can jump to that record. The highlighted ID shows the active record. When you open the table, the first record is active.

Examine the various parts of the Navigation bar as shown in Figure 8. The **Current Record** box shows which record is active and how many records are in the table. There are four arrow buttons in the Navigation bar that you can use to move between records.

A01.06



To Navigate Through the Table Using the Navigation Bar

- Click the **Next record** button to move to the second record. The **Current Record** box changes to show **2 of 17**. Access highlights the first name of participant John Trujillo.
- Click the **Next record** button again to move to the third participant. The **Current Record** box changes to show **3 of 17**.
- Click the **First record** button to return to the first participant.
- Click the **New (blank) record** button to go to the first blank row. Alternatively, you could click in the ParticipantID field of the first blank row.

The first blank row at the end of the table is the **append row**. This row allows you to enter new records to the table. Notice that Access displays an asterisk in the **record selector** box—it is the small box at the left of the record—to indicate that it is the append row. When you type information here, you create a new participant record. Whenever you add a participant, you want to make sure you are in the append row so you are not changing the information for an existing participant. You will add a participant to this empty row.

ParticipantID	LastName	FirstName	StreetAddress	City	State	ZipCode	ContactPhone
1	Last	First	1563 Catalina Dr	Santa Fe	NM	87508	(505) 555-17
2	Trujillo	John	427 Kanengiser Rd	Santa Ana Pueblo	NM	87045	(505) 555-82
3	McShane	Ian	823 4th St NW	Albuquerque	NM	87106	(505) 555-41
5	Fresquez	Marge	534 Asiento Blvd	Pueblo	NM	81232	(505) 555-38
8	Maestas	Marcus	83 Vuelta Rancho	Santa Fe	NM	87508	(505) 555-25
9	Marquardt	Keith	228 E Alejo Rd	Palm Springs	CA	92262	(760) 555-48
11	Neidhart	Kate	54 E Dona Rosa Tr	Las Vegas	NM	87701	(505) 555-41
15	Reed	Thomas	743 Windstone Dr.	Albuquerque	NM	87105	(505) 555-79
16	Reid	Cynthia	158A Calle Derecho	Las Vegas	NM	87701	(505) 555-02
17	Andrews	Joseph	819 Calle Don Roberto	Santa Fe	NM	87502	(505) 555-32
19	Sanchez	Ricardo	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 555-62
20	Sanchez	Julie	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 555-62
21	Schilling	John	15365 Sombra Del Monte	Santa Fe	NM	87508	(505) 555-92
24	Thomas	Joe	4355 Celsior St	Brougham	CA	92267	(760) 555-32
26	Trent	Eileen	433 Tortuga Ln	Las Cruces	NM	88003	(505) 555-41
27	Brevard	Jacque	23 Calle Montoya	Bernanillo	NM	87001	(505) 555-18
29	Winston	Mary	157 Green Galliard Rd	Agua Fria	NM	87506	(505) 555-17

Figure 10 Append a new record

- e. Make sure that the append row (blank row) is selected and that the record selector box contains an asterisk. In the ParticipantID field, type **30**. Press **Tab** to move to the next field, and then in the **LastName** column, type **Fox**.

Alternatively, you can press **Enter** after typing text in a field to move to the next field. Also, notice that when you start typing, the record indicator changed from an asterisk to a pencil. The pencil means that you are in edit mode. The record after Fox now becomes the new append row. Press **Enter**, and then in the FirstName column, type **Jeff**.

ParticipantID	LastName	FirstName	StreetAddress	City	State	ZipCode	ContactPhone
1	Last	First	1563 Catalina Dr	Santa Fe	NM	87508	(505) 555-17
2	Trujillo	John	427 Kanengiser Rd	Santa Ana Pueblo	NM	87045	(505) 555-82
3	McShane	Ian	823 4th St NW	Albuquerque	NM	87106	(505) 555-41
5	Fresquez	Marge	534 Asiento Blvd	Pueblo	NM	81232	(505) 555-38
8	Maestas	Marcus	83 Vuelta Rancho	Santa Fe	NM	87508	(505) 555-25
9	Marquardt	Keith	228 E Alejo Rd	Palm Springs	CA	92262	(760) 555-48
11	Neidhart	Kate	54 E Dona Rosa Tr	Las Vegas	NM	87701	(505) 555-41
15	Reed	Thomas	743 Windstone Dr.	Albuquerque	NM	87105	(505) 555-79
16	Reid	Cynthia	158A Calle Derecho	Las Vegas	NM	87701	(505) 555-02
17	Andrews	Joseph	819 Calle Don Roberto	Santa Fe	NM	87502	(505) 555-32
19	Sanchez	Ricardo	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 555-62
20	Sanchez	Julie	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 555-62
21	Schilling	John	15365 Sombra Del Monte	Santa Fe	NM	87508	(505) 555-92
24	Thomas	Joe	4355 Celsior St	Brougham	CA	92267	(760) 555-32
26	Trent	Eileen	433 Tortuga Ln	Las Cruces	NM	88003	(505) 555-41
27	Brevard	Jacque	23 Calle Montoya	Bernanillo	NM	87001	(505) 555-18
29	Winston	Mary	157 Green Galliard Rd	Agua Fria	NM	87506	(505) 555-17
30	Fox	Jeff					

Figure 11 Enter participant Jeff Fox into the append row

- f. Continue entering the data for Jeff Fox using the following information:

StreetAddress	1509 Las Cruces Drive
City	Las Cruces
State	NM
ZipCode	88003
ContactPhoneNumber	(505) 555-8786
CorporatePhoneNumber	(leave blank)

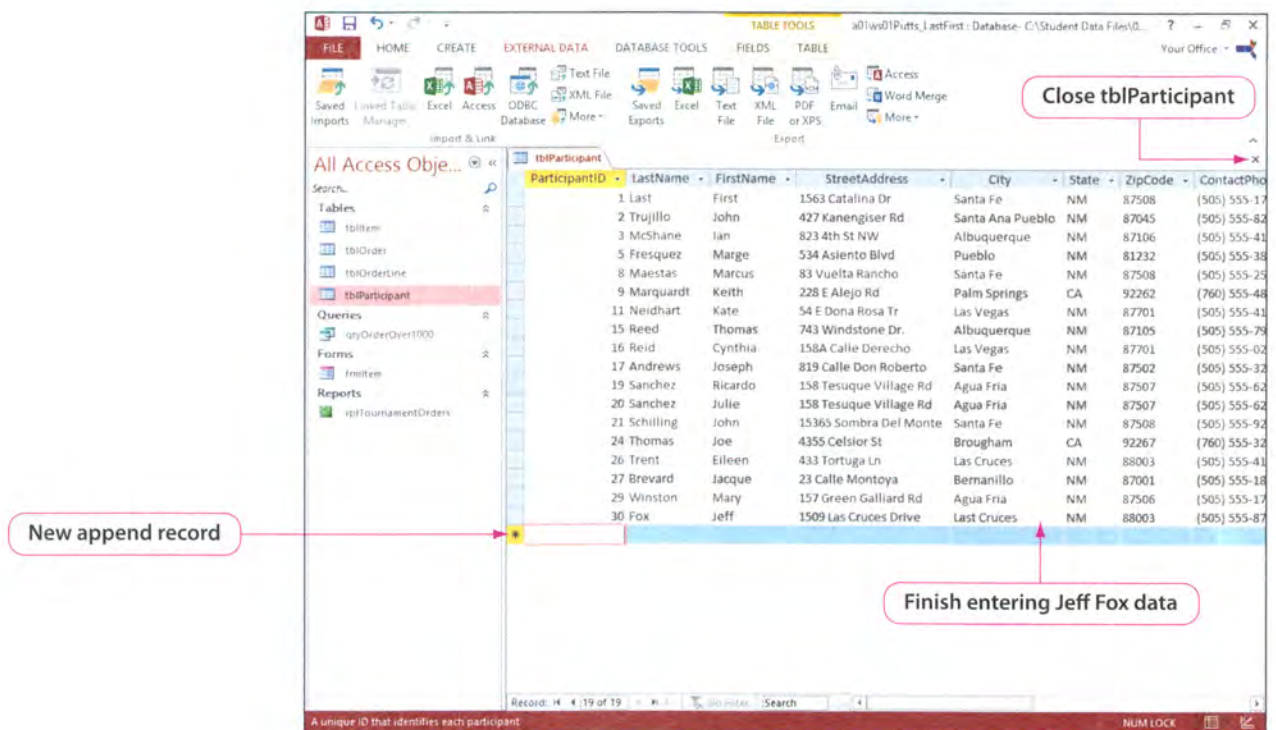


Figure 12 Finish entering the record for Jeff Fox

- g.** Click **Close**  to close the tblParticipant table. Keep Access and the database open. Notice that Access did not ask you if you want to save the table. Access is not like Word or the other Office applications where you must choose an option to save the file. Access automatically saves the data you enter as you type it.

Understanding Differences Between Access and Excel

An Access table looks similar to an Excel worksheet. Both have numbered rows of data and columns with labels. In addition, both applications allow you to manage data, perform calculations, and report on the data. The major difference between the two applications is that Access allows multiple tables with relationships between the tables, thus the term “relational database”. For example, if you are keeping track of participants and the items that they order, you create a table of participants and another table of orders. Excel 2013 has some of these features so it now blurs the distinction between spreadsheets and relational databases.

When you look at Access, you notice that several tables are used for an order. Why use multiple tables for a single order? Figure 13 shows how an order would look in Access and in Excel. The Excel version has to repeat the participant’s information on multiple lines. This leads to problems:

- **Data redundancy**—With repetition, you create redundant information. John Trujillo bought a cart and a team, so in Excel you have two rows. You would have to repeat the address information on both records. It is not efficient to enter the address information twice.
- **Errors**—Redundant information leads to errors. If the address needs to be changed, you have to look for all records with that information to make sure it is fixed everywhere.
- **Loss of data**—Suppose that John Trujillo orders just one item. If you deleted the ordered item, it would mean deleting all the information about him as well as the order.

tblParticipant									
ParticipantID	LastName	FirstName	StreetAddress	City	State	ZipCode	ContactPhoneNumber	CorporatePhone	
2	Trujillo	John	427 Kanengiser Rd	Santa Ana Pueblo	NM	87045	(505) 555-8217		

tblOrder				
OrderID	AmountPaid	MethodOfPayment	ResortRoomNumber	ParticipantID
1	\$2,550.00	CC		2

tblOrderLine			
OrderID	LineNum	ItemID	Quantity
1	1	CART	1
1	2	TEAM	1

tblItem				
ItemID	Itemdescription	QuantityAvailable	AmountToBeCharged	Notes
CART	Cart sponsor	40	\$2,000.00	Logo or brand displayed on cart
TEAM	Golfers - team of four	10	\$550.00	

Order in Excel												
Last Name	First Name	Street Address	City	State	Zip Code	Contact Phone Number	Corporate Phone Number	Order ID	Amount Paid	Method of Payment	Item ID	Quantity
Trujillo	John	427 Kanengiser Rd	Santa Ana Pueblo	NM	87045	(555) 373-8217		1	\$2,000.00	CC	CART	1
Trujillo	John	427 Kanengiser Rd	Santa Ana Pueblo	NM	87045	(555) 373-8217		1	\$ 550.00	CC	TEAM	1

Figure 13 John Trujillo's order in Access and in Excel

Because Access and Excel have so many common functionalities, many people use the tool that they are more confident using. If you prefer to use both, however, you can easily switch by exporting your data from Access to Excel or from Excel into Access. You can also use one tool for most uses and import your data into the other when you need to.

REAL WORLD ADVICE

When Do You Use Access Instead of Excel?

Generally, Access is designed to store data, and Excel is designed to analyze data and model situations. Fortunately, you can easily store data in Access and export a query to Excel for analysis.

Use Access for the following:

- You need to store data in multiple tables.
- You have a very large amount of data, as in thousands of records.
- You have large amounts of nonnumeric data.
- You want to run many different queries and reports from your data.
- You have multiple users accessing your data.

Use Excel for the following:

- Your data fits well into one table.
- You want to primarily do calculations, summaries, or comparisons of your data.
- You are using a report that you create just one time or in just one format.

Manually Navigate a Database

Before you explore the database using Access queries, you will explore the database manually. This will give you an understanding of what Access can do. Additionally, before you write queries and reports, you should examine your tables and fields so that you understand the database.

Using a Manual Query to Discover a Database

Patti Rochelle, the events coordinator at Painted Paradise, wants to send follow-up letters to those participants who have booked a corporate team for the Putts for Paws charity event. She asks you which participants have booked a team. First, you have to discover how a team is indicated in the database. Teams are items that participants can order, so you will start in the tblItem table.

A01.07



To Manually Navigate a Database

- a. In the **Navigation Pane**, double-click **tblItem**.

Access opens tblItem in Datasheet view. Explore the data, and you will notice that a corporate team is indicated as CTEAM.

tblItem table

Corporate team is indicated as CTEAM

ItemID	ItemDescription	QuantityAvailable	AmountToBeCharged	Notes
CART	Cart sponsor	40	\$2,000.00	Logo or brand displayed on
CTEAM	Golfers - corporate team of four	10	\$850.00	Includes hole sponsorship
FLAG	Flag sponsor	18	\$500.00	Logo or brand displayed on
G1	Golfer - one	100	\$200.00	
HOLE	Hole sponsor	18	\$500.00	Logo or brand displayed on
TEAM	Golfers - team of four	10	\$550.00	

Figure 14 tblItem table

- b. Close the tblItem table.

Next you need to determine which orders include CTEAM. Orders are composed of data from tblOrderLine and tblOrder.

- c. Double-click **tblOrderLine** to open the table.

Scan for orders that include CTEAM. There are two, OrderID 4 and OrderID 11.

- d. Close the tblOrderLine table.

- e. Double-click **tblOrder** to open the table, and then find OrderID 4 and 11.

You need to find which participants placed these orders. Access uses common fields to relate tables. tblParticipant and tblOrder have ParticipantID in common. You find that the ParticipantID for OrderID 4 is 5, and for OrderID 11 the ParticipantID is 19.

tblOrder table

OrderID	AmountPaid	MethodOfPayment	ResortRoomNumber	ParticipantID	Click to Add
1	\$2,550.00	CC		2	
2	\$2,000.00	CC		3	
3	\$1,000.00	CC		17	
4	\$2,850.00	CC		5	
5	\$400.00	ROOM	217	24	
6	\$200.00	CC		29	
7	\$3,000.00	CC		15	
8	\$550.00	ROOM	283	9	
9	\$0.00			16	
10	\$0.00			8	
11	\$850.00	CC		19	
(New)					

OrderID 4 is placed by Participant 5

OrderID 11 is placed by Participant 19

Figure 15 tblOrder table

- f. Close the tblOrder table.

- g. Double-click **tblParticipant** to open the table.

Scan for the participants that match the two ParticipantIDs you identified earlier, 5 and 19. You find that OrderID 4 was placed by ParticipantID 5, Marge Fresquez. In addition, OrderID 11 was placed by ParticipantID 19, Ricardo Sanchez.

tblParticipant table

Participant 5 is Marge Fresquez

Participant 19 is Ricardo Sanchez

ParticipantID	LastName	FirstName	StreetAddress	City	State	ZipCode	ContactPho
1	Last	First	1563 Catalina Dr	Santa Fe	NM	87508	(505) 555-17
2	Trujillo	John	427 Kanengiser Rd	Santa Ana Pueblo	NM	87045	(505) 555-82
3	McShane	Ian	823 4th St NW	Albuquerque	NM	87106	(505) 555-41
5	Fresquez	Marge	534 Asiento Blvd	Pueblo	NM	81232	(505) 555-38
8	Maestas	Marcus	83 Vuelta Rancho	Santa Fe	NM	87508	(505) 555-23
9	Marquardt	Keith	228 E Alejo Rd	Palm Springs	CA	92262	(760) 555-48
11	Neidhart	Kate	54 E Dona Rosa Tr	Las Vegas	NM	87701	(505) 555-41
15	Reed	Thomas	743 Windstone Dr.	Albuquerque	NM	87105	(505) 555-79
16	Reid	Cynthia	158A Calle Derecho	Las Vegas	NM	87701	(505) 555-02
17	Andrews	Joseph	819 Calle Don Roberto	Santa Fe	NM	87502	(505) 555-32
19	Sanchez	Ricardo	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 555-62
20	Sanchez	Julie	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 555-62
21	Schilling	John	15365 Sombra Del Monte	Santa Fe	NM	87508	(505) 555-92
24	Thomas	Joe	4355 Celsior St	Brougham	CA	92267	(760) 555-32
26	Trent	Eileen	433 Tortuga Ln	Las Cruces	NM	88003	(505) 555-41
27	Brevard	Jacque	23 Calle Montoya	Bermanillo	NM	87001	(505) 555-18
29	Winston	Mary	157 Green Galliard Rd	Agua Fria	NM	87506	(505) 555-17
30	Fox	Jeff	1509 Las Cruces Drive	Last Cruces	NM	88003	(505) 555-87

Figure 16 tblParticipant table

h. Close  the tblParticipant table.

You now can tell Ms. Rochelle which participants have booked corporate teams and the address that the follow-up should be sent to. However, it may seem like a lot of work to find out who booked the corporate teams. Access queries make this task easier. It is important to know what data is in your database. While Access will do the hard part of matching tables on common fields and finding the results, you still need to tell it what fields you want and where the fields are located.

REAL WORLD ADVICE

Closing Tables

While Access allows you to leave several tables open at the same time, it is a good idea to get into the habit of closing a table when you are done with it.

- First, there are many Access functions that use a table that cannot be completed while the table is open. If you close the table, you no longer risk running into this problem.
- Second, closing tables makes it less likely that you will accidentally change the wrong table.
- Third, each open table requires more memory for Access. With larger tables, Access could be slowed down by having multiple tables open.

Understanding Queries, Forms, and Reports

You have explored tables, the first of the four main object types in Access. As mentioned previously, the other three object types are queries, forms, and reports. Each object provides a different way to work with data stored in tables. A query is used to ask questions about your data. A form is primarily used to enter data into your database or display data in your database. Reports are used to provide professional looking displays of your tables that are suitable for printing. In this section, you will work with queries, forms, and reports within your database.

Understand What a Query Is

A query is a way to ask questions about your data. For your charity golf tournament, you can use queries to get answers to questions, such as “What is Ian McShane’s phone number?”, “What has John Trujillo ordered?”, and “What orders are over \$1,000?”

You can also conduct more complex queries such as calculating a score given a player’s strokes and their handicap.

One of the strengths of Access is the ability to ask such questions and get answers quickly. You traced who ordered corporate teams earlier in the workshop. That was difficult because you had to keep track of fields such as ParticipantID in one table and then look them up in another table. By using queries, Access will match common fields in the tables and trace the order for you.

You will look at two different views of queries in this workshop:

- Datasheet view shows the results of your query.
- Design view shows how the query is constructed. It shows the tables, fields, and selection criterion for the query.

Creating a Query Using a Wizard

Access provides wizards to help you with tasks. A **wizard** is a step-by-step guide that walks you through tasks by asking you questions to help you decide what you want to do. Once you have some experience, you can also do the task yourself without a guide. You would like to know which participants are from Santa Fe, New Mexico. You will use the Query Wizard to create the query getting all participants, and then you will modify the query design to select those from Santa Fe.

REAL WORLD ADVICE

Using Wizards in Access

Wizards can sometimes save you time! Access wizards are shortcuts to building objects such as queries, reports, and forms. They select fields, format the data, and perform calculations. After the wizard does the initial formatting, you can always modify the resulting query, report, or form to get exactly what you want.

However, anything that can be done with a wizard could also be done without a wizard. A wizard may limit your choices. On the other hand, starting in design view requires you to make choices without guidance. Whether you start with a wizard or with design view is usually personal choice. As you become more comfortable with Access, pick the method that you prefer. The results will be the same.

A01.08



To Create a Query with a Wizard

- a. Click the **CREATE** tab, and then in the Queries group, click **Query Wizard**.

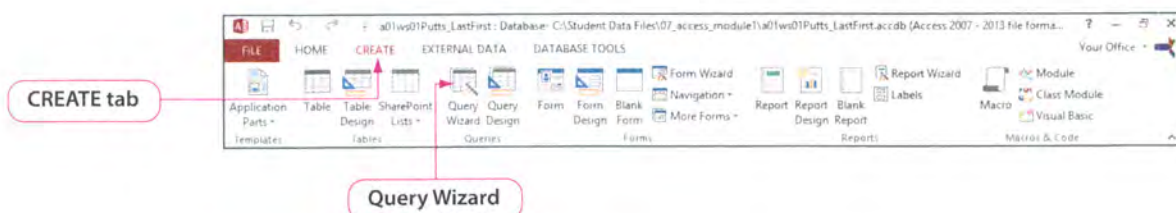


Figure 17 CREATE tab on the Ribbon

Access displays the New Query dialog box and asks you what kind of query you want.

Troubleshooting

If this is the first time that you have used an Access wizard, Access will need to set up the wizards. You will get a message “Setting up wizard” and will need to wait while the wizards are installed.

- b. If necessary, click **Simple Query Wizard**, and then click **OK**.

Access asks you which fields you want to include in the query. You have choices of tables or queries as the source for your fields. Your database has four tables to select as a source. You will choose only one table. You could choose fields from multiple tables, but that is not necessary in this query.

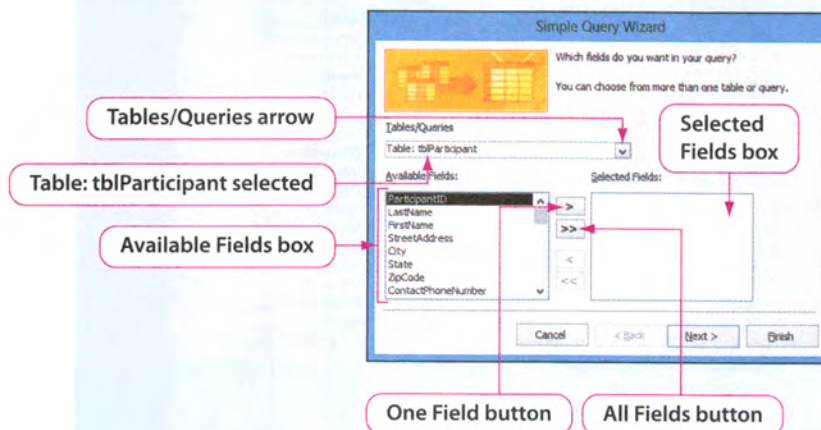


Figure 18 Select tblParticipant

- c. Click the **Tables/Queries** arrow to see available field sources, and then select **Table: tblParticipant** as the source of your fields.

The dialog box has two lists. The box on the left shows you all available fields from the selected table or query. The box on the right shows you all the fields that you have selected for this query. You use the buttons between the two lists to move fields from one box to the other. Selecting a field and clicking the **One Field** button  moves that field from the Available Fields box to the Selected Fields box. Clicking the **All Fields** button  moves all fields.

- d. Under Available Fields, click **LastName**, and then click the **One Field** button . Access moves the LastName field to the Selected Fields box.
- e. Click **FirstName**, and then click the **One Field** button .
- f. Click **City**, and then click the **One Field** button .

Your field list in the right box should display fields in the following order: LastName, FirstName, and City.

Troubleshooting

If you accidentally add the wrong field to the Selected Fields box, select the field and use the **One Field Back** button  to place it back in the Available Fields box.

If you select the fields in the wrong order, Access does not have a way to reorder the fields. It is best to place them all back in the Available Fields box using the **All Fields Back** button  and then select them again in the right order.

- g. Click **Next** to continue to the next page of the wizard. In the **What title do you want for your query?** box type `qryParticipantSantaFe_initialLastname` using your first initial and last name.
- h. Click **Open the query to view information**, and then click **Finish**.
- Access shows you the results of your query. Once you have created this query, the query name is displayed under All Access objects in the Navigation Pane.

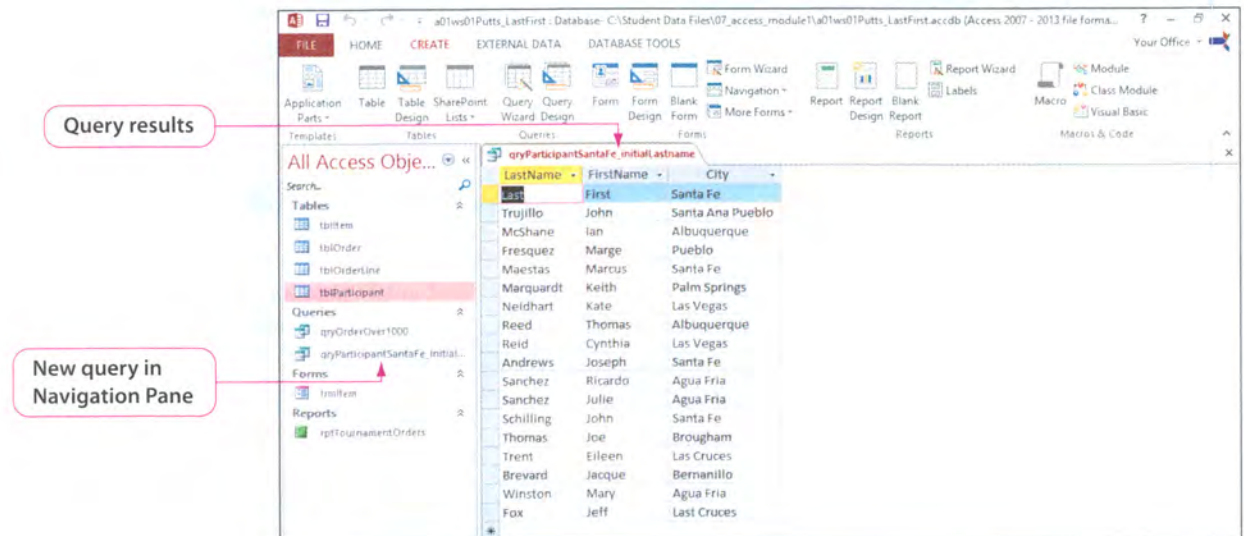


Figure 19 Results of your query

SIDE NOTE

Saving Design Changes

While Access automatically saves data changes, you need to tell it to save design changes. A new query is a design change.

- i. Click **Save**  to save the query, and then **close**  the query.

Query results are a recordset that provide an answer to a question posed in a query. The query results show records and fields created at **run time**, which means that the results are created each time you run the query. This run time table is referred to as a **recordset**. The method to create the query is saved but not the actual results. That means that if you add a participant who meets the query criteria to the participant table, the next time you run this query, that participant will appear in the results of this query.

REAL WORLD ADVICE

Naming Your Queries

Similar to tables, Access will allow you to give your query any name you want. There are two important considerations:

- You want to remember what a query does, so make the name as descriptive as possible. A query named “tblParticipant Query” will probably have no meaning for you in a few days. It will be easier to remember that “qryParticipantSantaFe” shows participants from Santa Fe.
- When you are looking at field sources, you often have a choice between tables and queries. Starting all your tables with “tbl” and all your queries with “qry” makes it easy to distinguish what you are choosing.

Selecting a Value Using Design View

The Query Wizard uses a question-and-answer dialog box to create a query. The other method of creating a query is to use Design view. Design view goes behind the scenes of the data and shows you the detailed structure of an Access object. You can also use Design view to modify an existing query.

A01.09



To Switch to Design View of a Query

- Right-click **qryParticipantSantaFe_initialLastName** in the Navigation Pane.
- Select **Design View** from the shortcut menu.

Access opens the Design view of your query. The DESIGN tab is open on the Ribbon. The left side of the screen shows the Navigation Pane. The top half of the screen shows the **query workspace**, which is the source for data in the query. In this case, the source is the table **tblParticipant**. The bottom half is called the **query design grid**. It shows which fields are selected in this query: **LastName**, **FirstName**, and **City**.

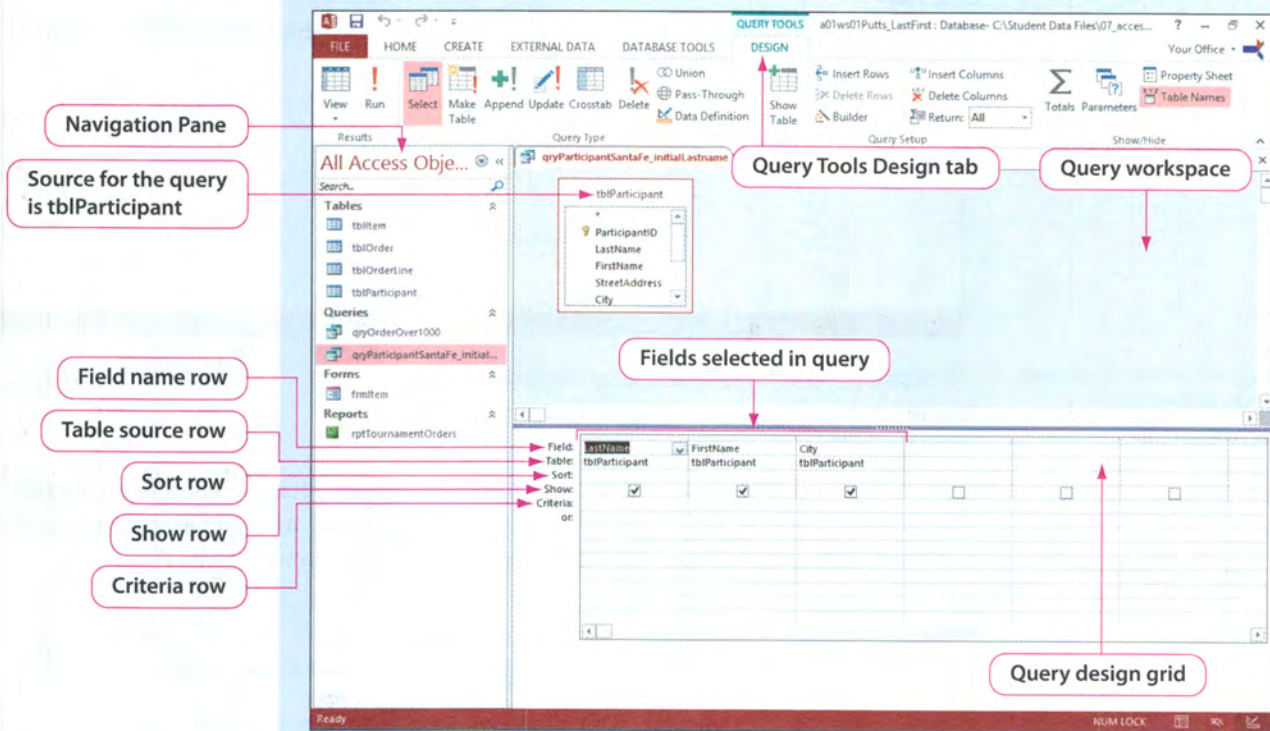


Figure 20 Design view for qryParticipantSantaFe_initialLastName

Selecting Values in a Query

Each row in the design grid shows information about the field. The top row is Field name. The next row shows the table or source for this field. The Sort row allows you to specify the order of records shown in your query results by setting one or more sort fields. The Show row is a check box that specifies whether the field is shown in the table of query results. The Criteria rows allow you to select certain records by setting conditions for the field contents. You are going to change this query to see which participants are from Santa Fe. You will do that by adding selection criteria.

A01.10



To Select a Value in a Query

- Click the **Criteria** cell in the City column.
- Type **Santa Fe**.

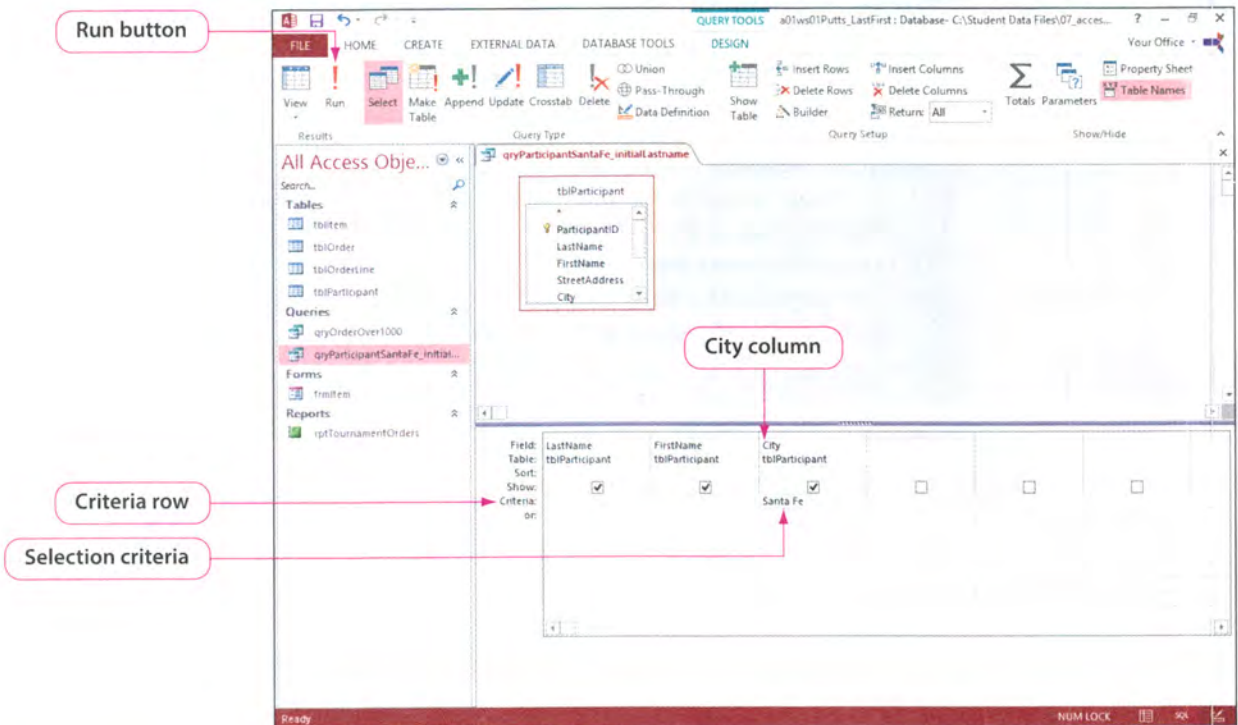


Figure 21 Enter criteria in a query selection

SIDE NOTE

Query Criteria

Because "City" is a text field, the criteria is treated as text, and Access adds quotation marks. You can also type the quotation marks.

- On the DESIGN tab, in the Results group, click **Run**.

Access returns the query results as shown in Figure 22. When you run a query, you should check the results to make sure they make sense. You wanted the participants with a city of Santa Fe, and the participants shown are only from Santa Fe.

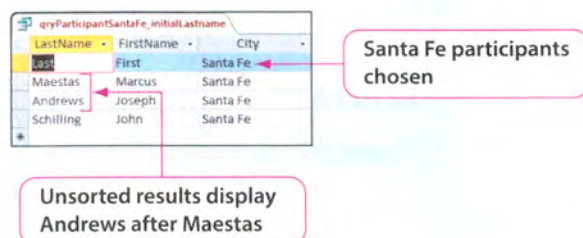


Figure 22 Unsorted query results showing participants from Santa Fe

Troubleshooting

If your query results are not what you expect (compare to Figure 22), you made an error in entering your selection criteria. Click the View button on the Home tab to switch back to Design view. Compare your criteria with Figure 21. Make sure that you spelled "Santa Fe" correctly and that it is in the City column.

QUICK REFERENCE**Selecting in a Query**

When you typed Santa Fe in the criteria, you asked Access to select those participants who had a city equal to "Santa Fe". The equals sign is implied, though you can enter it if you wish. Other operators that can be entered in the selection criteria follow:

Operator	Meaning	Description
=	Equal to	Selects the records where the field value is equal to the value provided. If no operator is used, equal to is assumed.
<	Less than	Selects the records where the field value is less than the value provided.
>	Greater than	Selects the records where the field value is greater than the value provided.
< =	Less than or equal to	Selects the records where the field value is less than or equal to the value provided.
> =	Greater than or equal to	Selects the records where the field value is greater than or equal to the value provided.
< >	Not equal	Selects the records where the field value is not equal to the value provided.
Between	Between	Selects the records where the field values listed are within the two values. For example, between 1 and 7 is true for any value between 1 and 7—this includes the value of 1 and the value of 7.

Sorting Query Results

When Access runs a query, it puts the results in a default order based on how the table is defined. As shown in Figure 22, the order of the participants does not make much sense with Joseph Andrews after Marcus Maestas. In addition, if the query result shows many records, it will be difficult to find a specific record. Usually you will want to change the sort order so that the order of the results makes sense. In this query, you will choose to put the participants in alphabetical order.

A01.11**To Sort Query Results**

- In the Views group, click the **View** arrow, and then select **Design View**.
- Click the **Sort cell** in the LastName column, click the **Selection** arrow , and then select **Ascending**.
- Click the **Sort cell** in the FirstName column, click the **Selection** arrow , and then select **Ascending**.

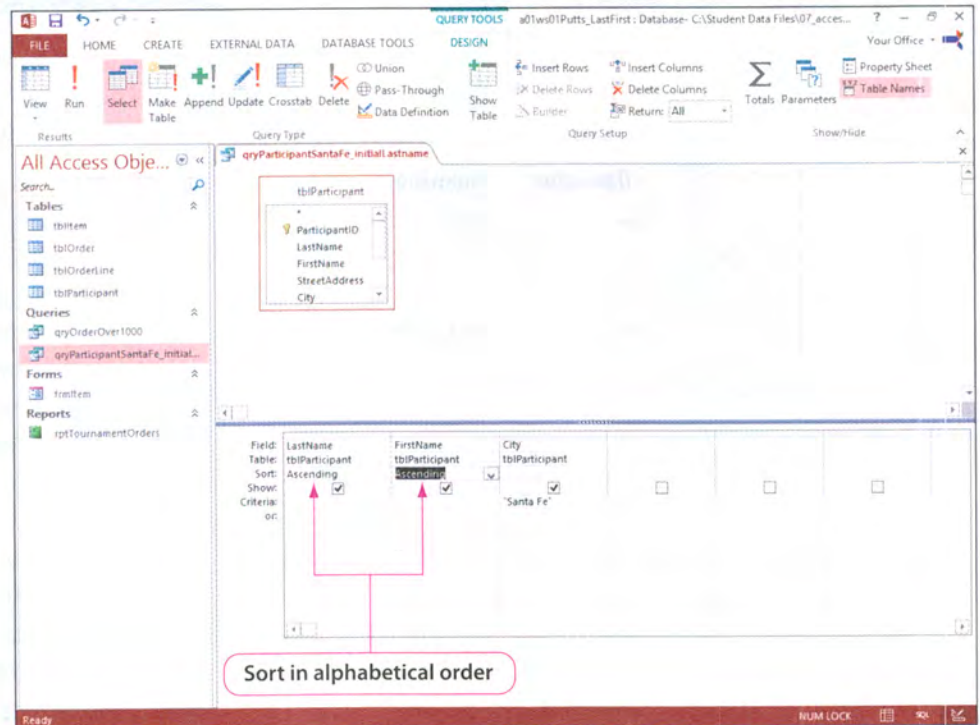


Figure 23 Sorting results of a query

- d. On the DESIGN tab, in the Results group, click **Run**.
Access puts the participants in alphabetical order by Last name. If there were two participants with the same Last name, they would be sorted alphabetically by First name.

Printing Query Results

If you want to print your query results, you can do this on the File tab. Printing tables is done the same way.

A01.12

To Print a Query

- a. Click the **FILE** tab to display Backstage view.
- b. Click **Print**, and then click **Print Preview** to see what the results would look like if printed.
- c. If your instructor asks you to print your results, on the PRINT PREVIEW tab, click **Print**. In the Print dialog box, select the correct printer, and then click **OK**.
- d. On the PRINT PREVIEW tab, click **Close Print Preview**.
- e. Click **Save** .
- f. **Close**  the qryParticipantSantaFe_initialLastname query.

Troubleshooting

If you accidentally closed Access instead of just the query, open Access the same way you did at the beginning of the workshop. In the Recent databases, click the name a01ws01Putts_LastFirst to open the database again.

REAL WORLD ADVICE**Do You Need to Print?**

Before you decide to print the results of a query, you may want to consider whether you really need a printed version. If you want to share the results with someone else, often you can share them via e-mail. Access provides an export-to-PDF feature for a query or table that allows you to save the results in PDF format. Right-click the object in the Navigation Pane, point to Export, and then select PDF or XPS. You can then publish your object as a PDF file, which you can e-mail to someone. Alternatively, you can use the External Data tab to export to a PDF format.

Understand What a Form Is

A form provides another interface to a table or query beyond the table in Datasheet view. In corporate databases, end users of a database computer system often use forms to enter and change data. You can also use forms to limit the amount of data you see from a table. In a personal database, you can create forms for entering data if you wish.

Forms have three views:

- **Form view** shows the data in the form. This is the view you use to enter or change data. You cannot change the form design in this view.
- **Layout view** shows the form and the data. Some of the form design such as field lengths and fonts can be changed in this view. The data cannot be changed.
- **Design view** shows the form design but not the data. Any aspect of the form design can be changed. The data cannot be changed.

REAL WORLD ADVICE**Layout View vs. Design View**

Both Layout view and Design view allow you to change the design of forms. Which view is best for changing design? Part of this is personal preference, but some features are only able to be changed in Design view. Some considerations:

- Layout view shows both the form and the data. When changing column widths or field lengths, it is often easier if you see both. You can adjust the sizes while seeing the data and make sure you pick a size that is appropriate.
- Many features can only be changed in Design view. How do you remember which ones? If you prefer Layout view, try it in that view first, and switch to Design view whenever you have trouble changing something.

Creating a Form

You want to create a form to make it easier to enter participants. There are different types of forms that can be created. The default form shows one participant at a time and has each field clearly labeled.

A01.13**To Create a Form**

- Click **tblParticipant** in the Navigation Pane. Click the **CREATE** tab, and then in the Forms group, click **Form**.

- b. Click **Save**  to save the form. In the Save As dialog box, type **frmParticipant_initialLastname** using your first initial and last name, and then click **OK**.

Access creates a form. Notice that the form displays the same Navigation bar that you had in the table. That is because a form is a data entry or display tool for the table. You can use it to navigate through your table. The form is created in Layout view, which allows you make minor changes to the design.

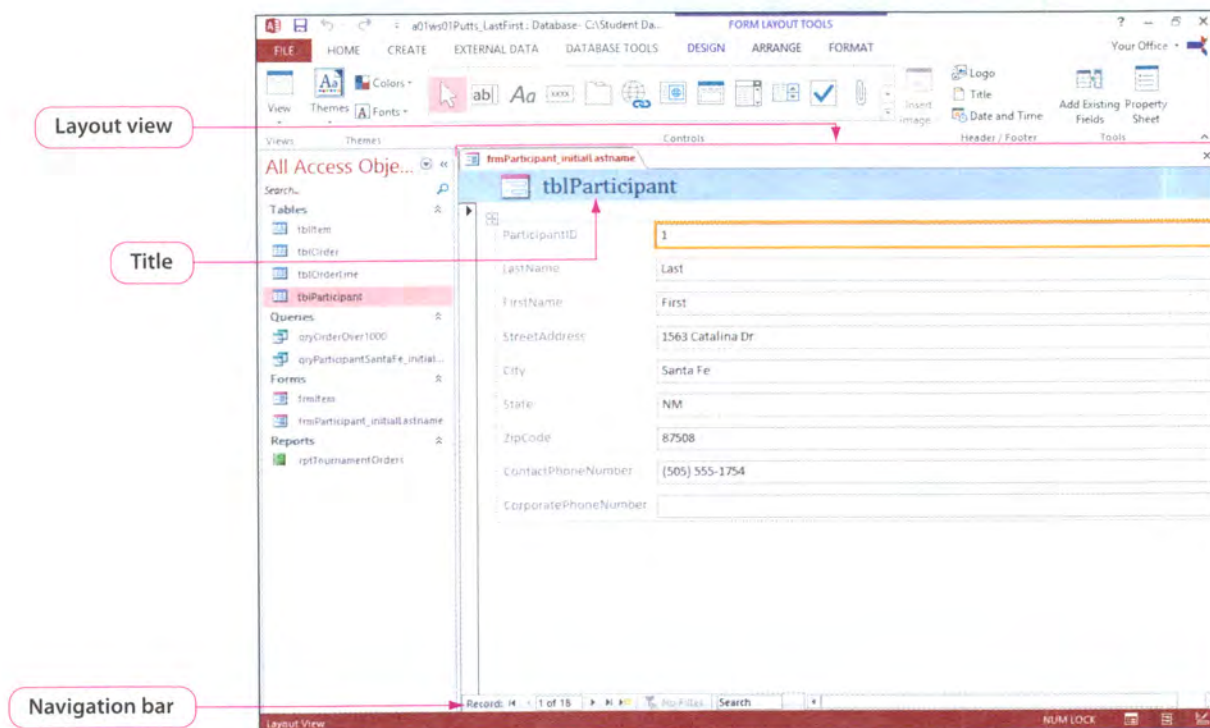


Figure 24 Form in Layout view

- c. Click the **title** of the form, and then click again to select the **title**. Replace the current title with **Participant form by initial Lastname** using your first initial and last name.
- d. Press **[Enter]**, and then click **Save**  to save your form.

Entering Data via a Form

Jackie Silva has asked to register for the tournament. You will use your newly created form to add her to the participant table. It is very important that you navigate to the append row so you enter her information into a blank form. If you see data about a participant in the form, you will be replacing that participant with Jackie Silva instead of adding a new participant.

A01.14



To Enter Data Using a Form

- a. Click the **DESIGN** tab, in the Views group, click the **View** arrow, and then click **Form View**. This view allows you to use the form to enter data into the table.
- b. Click the **New (blank) record button**  on the Navigation bar. If you see a participant's name in the form, try again. This will be record 19 of 19 in the Navigation bar.

Blank record

19 of 19 records

Figure 25 Blank append record

SIDE NOTE**Saving in Access**

Unlike Word, Access saves your data as it is entered. Typing over the data in another record means that you lose the data that was there.

- c. Type the following information into the form. Press **Enter** or **Tab** to move to each field.

ParticipantID	31
LastName	Silva
FirstName	Jackie
StreetAddress	1509 Main Street
City	Santa Ana Pueblo
State	NM
ZipCode	87044
ContactPhoneNumber	(505) 555-3355
CorporatePhoneNumber	(leave blank)

- d. Close the form. The participant data you entered in the form is saved to the table.
- e. On the Navigation Pane, under Tables, double-click **tblParticipant**.
- f. Click the **Last Record button** on the Navigation bar. Verify that Jackie Silva has been added to your table.
- g. Close the table.

CONSIDER THIS**Adding Data Directly into a Table vs. Adding Data via a Form**

You have added two participants to your table. Earlier, you added a row to the table and added Jeff Fox. Now, you have added Jackie Silva via a form. Which was easier for you? Why would most companies use forms to enter data?

Understand What a Report Is

A report provides an easy-to-read format suitable for printing. A sample report is shown in Figure 26. As you can see, the report has page headers—the column headings—and a footer. You can easily provide column totals as needed. When printing data for

management presentations, you usually use a report rather than a query. The source of the data for a report can be a table or query.

Reports have four views:

- **Report view** shows how the report would look in a continuous page layout.
- **Print Preview** shows how the report would look on the printed page. This view allows you to change the page layout.
- **Layout view** shows the report and the data. Some of the report design such as field lengths and fonts can be changed in this view.
- **Design view** shows the report design but not the data. Any aspect of the report design can be changed.

Figure 26 An Access report

Creating a Report Using a Wizard

The report feature in Access allows you to easily design reports that can serve management purposes and look professional. You will create a report listing the participants in the database. You will use the Report Wizard to create the report.

The Report Wizard starts similarly to the Query Wizard in selecting fields for the report. After that the wizard asks questions about report formatting that were not part of the Query Wizard.

You want to create a list of participants entered in the tournament with their contact phone numbers. You will group all the participants in a single city into a single group. You will print the participants in alphabetic order within each group.

A01.15



To Create a Report Using a Wizard

- Click the **CREATE** tab, and then in the Reports group, click **Report Wizard**. Click the **Tables/Queries** arrow, and then click **Table: tblParticipant**.
- Using the One Field button , move these fields to the Selected Fields box: **LastName**, **FirstName**, **City**, and **ContactPhoneNumber**.
- Click **Next**. The wizard asks if you want to add grouping levels.
- Click to select **City**, and then click the **One Field** button  to group by City. When you make this selection, the box on the right of the dialog box shows a preview of what the report grouping will look like.

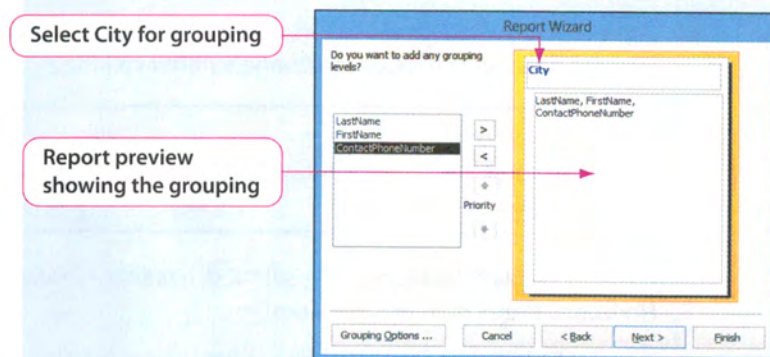


Figure 27 Add grouping levels

e. Click **Next**.

The wizard asks what sort order you want. You always want to put your report in some order that makes it easy to read and understand. Otherwise, a report with a lot of information is difficult to understand. In this report, you will list participants alphabetically.

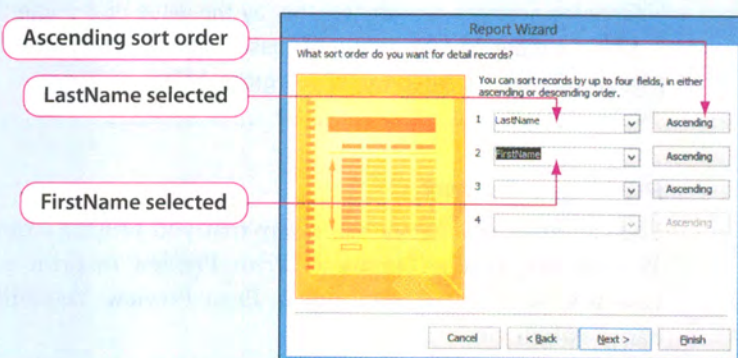
f. In the **1** box, click the **arrow**, and then select **LastName**. If necessary, make sure that the sort order is **Ascending**, meaning in alphabetical order from A to Z.g. In the **2** box, click the **arrow**, and then select **FirstName**.

Figure 28 Add sorting

h. Click **Next**. If necessary, change the layout to **Stepped** and the orientation to **Portrait**.i. Click **Next**. In the **What title do you want for your report?** box, type **rptParticipantsByCity_initialLastName** using your first initial and last name.j. Click **Finish**.

Access displays the report in Print Preview. You notice that the ContactPhoneNumber heading is not fully shown. You can fix that easily in Layout view.

City	LastName	First Name	ContactPhoneN
Agua Fria	Sanchez	Julie	(505) 555-6243
	Sanchez	Ricardo	(505) 555-6243
	Winston	Mary	(505) 555-1756
Albuquerque	McShane	Ian	(505) 555-4149
	Reed	Thomas	(505) 555-7943

Figure 29 Report in Print Preview

- k. Right-click anywhere on the report, and then click **Layout View** from the shortcut menu. Click the heading of the **ContactPhoneNumber** column.

Troubleshooting

If either the Field List Pane or Property Sheet show on the right side of the field, click  to close it.

- l. Point to the **left border** of the selected heading (ContactPhoneNumber) until the Horizontal Resize pointer is displayed .
- m. Drag to the left until you can see the entire column heading.
- n. Double-click the **title** of the report, and then change the report title to **Tournament Participants By City by initial Lastname** using your first initial and last name. Your report should look like Figure 26.
- o. Click **Save**  to save the report.

Notice that the City data is a line above the data in the other columns. That is because the participants are grouped by city. Within a city, participants are sorted alphabetically.

CONSIDER THIS | Grouping vs. Sorting

Grouping arranges records together by the value of a single field. Sorting puts the records within a group in a specific order based on field values. When would you choose to sort your records, and when would you group before sorting?

Printing a Report

You can print reports the same way that you printed a query earlier using the File tab. You can also take advantage of Print Preview to print a report. You are currently in Layout view and need to change to Print Preview. You will use the button on the status bar to switch views.

A01.16



To Print a Report

- a. Click **Print Preview**  to change to Print Preview. Alternatively, you could change to Print Preview using the button on the Ribbon as you have done before.

	Fox	Jeff	(505) 555-8786
Palm Springs	Marquardt	Keith	(760) 555-4836
Pueblo	Fresquez	Marge	(505) 555-3800

Print Preview button

Layout View button

Figure 30 Switch views with status bar

- b. If your instructor directs you to print the report, in the Print group, click **Print**, and then click **OK**.
- c. In the Close Preview group, click **Close Print Preview**, and then **close**  the report.

REAL WORLD ADVICE**When Do You Use a Report vs. a Query?**

Both reports and queries can be used to report on your data. A report provides a more formal presentation of your data and is designed for printing. A query has more selection capabilities, but the formatting is not as attractive. You can combine the two capabilities by first creating the query object and then creating a report using the query as your source.

Back Up a Database

A **backup database** is an extra copy of your database that you can use to protect yourself from the accidental loss of your database. Backups can help in cases of accidental deletion of data. You can return to the backup copy if you accidentally delete the real database. The backup copy may not be as current as your real database, but it may save you from having to recreate the whole database. If you store the backup on another storage medium, it can also help in cases of hardware failure such as a hard drive crash.

Creating a Backup

In Access, you make backups by using the **Back Up Database** command, which is available on **Backstage view** under **Save As**. If you make multiple backup copies, you will want to give them different names. The backup feature appends the current date to the suggested file name. That allows you to easily distinguish between various versions of the backups. You can be sure that you are getting the most recent one.

If you ever need a backup, simply return to the most recent copy that you have and start working with that file. You can save it as the name of the file you want to work with.

A01.17**To Back Up a Database**

- a. Click the **FILE** tab, and then click **Save As**. Make sure that **Save Database As** is selected under File Types. Access displays Save Database As options in the right pane.
- b. Under **Advanced**, click **Back Up Database**, and then click the **Save As** button. The Save As dialog box appears with a suggested file name that has the date appended.
- c. Navigate to the drive and folder where you want to store your backup. Change the file name if necessary, and then click **Save**.

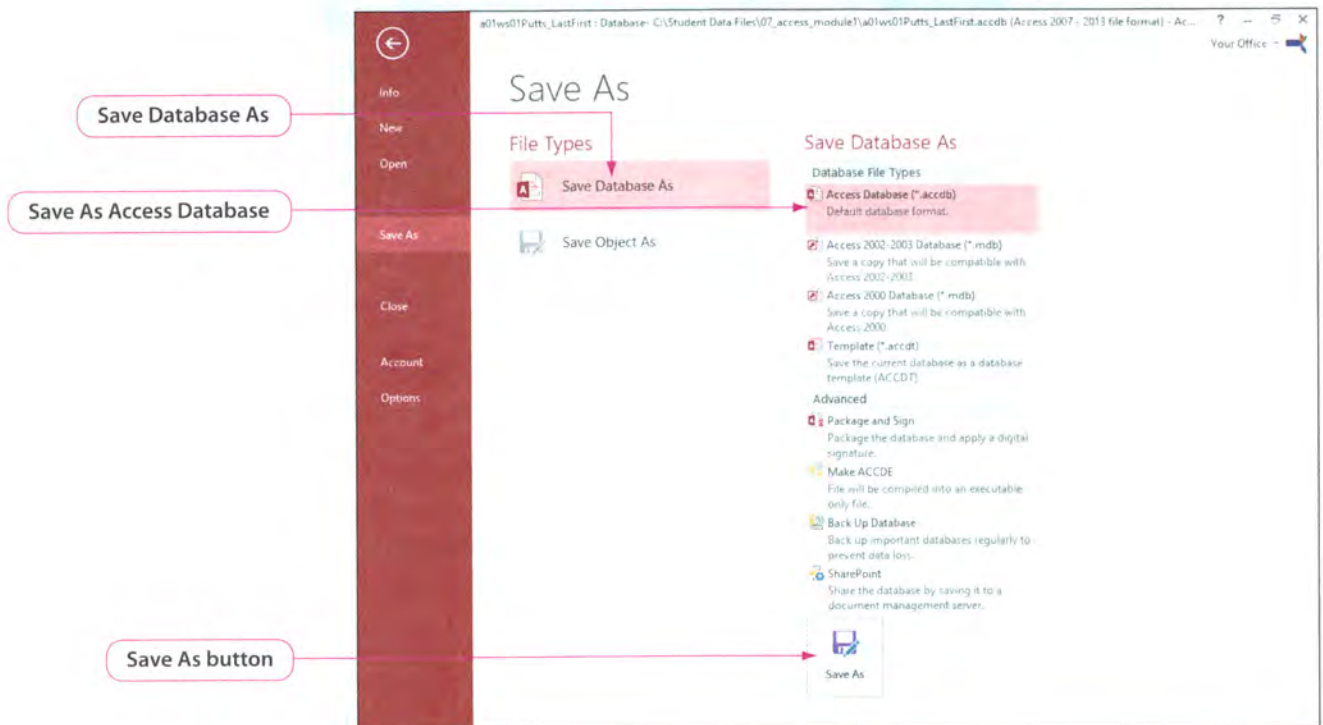


Figure 31 Make a backup copy of your database

CONSIDER THIS

Backups

What would you lose if your PC's hard drive crashed? Do you have copies of school work, photographs, or music? You may never need to retrieve the backup, but which would be worse: making unnecessary backups or losing all your files?

Compact a Database

While you work on an Access database, the size of the database file increases. When you delete a record or object, or if you make changes to an object, Access does not reuse the original space. Access provides a compacting feature that makes more efficient use of disk space. **Compacting** rearranges objects to use disk space more efficiently, thus releasing the now unused space to be used again. If you do not compact your database, its size can get very large quickly. The compact option also looks for damaged data and tries to repair it.

Compacting Your Database

You have two options for compacting: (1) You can perform a single Compact and Repair Database action at any time, or (2) You can select Compact on Close. If you select Compact on Close, Access automatically compacts your database anytime you close it. Both options are available on Backstage view.

A01.18



To Compact a Database

- a. Click the **FILE** tab.
- b. Click **Compact & Repair Database**.
Access compacts your database, fixes it if necessary, and returns you to the HOME tab. On a small database such as Putts for Paws, this action is very fast. On a larger database with many changes made, there may be a noticeable delay.
- c. Click the **FILE** tab, and then click **Options**.
- d. Click **Current Database** in the left pane, and then under Application Options, click the **Compact on Close** check box.
By default, Compact on Close is turned off. Many professionals like to turn on Compact on Close so they do not need to remember to compact the database themselves.

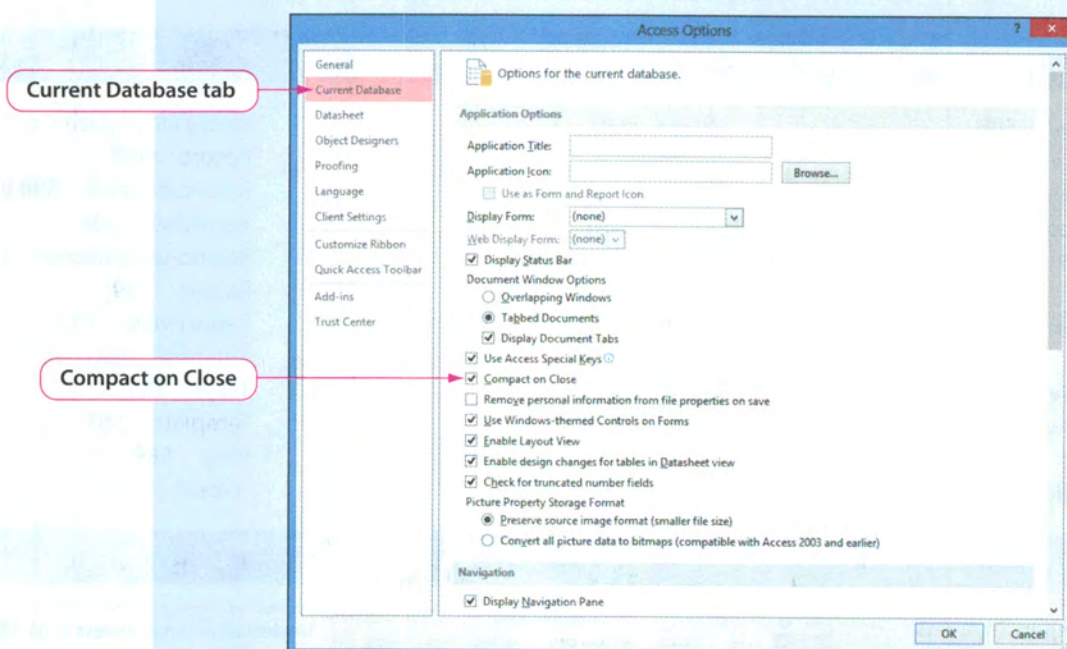


Figure 32 Select Compact on Close

- e. Click **OK** to turn this option on. Access warns you that the option will not take effect until you close and reopen the database.
- f. Click **OK**, and then close Access.

Concept Check

1. What is Access? When would you use Access instead of Excel? p. 588, 598
2. What is the Navigation Pane? Where do you find it? p. 592
3. What is a record? What is a field? How are they represented in Access? p. 597–600
4. How do you manually navigate a database? p. 601–603
5. How is a query used? What is the difference between Datasheet view and Design view of a query? p. 603–604
6. How is a form used? p. 611
7. How is a report used? What is Report Layout view? p. 613–614
8. What is a database backup, and how is it used? p. 617
9. What does it mean to compact and repair your database? What is the difference between a single compact and a compact on close? p. 618

Key Terms

Append row 598
Backstage view 617
Backup database 617
Compacting 618
Data 588
Database 588
Database management system (DBMS) 588
Datasheet view 589
Design view 589
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Visual Summary

The screenshot shows the Microsoft Access 2013 interface. The ribbon at the top includes FILE, HOME, CREATE, EXTERNAL DATA, DATABASE TOOLS, and FIELDS. The left sidebar contains the Navigation Pane with sections for All Access Objects, Tables, Queries, Forms, and Reports. The main workspace displays a table named 'tblParticipant' in Datasheet view, showing columns for ParticipantID, LastName, FirstName, StreetAddress, City, State, ZipCode, and ContactPhone. The status bar at the bottom indicates 'Record: 14 of 19' and 'A unique ID that identifies each participant'.

Annotations with arrows point to specific features:

- Import an Access object (p. 595)**: Points to the 'Import' button in the 'EXTERNAL DATA' tab.
- Open and close the navigation pane (p. 593)**: Points to the 'Navigation Pane' button in the 'VIEW' tab.
- Search for an object (p. 594)**: Points to the search box in the Navigation Pane.
- Customize the navigation pane (p. 593)**: Points to the 'Show/Hide' button in the Navigation Pane.
- Change the first record to your name (p. 598)**: Points to the first record in the 'tblParticipant' table.
- Manually navigate a database (p. 601, 602)**: Points to the 'Navigation Bar' at the bottom of the table.
- Understand what Access is (p. 588)**: Points to the title bar of the Access window.
- Understand what a table is (p. 595)**: Points to the 'tblParticipant' table name in the Navigation Pane.
- Navigate through the table using the navigation bar (p. 598)**: Points to the 'Navigation Bar' at the bottom of the table.
- Maneuver in the Navigation Pane (p. 592)**: Points to the 'Navigation Pane' button in the 'VIEW' tab.

Understand what a form is (p. 611)

Create a form (p. 611)

Enter data using a form (p. 612)

Create a query with a wizard (p. 604)

Switch to design view of a query (p. 607)

Understand what a query is p. 604

Select a value in a query (p. 608)

Sort query results (p. 609)

Compact a database (p. 619)

Compact & Repair
Help prevent and correct database file problems by using Compact and Repair.

Back up a database (p. 617)

Print a query (p. 610)

Understand what a report is (p. 613)

Create a report using a wizard (p. 614)

Print a report (p. 616)

City	LastName	FirstName	ContactPhoneNumber
Agua Fria	Sanchez	Julie	(505) 555-6243
	Sanchez	Ricardo	(505) 555-6243
	Winston	Mary	(505) 555-1756
Albuquerque	McShane	Ian	(505) 555-4149
	Reed	Thomas	(505) 555-7943
Bernanillo	Brevard	Jacque	(505) 555-1828
Brougham	Thomas	Joe	(760) 555-3227
Las Cruces	Trent	Eileen	(505) 555-4101
Las Vegas	Neidhart	Kate	(505) 555-4103
	Reid	Cynthia	(505) 555-0247
Last Cruces	Fox	Jeff	(505) 555-8786
Palm Springs	Marquardt	Keith	(760) 555-4836
Pueblo			

Figure 33 Putts for Paws Charity Tournament Participants Final Database

Practice 1

Student data files needed:

-  a01ws01Giftshop.accdb
-  a01ws01Products.accdb

You will save your file as:

-  a01ws01Giftshop_LastFirst.accdb



Sales &
Marketing

Painted Treasures Gift Shop

The Painted Treasures Gift Shop sells many products for the resort patrons. These include jewelry from local artists, Painted Paradise linens, products from the resort's restaurant, and spa products. You will create a database that stores the gift shop's products. You will create a form to enter products and create an inventory report.

- a. Create your database.
 - Start **Access**, and then open **a01ws01Giftshop**.
 - Click the **FILE** tab, and then click **Save As**. Make sure **Save Database As** and **Access Database** are selected, and then click **Save As**. In the Save As dialog box, navigate to where you are saving your files, and then type **a01ws01Giftshop_LastFirst**, using your last and first name. Click **Save**.
 - In the SECURITY WARNING, click **Enable Content**.
 - Click the **EXTERNAL DATA** tab, and then in the Import & Link group, click **Access**.
 - In the Get External Data - Access Database dialog box, click **Browse**, navigate to your student data files, and then select **a01ws01Products**. Click **Open**, and then click **OK**.
 - In the **Import Objects** dialog box, select **tblProduct**, click **OK**, and then click **Close**.
- b. Create a query to find the clothing products.
 - Click the **CREATE** tab, and then in the Queries group, click **Query Wizard**. Click **Simple Query Wizard**, and then click **OK**.
 - Select **Table: tblProduct** as the source of your fields.
 - In this order, select the **ProductID**, **Category**, **ProductDescription**, **Color**, **Size**, and **Price** fields and move them to the Selected Fields box. Click **Next**, click **Detail (shows every field of every record)**, and then click **Next**.
 - Under **What title do you want for your query?**, type **qryProductsClothingType_initialLastname** using your first initial and last name.
 - Click **Modify the query design**, and then click **Finish**.
 - In the Category Criteria cell, type **Clothing**, in the ProductDescription Sort cell, select **Ascending**, and then click **Run** in the Results group.
 - Save and close the query.
- c. Create a form to enter new products.
 - Click **tblProduct** in the Navigation Pane. Click the **CREATE** tab, and then in the Forms group, click **Form**.
 - Click **Save**, and then in the Save As dialog box, type **frmProduct_initialLastname** using your first initial and last name. Click **OK**.
 - In Layout view, select the **form title**, and then change the title of the form to **Products Form by initial Lastname** using your first initial and last name. Save the form.
 - On the **DESIGN** tab, in the Views group, click the **View** button arrow, and then select **Form View**. Click **New (blank) record**, and then enter the following product in the blank append record.

ProductID	42
ProductDescription	Polo Shirt
Category	Clothing
QuantityInStock	35
Price	30.00
Size	L
Color	Blue

- Close the form.
- d. Create an inventory report.
 - Click the **CREATE** tab, and then in the Reports group, click **Report Wizard**.
 - Click the **Tables/Queries** arrow, and then click **Table: tblProduct**.
 - Select the fields in the following order: **Category**, **ProductDescription**, **Color**, **Size**, and **QuantityInStock**, and then click **Next**.
 - Under **Do you want to add any grouping levels?**, double-click **Category** and **ProductDescription**, and then click **Next**.
 - In the **1** box, click the **arrow**, and then select **Color**. In the **2** box, click the **arrow**, select **Size**, and then Click **Next**.
 - Change the Layout to **Stepped**, the Orientation to **Landscape**, and then click **Next**.
 - Type **rptInventory_initialLastname**, using your first initial and last name, as the title for your report, and then click **Finish**.
 - Switch to **Layout** view, and then change the report title to **Inventory Report by initial Lastname** using your first initial and last name.
 - Save and close the report, and then close the database. Submit your file as directed by your instructor.

Problem Solve 1

MyITLab®
Grader
Homework 1



Production &
Operations

Student data files needed:

-  a01ws01Arena.accdb
-  a01ws01Employee.accdb

You will save your file as:

-  a01ws01Arena_LastFirst.accdb

Sunshine Event Arena

The Sunshine Event Arena (SEA) is an arena that hosts such local events as banquets, concerts, and sporting events. The database contains tables that track events, ticket sales, and patrons of the arena.

You will expand the database by importing an employee table and creating a form, a report, and a query.

- a. Start **Access**, and then open **a01ws01Arena**.
- b. Click the **FILE** tab, and then click **Save As**. Make sure **Save Database As** and **Access Database** are selected, and then click **Save As**. Browse to where you are storing your files, name your database **a01ws01Arena_LastFirst**, using your last and first name, and then click **Save**. Click **Enable Content** in the SECURITY WARNING.
- c. Import tables from the Access database **a01ws01Employee**, selecting the **tblEmployee** table. Do not save the import steps.
- d. Create a form for **tblEmployee**, and then save the form as **frmEmployee_initialLastname**.
- e. Change the title of the form to **Employee Form by initial Lastname** using your first initial and last name.

- f. Switch to Form view. Use the navigation bar at the bottom of the screen to navigate to the **New (blank) record** for `tblEmployee`. Make sure the employee fields are blank, and enter the following information for a new employee:

Employee ID	(Access will fill)
First Name	Your actual first name
Last Name	Your actual last name
Address	1020 Range Drive
City	Pueblo
State	NM
Phone	(505) 555-1222

- g. A patron named Elaine called, and you want to call her back but need her number. Use the Query Wizard to create a query listing **FirstName**, **LastName**, and **Phone** from `tblPatrons`. Save your query as `qryPatronNamedElaine_initialLastname`.
- h. In **Design** view for `qryPatronNamedElaine_initialLastname`, select the patrons with a **FirstName** of **Elaine**. Sort the results by **LastName**, and then run the query.
- i. Create a report on events showing **EventDate**, **EventName**, **EventType**, **TicketsAvailable**, and **TicketPrice** from `tblEvents`. Group by **EventType**, sort by **EventDate**, and then change to **Landscape** orientation. Name your report `rptEvents_initialLastname`. In Layout view, change the report title to read **Event Report by initial Lastname**.
- j. Close the database. Submit your file as directed by your instructor.

Perform 1: Perform in Your Career

Student data file needed:

 a01ws01Roadhouse.accdb

You will save your file as:

 a01ws01Roadhouse_LastFirst.accdb

Beverage Database at The Roadhouse Bar and Grill

You are the bar manager at The Roadhouse Bar and Grill, a local restaurant that specializes in home-cooked meals for breakfast, lunch, and dinner. You have a database that you use for managing the inventory of beverage items.

You will expand the database by creating a form, reports, and queries.

- Start **Access**, open the student data file **a01ws01Roadhouse**, and then save it as `a01ws01Roadhouse_LastFirst`, using your first and last name. Manually navigate the tables in the database to explore the types of data in the database.
- Create a form for `tblSuppliers` and name it `frmSuppliers_initialLastname`. Use your form to change the name of the first supplier to your full name.
- Create a report showing suppliers and name it `rptSuppliers_initialLastname`.
- Create a query that shows what types of beverages you have that are in a can and name it `qryCannedBeverage_initialLastname`.
- Create another report that you would find useful in your job.
- Create another query that you would find useful in your job.
- If your instructor asks you to print your results, print all reports and queries.
- Close your database. Submit your file as directed by your instructor.



Production &
Operations



Additional
Cases

Additional Workshop Cases are available on the companion website and in the instructor resources.

Microsoft Office Access 2013

Module 1

Understanding and Using a Relational Database

WORKSHOP 2 | TABLES, KEYS, AND RELATIONSHIPS

OBJECTIVES

1. Understand database design p. 626
2. Import data from other sources p. 629
3. Enter data manually p. 637
4. Create a table in Design view p. 640
5. Understand masks and formatting p. 644
6. Understand and designate keys p. 647
7. Understand basic principles of normalization p. 652
8. Understand relationships between tables p. 653
9. Create a one-to-many relationship p. 655
10. Create a many-to-many relationship p. 659
11. Understand referential integrity p. 664

Prepare Case

Red Bluff Golf Club Putts for Paws Charity Tournament Database

The Red Bluff Golf Club is sponsoring a charity tournament, Putts for Paws, to raise money for the local pet shelter. You are modifying a database for the tournament that tracks money being raised from the event. The scope of this database is limited to tracking monies. Thus, in this instance, you are not tracking whether a participant is a golfer, volunteer, or other role. Anyone can donate money in the form of hole sponsorship or other donation item. You will want to track monies derived from corporate sponsorship. You will bring in data for the event from various sources including Excel worksheets and text files.



Production & Operations



Nico Traut / Shutterstock

REAL WORLD SUCCESS



"Reports on open issues were very important to my project manager. I set up a database with a main table of open issues. I used foreign keys to link it to employee tables and to a table of priorities. That way I could give a report on the issue and who reported it with how important it was."

- Joseph P., IT intern

Student data files needed for this workshop:



a01ws02Putts.accdb



a01ws02PuttsGolf.xlsx



a01ws02PuttsCont.xlsx



a01ws02PuttsVol.xlsx



a01ws02PuttsDon.txt

You will save your files as:



a01ws02Putts_LastFirst.accdb



a01ws02PuttsDon_LastFirst.txt

Inserting Data into a Database

In designing a database, you will develop the tables, fields, and relationships of the tables. To manage the golf tournament, you will need to keep track of participants, the corporations that participate, the tee times, and the items each of the participants purchase. Each of these will be a table in your database. In this section, you will load tables from already existing databases and from Excel worksheets, in addition to creating two new tables.

Understand Database Design

Database design can be thought of as a three-step process:

1. Identify your entities—they become the tables.
2. Identify the attributes—they become the fields.
3. Specify the relationships between the tables.

An **entity** is a person, place, item, or event that you want to keep data about. You decide that you need to keep track of participants including golfers, donors, and corporate representatives. You need a participant table to track these people. A single participant is an instance of the participant entity and will become a record in the participant table.

An **attribute** is information about the entity. For example, for each participant you will want to keep information, such as name and address. These attributes will become the fields in your table.

A **relationship** is an association between tables based on common fields. You can see the power of Access when you relate tables together. For example, you can relate participants to orders that the participants place.

Later in the workshop, you will look more closely at designing a database. While you explore the database tables and data, think about these general principles or steps to follow.

1. Brainstorm a list of all the types of data you will need.
2. Rearrange data items into groups that represent a single entity. These groups will become your tables.
3. If one item can have several attributes, such as a credit card number, expiration date, name on a card, and security code, then put it into one group that will later become a table of its own. In this example, it would be a group named "credit card".
4. Break each attribute into the smallest attributes; they will become the fields. Give each attribute a descriptive name. For example, split addresses into street, city, state, and zip code.
5. Do not include totals, but do include all of the data needed so the calculation can be done in a query. For example, include the price of an item and the quantity ordered so the total cost can be calculated.
6. Remove any redundant data that exists in multiple groupings. For example, do not repeat customer names in both the customer grouping and the sales grouping.
7. Ensure common fields connect the groupings. For example, make sure that there is a common field between the customer grouping and the sales grouping so they can be connected. Later in this workshop, you will learn more about common fields.

You start with the participant entity, which is the tblParticipant table. You notice that it contains the fields shown in Table 1 to track the participants in the tournament.

Field Name	Data Type	Description	Field Size
ParticipantID	Number—Long Integer	A unique ID that identifies each participant	
LastName	Short Text	Last name	25
FirstName	Short Text	First name	20
StreetAddress	Short Text	Street address	35
City	Short Text	City	25
State	Short Text	State abbreviation	2
ZipCode	Short Text	Five digit zip code	5
ContactPhoneNumber	Short Text	Phone number for the individual participant	14
CorporatePhoneNumber	Short Text	Phone number for the corporation the participant represents	14

Table 1 Fields for tblParticipant

REAL WORLD ADVICE

Break Compound Fields into Their Parts

You might wonder why the name field and address fields are divided into multiple fields. Would it not be easier to have a single field for Name and a single field for Address? It might be easier for data entry, but it is much more difficult for reporting.

- Break names into first name and last name fields. That means you can sort on people alphabetically by last name, and if two people have the same last name, by first name.
- Break addresses into fields such as StreetAddress, City, State, and ZipCode. This allows reporting by state, city, or other fields.
- For other fields, consider whether you might want to report on smaller parts of the field. For example, for PhoneNumber in some applications, you might want to report on AreaCode. However, that would be rare, and so you usually use just one field.

Illustrating some of the basic principles of database design, notice that the participant's name is split into two fields and the address is split into four fields. Why should you do this? When you have fields such as name or address that are composed of several smaller fields, you should split them into their component parts. This allows for more flexibility for reporting. For example, often a report is needed in alphabetic order by last or first name. You could not do this if you had stored the first and last name combined in the same field. Further, a field named "Name" is confusing, leading to inconsistent data such as nicknames and incomplete names. This also allows you to report or query on just part of the field such as which participants are from a particular state.

CONSIDER THIS

Street Address Components

Street addresses contain two parts, the number and street name. While some databases split these apart, this is not necessary for most business uses. What are some businesses that would benefit from separating these?

REAL WORLD ADVICE

First and Last Names

Painted Paradise is a U.S. company with guests who primarily use a first name followed by a last name. However, not all cultures around the world break names into first and last. For example, Korean names are designated as family name followed by given name. Designing database fields to accommodate all of the different cultures in the world is challenging. Always keep in mind the typical name for the database, but try to design it in such a way that other naming practices can fit into the database. Because businesses today are global, designing a database sensitive to all global cultures is difficult but important.

Opening the Starting File

For the golf tournament, you will need to keep track of participants, the corporations that participate, and the items each of the participants purchase. There are several files that tournament organizers have been keeping about the tournament. You will import all the files into your Access database.

A02.00



To Open the a01ws02Putts Database

- Start **Access**, and then open the student data file named **a01ws02Putts** in the folder location designated by your instructor.
- Click the **FILE** tab, click **Save As**, click **Save Database As**, click **Save As** and then locate the folder or location designated by your instructor. Save the file as an Access Database in the location where you save your files with the name **a01ws02Putts_LastFirst** using your last and first name. If necessary, enable the content.

Understanding Data and Design Views of Tables

Tables have two views: Datasheet view and Design view. Datasheet view shows the values of the data within the table. The Design view shows the structure of the table with the fields and their definitions.

A02.01



To View Table Design View

- Double-click the **tblParticipant** table to open it.
When you open the **tblParticipant** table, it opens in Datasheet view. In Datasheet view, you can see the information about the participants.
- If necessary, click the **First record** button  in the Navigation bar to return to the first participant.
- Press **Tab** to move to the **LastName** column.
- Replace **Last** in the first record of the **LastName** column with your last name, press **Tab** to move to the next column, and then replace **First** in the **FirstName** column with your first name.

Replace Last and First with
your last and first name

ParticipantID	LastName	FirstName	StreetAddress	City	State	ZipCode	ContactPhone
1	Last	First	1563 Catalina Dr	Santa Fe	NM	87508	(505) 555-17
2	Trujillo	John	427 Kanengiser Rd	Santa Ana Pueblo	NM	87045	(505) 555-82
3	McShane	Ian	823 4th St NW	Albuquerque	NM	87106	(505) 555-43
5	Fresquez	Marge	534 Asiento Blvd	Pueblo	NM	81232	(505) 555-38
8	Maestas	Marcus	83 Vuelta Rancho	Santa Fe	NM	87508	(505) 555-23

Figure 1 Datasheet view of tblParticipant

- e. Click the **HOME** tab, and then in the Views group, click the **View** arrow, and then select **Design View**. When you switch to Design view, you see the structure of the fields and the field properties.

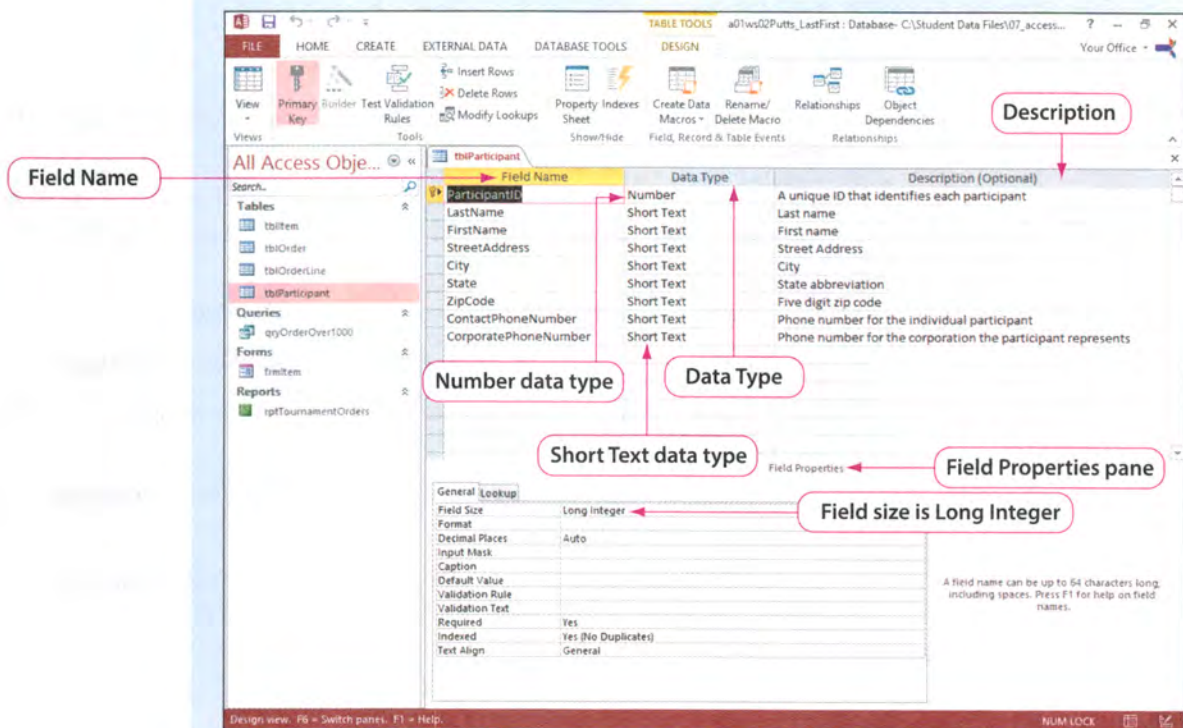


Figure 2 Design view of tblParticipant

The upper pane of Design view has three columns: Field Name, Data Type, and Description. The Field Name is the column label in Datasheet view. **Data types** define the kind of data that can be entered into a field, such as numbers, text, or dates. The data type tells Access how to store and display the field. Number and Short Text are the two most common data types. In this table, you can see that one field is stored as a **Number data type**. That means that the data can only contain numeric characters. The **Short Text data type** allows any text and numeric characters to be stored. Street Address is the Short Text data type, so a street address in this database can contain numbers, letters, and special characters. The third column, Description, helps the user discern the meaning of the field.

The Field Properties pane in Design view gives more information on how the data is stored, entered, and processed. If the ParticipantID field is selected, you can see that its Field Size is Long Integer.

Import Data from Other Sources

Painted Paradise has had different employees collecting data in different ways. Luckily, the applications within the Microsoft Office suite work together. This allows you to import—move data—easily between Excel and Access. You will import the files from Excel, Access, and Notepad. After importing the data, you will be able to further analyze and refine the table structure for the database. Even though other employees have kept track of the roles that each participant plays, remember that the scope of this database does not include tracking the participants' roles in the event. You are only tracking corporate involvement.

Copying and Pasting

Only a few golfer participants were entered into the tblParticipant table. Some others were put in an Excel worksheet. You will copy and paste them from Excel into your Access table.

A02.02



To Copy and Paste Data from Excel

- Click the **HOME** tab, in the Views group, click the **View** arrow, and then select **Datasheet View**.
- Point to the **bottom-right corner** of the screen. The Charms will be displayed on the right side of the screen. Note the labels underneath each of the charms. Click the **Search** charm.
- Click inside the **search box** at the top of the page. Type **Excel**.
- Click **Excel 2013** in the search results, and then open **a01ws02PuttsGolf**.
- In Excel, drag to select **cells A1 through I9**. On the **HOME** tab, in the Clipboard group, click **Copy** to copy these cells.
- On the Windows taskbar, click **Access**, and then click the **record selector** at the beginning of the append row.
- On the **HOME** tab, in the Clipboard group, click **Paste** to paste the golfers into Access. In the warning dialog box, click **Yes** to paste the records into the table.

New golfers added to table

ParticipantID	LastName	FirstName	StreetAddress	City	State	ZipCode	ContactP
1	Last	First	1563 Catalina Dr	Santa Fe	NM	87508	(505) 555-
2	Trujillo	John	427 Kanengiser Rd	Santa Ana Pueblo	NM	87045	(505) 555-
3	McShane	Ian	823 4th St NW	Albuquerque	NM	87106	(505) 555-
5	Fresquez	Marge	534 Asiento Blvd	Pueblo	NM	81232	(505) 555-
8	Maestas	Marcus	83 Vuelta Rancho	Santa Fe	NM	87508	(505) 555-
9	Marquardt	Keith	228 E Alejo Rd	Palm Springs	CA	92262	(760) 555-
11	Neidhart	Kate	54 E Dona Rosa Tr	Las Vegas	NM	87701	(505) 555-
15	Reed	Thomas	743 Windstone Dr	Albuquerque	NM	87105	(505) 555-
16	Reid	Cynthia	158A Calle Derecho	Las Vegas	NM	87701	(505) 555-
17	Romero	Joseph	819 Calle Don Roberto	Santa Fe	NM	87502	(505) 555-
19	Sanchez	Ricardo	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 555-
20	Sanchez	Julie	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 555-
21	Schilling	John	15365 Sombra Del Monte	Santa Fe	NM	87508	(505) 555-
24	Thomas	Joe	4355 Celsior St	Brougham	CA	92267	(760) 555-
26	Trent	Eileen	433 Tortuga Ln	Las Cruces	NM	88003	(505) 555-
27	Brevard	Jacque	23 Calle Montoya	Bernanillo	NM	87001	(505) 555-
29	Winston	Mary	157 Green Galliard Rd	Agua Fria	NM	87506	(505) 555-
30	Fox	Jeff	1509 Las Cruces Drive	Las Cruces	NM	88003	(505) 555-
31	Silva	Jackie	1509 Main Street	Santa Ana Pueblo	NM	87044	(505) 555-
50	Druplet	Brenda	1522 Watson Ln	Las Cruces	NM	88001	(505) 555-
51	Maestas	Marcus	83 Vuelta Rancho	Santa Fe	NM	87508	(505) 555-
52	Marquardt	Keith	228 E Alejo Rd	Palm Springs	CA	92262	(760) 555-
53	Nelson	Kris	915 Somerset Ln	Las Cruces	NM	88018	(505) 555-
54	Nelson	Rodney	915 Somerset Ln	Las Cruces	NM	88018	(505) 555-
55	Romero	Maria	819 Calle Don Roberto	Santa Fe	NM	87502	(505) 555-
56	Thomas	Joe	4355 Celsior St	Brougham	CA	92267	(209) 555-
57	Thomas	Lois	4355 Celsior St	Brougham	CA	92267	(209) 555-

Figure 3 New golfers at the end of the tblParticipant table

Troubleshooting

If you accidentally click in a single cell of the append row and try to paste there, you get the error message "The text is too long to be edited." It appears that you are trying to paste all the data into one cell, and Access will not let you continue. If this happens, click OK, indicating that you do not want to put all the text into the one cell.

After that it may be difficult to exit that row and click in the record selector column. It appears you are trying to paste an invalid row, and Access will not let you continue. You will get an error message saying "Index or primary key cannot contain a Null value." When you click OK and try to recover, the message will reappear. If this happens, press **[Esc]** indicating that you do not want to keep that record.

- h. Close **[X]** the tblParticipant table.

REAL WORLD ADVICE**Copying and Pasting from Excel into Access**

Copying and pasting requires that the columns be exactly the same in Excel and Access. There cannot be missing columns or columns in different orders. You cannot paste fields that are nonnumeric into numeric fields. If you have any doubt about the data being compatible, use the Import feature to append the data to the table.

Use Copy and Paste when:

- You started in Access and exported the data to Excel, made additions, and now want to import it into Access. That way you know that the columns are the same.
- You are copying and pasting the contents of a single field from Excel into Access, such as a street address.

Importing a Worksheet

Access allows you to import an entire worksheet or a smaller portion of a worksheet into a table. This is quite useful as Excel is so frequently used in organizations. Excel column headings are frequently imported as field names.

The golf club has been keeping corporate contacts for the event in an Excel worksheet. You will import this Excel worksheet into your tblParticipant table.

A02.03**To Import an Excel Spreadsheet**

- On the Windows taskbar, click **Excel**, click the **FILE** tab, and then click **Close**.
- Click the **FILE** tab, and then click **Open**. Navigate to your student data files, click **a01ws02PuttsCont**, and then click **Open**.

Notice that the contacts data looks like the tblParticipant table in many ways. However, the corporate phone number immediately follows the participant's name rather than being at the end of the record as it is in the Access table. An import from Excel into an existing Access table is ideal for this type of import because as long as the columns have the same name, Access will match up the columns, skipping any missing column. You cannot copy and paste the way you did earlier because the columns are not arranged in the same order.

CorporatePhoneNumber
immediately follows
FirstName

ParticipantID	LastName	FirstName	CorporatePhoneNumber	StreetAddress	City	State	ZipCode	ContactPhoneNumber
40	Levant	Ronald	(505) 555-1200	672 N Mesquite St	Las Cruces	NM	88001	(505) 555-3878
41	Dearman	Seth	(505) 555-1000	1717 Junior Hills Rd	Santa Ana Pueblo	NM	87044	(505) 555-9217
42	Reed	Thomas	(505) 555-2000	743 Windstone Dr.	Albuquerque	NM	87105	(505) 555-7943

Figure 4 Contact data in Excel

- c. Click **Close**  Excel.
- d. In Access, click the **EXTERNAL DATA** tab, and then in the Import & Link group, click **Excel**. The Get External Data - Excel Spreadsheet dialog box appears.
- e. Click **Browse**, navigate to your student data files, click **a01ws02PuttsCont**, and then click **Open**. Select **Append a copy of the records to the table**, click the **arrow**, select **tblParticipant**, and then click **OK**.

The Import Spreadsheet Wizard opens, which displays worksheets and named ranges in the Excel workbook.

- f. Make sure **Show Worksheets** is selected and the **Corporate contacts** worksheet is highlighted, and then click **Next**.

Access displays the next page of the wizard. This shows that Access found the column headings in Excel and matched them to the field names in Access.

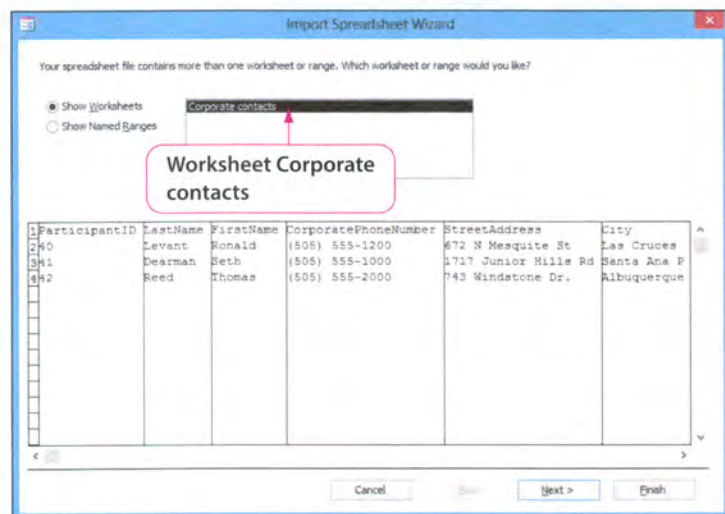


Figure 5 Worksheet to be imported

SIDE NOTE

Tables Are Ordered by Primary Key

When you added the contacts, they were added in the middle of the table because Access orders tables by primary key.

- g. Click **Next**, click **Finish**, and then click **Close**.
- h. In the Navigation Pane, double-click the **tblParticipant** table to open the table.
Your table has the three corporate contacts added. The contacts were imported and because the field names in Access matched the Excel column headings, the fields were rearranged to match the Access table order.

Contacts imported

ParticipantID	LastName	FirstName	StreetAddress	City	State	ZipCode	ContactP
1	Last	First	1563 Catalina Dr	Santa Fe	NM	87508	(505) 555
2	Trujillo	John	427 Kanengiser Rd	Santa Ana Pueblo	NM	87045	(505) 555
3	McShane	Ian	823 4th St NW	Albuquerque	NM	87106	(505) 555
5	Fresquez	Marge	534 Asiento Blvd	Pueblo	NM	81232	(505) 555
8	Maestas	Marcus	83 Vuelta Rancho	Santa Fe	NM	87508	(505) 555
9	Marquardt	Keith	228 E Alejo Rd	Palm Springs	CA	92262	(760) 555
11	Neidhart	Kate	54 E Dona Rosa Tr	Las Vegas	NM	87701	(505) 555
15	Reed	Thomas	743 Windstone Dr.	Albuquerque	NM	87105	(505) 555
16	Reid	Cynthia	158A Calle Derecho	Las Vegas	NM	87701	(505) 555
17	Romero	Joseph	819 Calle Don Roberto	Santa Fe	NM	87502	(505) 555
19	Sanchez	Ricardo	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 555
20	Sanchez	Julie	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 555
21	Schilling	John	15365 Sombra Del Monte	Santa Fe	NM	87508	(505) 555
24	Thomas	Joe	4355 Celsior St	Brougham	CA	92267	(760) 555
26	Trent	Eileen	433 Tortuga Ln	Las Cruces	NM	88003	(505) 555
27	Brevard	Jacque	23 Calle Montoya	Bernanillo	NM	87001	(505) 555
29	Winston	Mary	157 Green Galliard Rd	Agua Fria	NM	87506	(505) 555
30	Fox	Jeff	1509 Las Cruces Drive	Las Cruces	NM	88003	(505) 555
31	Silva	Jackie	1509 Main Street	Santa Ana Pueblo	NM	87044	(505) 555
40	Levant	Ronald	672 N Mesquite St	Las Cruces	NM	88001	(505) 555
41	Dearman	Seth	1717 Junior Hills Rd	Santa Ana Pueblo	NM	87044	(505) 555
42	Reed	Thomas	743 Windstone Dr.	Albuquerque	NM	87105	(505) 555
50	Druplet	Brenda	1522 Watson Ln	Las Cruces	NM	88001	(505) 555
51	Maestas	Marcus	83 Vuelta Rancho	Santa Fe	NM	87508	(505) 555
52	Marquardt	Keith	228 E Alejo Rd	Palm Springs	CA	92262	(760) 555
53	Nelson	Kris	915 Somerset Ln	Las Cruces	NM	88018	(505) 555
54	Nelson	Rodney	915 Somerset Ln	Las Cruces	NM	88018	(505) 555

Figure 6 Corporate contacts imported into tblParticipant table

- i. Close the tblParticipant table.

Importing from a Named Range

Access allows you to import a smaller portion of a worksheet, known as a named range, into a table. A named range is a group of cells that have been given a name that can then be used within a formula or function. This part of the worksheet can then be referenced in formulas or charts by name rather than by cell address or range address.

The golf club has been keeping information about the volunteers for the event in an Excel worksheet. This worksheet contains other information about volunteering that you will not need. The range containing the contact information for the volunteers has been named VolunteerNamesAddress.

A02.04



To Import a Named Range

- a. Start **Excel 2013**, and then open **a01ws02PuttsVol**.

Notice the Volunteers worksheet contains the volunteer information as well as other data.

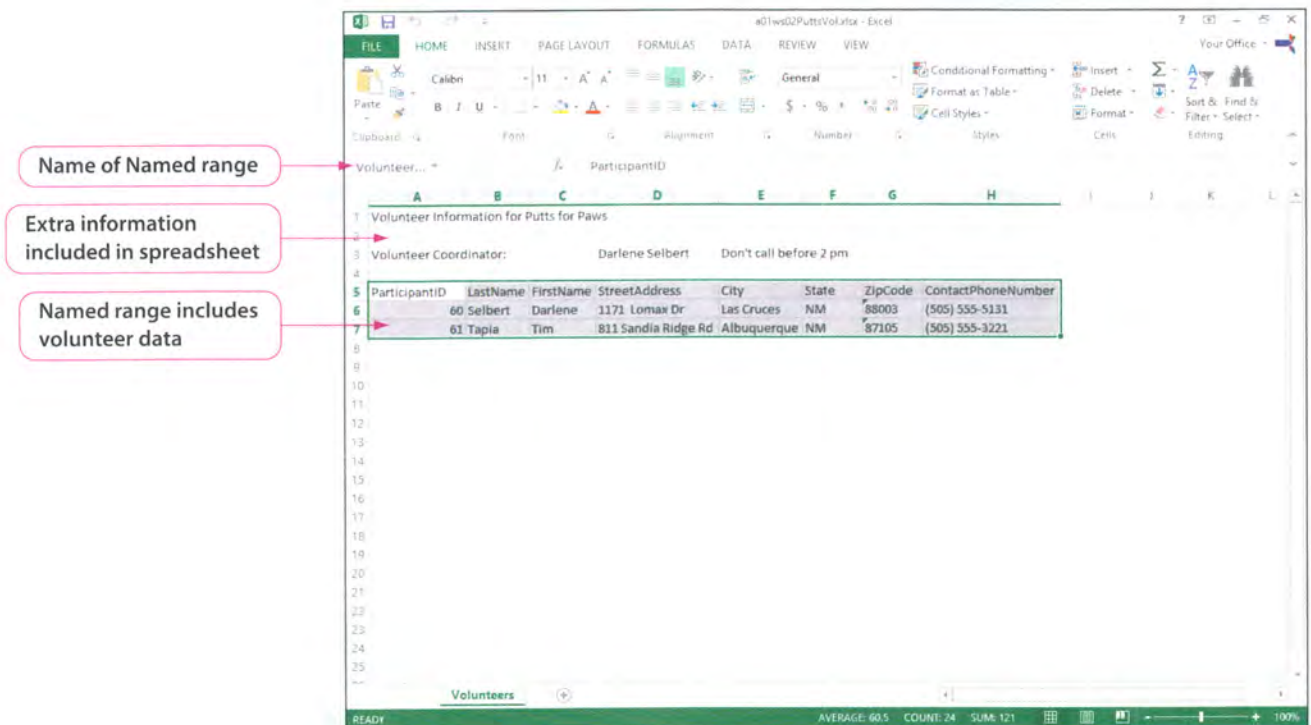


Figure 7 Volunteers worksheet with extra information

- b. Close Excel.
- c. In Access, click the **EXTERNAL DATA** tab, and then in the Import & Link group, click **Excel**. The Get External Data - Excel Spreadsheet dialog box appears.
- d. Click **Browse**, navigate to your student data files, click **a01ws02PuttsVol**, and then click **Open**.
- e. Select **Append a copy of the records to the table**, click the **arrow**, and then select **tblParticipant**.
- f. Click **OK**, and then click **Show Named Ranges**.
One named range, VolunteerNamesAddress, is displayed and highlighted in the list box.
- g. Click **Next**. Access tells you that it found your column headings in Excel and matched them to the field names in Access. Click **Next**.
- h. Click **Finish**, and then click **Close**.
- i. In the Navigation Pane, double-click the **tblParticipant** table to open the table. Your table has the two volunteers added.
- j. Close the tblParticipant table.

Importing from a Text File

Access enables you to import data from text and Word files. Typically these files would have data organized in tables. In Word, these tables will have actual rows and columns. In text files, the tables are implied by the separation of the columns. This separation is done by delimiter characters. A **delimiter** is a character such as a tab or comma that separates the fields. The rows in the text tables will be imported as records into your Access table.

The golf course has been keeping information about the donors for the event in a text file. You want to import that data into your Access database.

A02.05



To Import from a Text File

- Point to the **bottom-right corner** of the screen. The Charms will be displayed on the right side of the screen. Click the **Search** charm.
- Click inside the **search box** at the top of the page, type **Notepad** and then click **Notepad** in the search results.
- Click **File**, click **Open**, and in the Open dialog box in the left pane, navigate to your student data files, click **a01ws02PuttsDon**, and then click **Open**.
Notice that there are three donors in this file. The fields are separated by unseen tabs.
- Close Notepad.

Troubleshooting

Your columns may not line up the way that Figure 8 shows them lining up. This happens because Notepad does not save font formatting. Notepad does save tabs so you do not need to worry about any display differences.

File menu

Three donors in text file

ParticipantID	LastName	FirstName	StreetAddress	City	State	ZipCode	ContactPhoneNumber
30	Ortiz	Luis	1801 Brilliant Sky Dr	Santa Fe	NM	87508	(505) 555-1722
33	Ramirez	Alice	124 Nana Lou St.	Avondale	CO	81022	(719) 555-9247
34	Victor	Lisa	988 Elguitarra Rd	Santa Fe	NM	87507	(505) 555-2757

Figure 8 Donor text file in Notepad

- In Access, click the **EXTERNAL DATA** tab, and then in the Import & Link group, click **Text File**. The Get External Data - Text File dialog box appears.
- Click **Browse**, navigate to your student data files, click **a01ws02PuttsDon**, and then click **Open**.
- Click **Append a copy of the records to the table**, click the **arrow** to select **tblParticipant**, and then click **OK**. Access recognizes that this data has columns that are delimited—separated by tabs or commas.
- Click **Next**, select the **Tab** delimiter, and then click to select the **First Row Contains Field Names** check box.
- Click **Next**, and then click **Finish**.
An error message appears saying that Access is unable to append all the data to the table and that one record was lost because of key violations. The first field in your table is a primary key that must be unique. Apparently one of the donors has a ParticipantID that was already used in the Access table.
- Click **No**, click **OK**, click **OK**, and then click **Cancel**.
- Double-click **tblParticipant** to open the table in Datasheet view.
- Open **Notepad**, click **File**, select **Open...**, navigate to your student data files, click **a01ws02PuttsDon**, and then click **Open**. There are three donors in the file that have ParticipantIDs of 30, 33, and 34 as shown in Figure 8.
- Compare the donor data in the text file to the records in the tblParticipant table. Notice ParticipantID 30 has been used twice, once for Jeff Fox in the Access table and once for Luis Ortiz in the Notepad file. You talk to the person keeping records of donors and discover she meant to type "32" for Luis Ortiz.

- n. In Notepad, click **File**, and then click **Save As**. In the Save As dialog box, navigate to the location where you are saving your files. In the **File** name box, type **a01ws02PuttsDon_LastFirst** using your last and first name. Click **Save**.

Troubleshooting

If your Save As dialog box does not show folders, click Browse Folders at the bottom of the dialog box.

- o. In Notepad, select the text **30**, and then type **32**.

ParticipantID 30
changed to 32

ParticipantID	LastName	FirstName	StreetAddress	City	State	ZipCode	ContactPhoneNumber
32	Ortiz	Luis	1801 Brilliant Sky Dr	Santa Fe	NM	87508	(505) 555-1722
33	Ramirez	Alice	124 Nana Lou St.	Avondale	CO	81022	(719) 555-9247
34	Victor	Lisa	988 Elguitarra Rd	Santa Fe	NM	87507	(505) 555-2757

Figure 9 Change ParticipantID from 30 to 32

- p. **Close** Notepad, and then save the file.
- q. In Access, **close** the tblParticipant table. On the EXTERNAL DATA tab, in the Import & Link group, click **Text File**. The Get External Data - Text File dialog box appears.
- r. Click **Browse**, navigate to where you are storing your solution files, click **a01ws02PuttsDon_LastFirst**, and then click **Open**.
- s. Repeat the import Steps g–i. This time Access successfully imports the donors.
- t. Click **Close**. Double-click **tblParticipant** to open the table and verify that the records for Luis Ortiz, Alice Ramirez, and Lisa Victor were imported.
- u. **Close** the tblParticipant table.

REAL WORLD ADVICE

Importing an Excel Worksheet into a New Table

In all the previous examples of importing, you imported into an already existing table. You can also import into a new table. Access creates a table using the column headings for field names. Access defines fields with default definitions. After performing the import, open the table in Design view and adjust fields and properties as necessary. Some things that you should consider in these adjustments are the following:

- What field did Access assign as the primary key for the table? Access defaults to creating a new field called ID for the primary key. Later in the workshop, you will learn what field might work better as a primary key.
- The default length for all short text fields is 255 characters. Adjust the field size properties to sizes that are appropriate for your fields. Check all field definitions for errors.
- Are the field names descriptive? The column headings from Excel might not be appropriate as field names in Access.

Enter Data Manually

If the data does not already exist in another form, you can type the data directly into Access. There are two methods: entering data directly into the table or entering the data in a form.

Entering Data Using Datasheet View

When you open a table in Datasheet view, you can type data directly into the table. You want to enter a new order. You will need to enter data into **tblOrder** and the details of the order in **tblOrderLine**. The order to enter is your own; you are entering the tournament as a golfer.

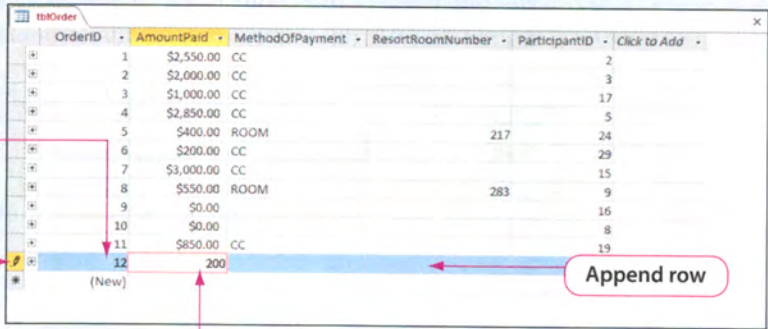
A02.06



To Enter Data in Datasheet View

- a. In the Navigation Pane, double-click **tblOrder**, click in the **AmountPaid** column of the append row, and then type **200**.

As you type the "200", a pencil icon  appears in the record selector on the left. The pencil icon means that this record is actively being modified. Additionally, the OrderID was filled in with "12". This happens because the field has a data type of AutoNumber, which means that Access assigns the next highest number.



OrderID	AmountPaid	MethodOfPayment	ResortRoomNumber	ParticipantID	Click to Add
1	\$2,550.00	CC			2
2	\$2,000.00	CC			3
3	\$1,000.00	CC			17
4	\$2,850.00	CC			5
5	\$400.00	ROOM		217	24
6	\$200.00	CC			29
7	\$3,000.00	CC			15
8	\$550.00	ROOM		283	9
9	\$0.00				16
10	\$0.00				8
11	\$850.00	CC			19
12 (New)	200				

Figure 10 Type 200 in AmountPaid

- b. Press **Tab** to continue filling in the record with a **MethodOfPayment** of **CC**, leave the **ResortRoomNumber** empty, and then type **1** in **ParticipantID**.
- c. Press **Tab** to go to the next record. The pencil icon disappears. Unlike Word and Excel, Access immediately saves the data change.
- d. **Close**  the **tblOrder** table.
- e. In the Navigation Pane, double-click **tblOrderLine**, click in **OrderID** of the append row, and then type **12**.
- f. Press **Tab** to continue filling in the record with **LineNum** **1**, **ItemID** **G1**, and **Quantity** **1**.
- g. **Close**  the **tblOrderLine** table.

REAL WORLD ADVICE

Undoing in Access

Access immediately saves the changes you make to data. There is very limited undo/redo functionality in Access. If the Undo button  is dimmed, you cannot undo the change you made.

- Typically you can undo a single typing change even if you have gone on to the next record. However, if you made several changes to different records, you cannot undo more than the changes to the last record.
- If you have made changes to several fields in a single record, you can click Undo to undo each of them.
- You can also press **[Esc]** to stop editing a record and revert to the record data as it appeared before you started changing the record.
- If you make an error, you can press **[Esc]** to get out of the error.

Because of the limited undo features in Access, do not count on undoing your changes. You will often find that you cannot undo. For example, when you delete a record or records, you cannot undo the deletion.

Design changes are not saved until you save the object you changed. Thus, you can undo design changes until you save.

Removing Data

You can delete records from a table. These are permanent deletions and cannot be undone. Golfer Kate Neidhart needs to withdraw from the tournament.

A02.07



To Delete Data in Datasheet View

- In the Navigation Pane, double-click **tblParticipant** to open the table in Datasheet view.
- Click the **record selector** for record 7, Kate Neidhart, ParticipantID 11, to select the row.

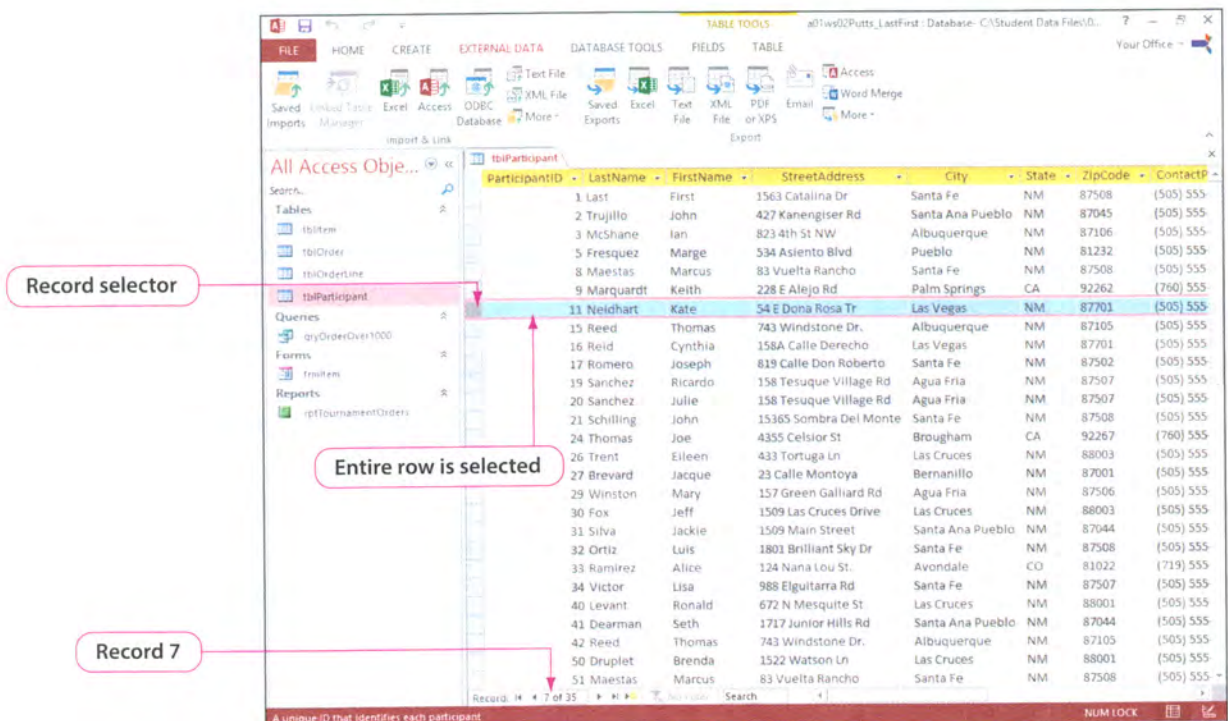


Figure 11 Delete Kate Neidhart record

- c. Right-click the **row**, and then select **Delete Record**. Because you cannot undo a delete, Access asks if you are sure you want to delete this record.
- d. Click **Yes**. The record is deleted.

Troubleshooting

If you do not get the Access confirmation message asking if you are sure you want the deletion to occur, the confirmation message setting may be turned off. If you would like to turn it back on, on the File tab, click Options, and then click Client Settings. Scroll down to find the Confirm section under Editing, click the Document deletions check box, and click OK.

You can also delete individual fields from a table. These are also permanent deletions and cannot be undone. You decide that you will create a table for corporations involved with the tournament, `tblCorporate`, and that the `CorporatePhoneNumber` will be a part of that table. Thus, you will not need `CorporatePhoneNumber` for each `tblParticipant` record, and you will delete that field. You can delete a field in either Design view or Datasheet view. In Datasheet view, you can see the contents of the field that you are deleting, which gives you an extra check on whether you really want to delete the field.

A02.08



To Delete a Field in Datasheet View

- a. Scroll to the right to find the **CorporatePhoneNumber** column. Point to the **column heading** until it changes to a black down arrow, and then click so the entire column is highlighted. Make sure that you selected **CorporatePhoneNumber** and not **ContactPhoneNumber**.

StreetAddress	City	State	ZipCode	ContactPhoneNumber	CorporatePhoneNumber
1563 Catalina Dr	Santa Fe	NM	87508	(505) 555-1754	
427 Kanengiser Rd	Santa Ana Pueblo	NM	87045	(505) 555-8217	
823 4th St NW	Albuquerque	NM	87106	(505) 555-4149	(505) 555-1800
534 Asiento Blvd	Pueblo	NM	81232	(505) 555-3800	(505) 555-1111
83 Vuelta Rancho	Santa Fe	NM	87508	(505) 555-2525	
228 E Alejo Rd	Palm Springs	CA	92262	(760) 555-4836	
743 Windstone Dr.	Albuquerque	NM	87105	(505) 555-7943	(505) 555-2000
158A Calle Derecho	Las Vegas	NM	87701	(505) 555-0247	

CorporatePhoneNumber

Figure 12 Select the CorporatePhoneNumber column

- b. Click the **HOME** tab, and then in the Records group, click **Delete**.
Because you cannot undo a delete, Access asks, "Do you want to permanently delete the selected field(s) and all the data in the field(s)? To permanently delete the field(s), click Yes." Because you are in Datasheet view, you can glance at it and make sure this is the data you want to delete.
- c. Click **Yes**. The column is deleted.
- d. Click **Close** the `tblParticipant` table.

Troubleshooting

If when you clicked in the column heading you accidentally double-clicked and then clicked Delete, Access blanked out the field name rather than deleting the column. This put you in edit mode, ready to rename the field. Press **[Esc]** to cancel edit mode and try again.

Understanding Tables and Keys

Now that you have imported data into the tblParticipant table, you need to further examine and evaluate how the tables have been set up. Tables represent entities—people, places, things, or events that you want to track. Each row represents a single person, place, and so on. To identify that entity, you use a primary key field. A **primary key** field is a field that uniquely identifies the record; it can be any data type, but it should be a field that will not change. For example, a person's name is not a good primary key for two reasons. First of all, it is not unique—several people may have the same name, and second, a person's name could change. If you define a primary key for a table, the field cannot be blank.

In this section, you will create a table from scratch, minimize file size, facilitate quick data entry, minimize errors, and encourage data consistency as shown in Table 2.

Goal	Example
Minimize file size	If a field is an integer that is always less than 32,767, use Integer rather than Long Integer to define the field.
Facilitate quick data entry, including removing redundant data	Store a state abbreviation rather than the state name spelled out.
Minimize errors	Use the Date/Time data type for dates and not a Text data type. Access will then only accept valid dates, and not 2/31/2013, which is invalid.
Encourage data consistency	Use a Yes/No check box rather than having the word Yes or No typed into a text field where misspellings could occur.

Table 2 Table design goals

Create a Table in Design View

You want to keep track of corporations who are involved with the tournament. You do not have a source that you can import, so you will need to design and create the table. You will use Design view to enter fields, data types, and descriptions.

Defining Data Types

Data types define the kind of data that can be entered into a field, such as numbers, text, or dates. The data type tells Access how to store and display the field.

QUICK REFERENCE		Data Types
Data Type	Description	Examples
Short Text	Used to store textual or character information. Any character or number can be entered into this type of field. You should store any data that will never be used in calculations, such as a Social Security number, as text, not a number. There is an upper limit of 255 characters that can be stored in a Short Text field.	Names, addresses
Long Text	Used to capture large amounts of text. Can store up to 1 gigabyte of characters, of which you can display 65,535 characters in a control on a form or report. This is a good data type to use if you need more than 255 characters in one field.	Comments
Number	Used for numeric data.	Quantity

Data Type	Description	Examples
Date/Time	Used to store a date and/or time.	Start time
Currency	A numeric value that is used for units of currency. It follows the regional settings preset in Windows to determine what the default currency should be. In the United States, the data is displayed with a dollar sign and two decimal places.	Salary
AutoNumber	Used for keys. Access generates the value by automatically incrementing the value for each new record to produce unique keys. For example, it would set the value as 1 for the first record, 2 for the next, and 3 for the third.	ProductID
Yes/No	A checked box where an empty box is no, and a checked box is yes.	EntryPaid
OLE Object	Use to attach an OLE object, such as a Microsoft Office Excel worksheet, to a record. An OLE object means that when you open the object, you open it in its original application such as Excel. It allows cross-application editing.	SalarySpreadsheet
Hyperlink	Text or combinations of text and numbers stored as text and used as a hyperlink address.	CompanyWebsite
Attachment	Images, worksheet files, documents, charts, and other types of supported files that are attached to the records in your database, similar to attaching files to e-mail messages.	EmployeePhoto
Calculated	A field calculated from other fields in the table. A calculated field may not be edited as it performs a calculation on other data that is entered.	GrossPay, which is calculated based upon HoursWorked and HourlySalary
Lookup Wizard	Lists either values retrieved from a table or query, or a set of values that you specified when you created the field.	ProductType, which gives a list of valid types

REAL WORLD ADVICE**Number or Text?**

Any character can be used in a text field. However, if you expect a field to contain only numbers, you should only store the data in a text field if the numbers will never be used in a calculation. If you store numbers as text, you cannot use them in calculations. Conversely, if you improperly store numeric text as a number, Access will remove any leading zeros. For example, you would not use zip codes in calculations, so a zip code should be stored as text. A person living in Boston might have a zip code of 02108. If you stored the zip code as a number, Access would convert this to 2108.

Determining Field Size

Field size indicates the maximum length of a data field. Whenever you use a Text data type, you should determine the maximum number of text characters that can exist in the data to be stored. That number would then be the field size. For example, a state abbreviation can only be two characters long, so the size for this field should be 2. If you allow

more than two characters, you are likely to get a mix of abbreviations and spelled-out state names. Limiting the size will limit errors in the data. There is an upper limit of 255 characters for a Short Text field. If you need more than 255 characters, use a Long Text data type.

For numeric fields, the type defines the maximum length or range of values. You should use the number size that best suits your needs. For example, if a value in a field is always going to be a whole number and is never going to be above 32,768 then Integer is the best field size. If the number is currency, you should use the Currency data type instead of Number.

QUICK REFERENCE		Number Field Sizes
Field Size	Description	
Byte	For integers that range from 0 to 255. These numbers can be stored in a single byte.	
Integer	For integers that range from -32,768 to +32,767. Must be whole numbers. Integers cannot have decimal places.	
Long Integer	For integers that range from -2,147,483,648 to +2,147,483,647. Long Integers cannot have decimal places. (AutoNumber is a long integer.)	
Single	For large numbers with up to seven significant digits. Can contain decimal places. Numbers can be negative or positive. For numeric floating point values that range from -3.4×10^{38} to $+3.4 \times 10^{38}$.	
Double	For very large numbers with up to 15 significant digits. Can contain decimal places. Numbers can be negative or positive. For numeric floating point values that range from -1.797×10^{308} to $+1.797 \times 10^{308}$.	
Decimal	For numeric values that contain decimal places. Numbers can be negative or positive. For numeric values that range from $-9.999... \times 10^{27}$ to $+9.999... \times 10^{27}$.	

You determine that your corporation table, tblCorporate, should contain the company name, address, and phone number.

A02.09



To Create a Table in Design View

- Click the **CREATE** tab, and then in the Tables group, click **Table Design**.
Access opens a blank table in Design view. You will enter each field in the appropriate row.
- Type **CompanyName** for the Field Name, and then press **[Tab]** to move to the Data Type column.
Notice that Short Text is the default data type, so you do not need to make a selection to keep Short Text for this field. For other data types, click the arrow and select the data type.
- Press **[Tab]** to move to the Description column, and then type **Company name**.
- In the Field Properties pane, type **50** in the Field Size box.

SIDE NOTE

Select Data Type

Alternatively, you can type the first letter of the data type, and it will appear, such as "N" for Number.

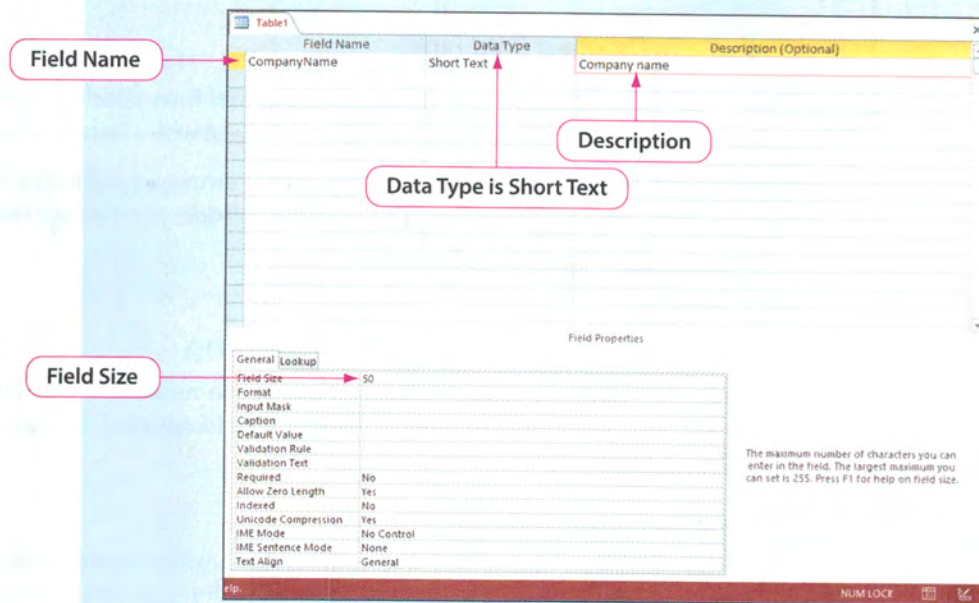


Figure 13 First field in the tblCorporate table

- e. Continue defining the table with the following information, being sure to enter maximum length in the Field Size box.

Field Name	Data Type	Description	Field Size
StreetAddress	Short Text	Company's street address	40
City	Short Text	Company's city	40
State	Short Text	State abbreviation	2
ZipCode	Short Text	Zip code either 5- or 9-character format	10
PhoneNumber	Short Text	Phone number with area code	14

- f. **Save**  the table, and name it **tblCorporate** and then click **OK**. In the warning message that asks if you want to create a primary key, click **No**. You will define a key later.
- g. **Close**  the tblCorporate table.

Changing Data Type

In Design view, you can change the size of a field. If you decide that a field length needs to be longer, you can change the field without concern. If you make a field length shorter and there were data that needed the longer length, you may truncate those values. For that reason, Access will always warn you that data may be lost if you change the length to a smaller size.

The tblItem table has a Notes field that has a data type of Short Text. The tournament director asks you to change that to have a data type of Long Text so that full comments can be added for items.

A02.10



To Change a Data Type

- Right-click **tblItem** in the Navigation Pane, and then select **Design View** to open the table in Design view. Notice that Notes is defined with a Data Type of Short Text.
- Click the **Data Type** column for Notes, click the **arrow** , and then select **Long Text**. Note that there is no longer a Field Size field. Long Text does not show the maximum field length.
- Save  and close  the table.

Understand Masks and Formatting

One of the values of using a DBMS is that it can make sure that information is entered, stored, and displayed consistently. Masks and formatting are two of the methods that assist in that process.

Defining Input Masks

Access provides a way to consistently enter data, called **input masks**. For example, phone numbers can be typed (555) 555-5555, 555-5555, or 555-555-5555. An input mask defines a consistent template and provides the punctuation, so you do not have to type it. Access also has a wizard that creates automatic masks for Social Security numbers, zip codes, passwords, extensions, dates, and times. You can also create your own custom masks. Input masks can affect how data is stored.

A02.11



To Create an Input Mask

- Right-click **tblCorporate** in the Navigation Pane, and then select **Design View** to open the table in Design view.
- Click the **PhoneNumber** Field Name to select the PhoneNumber field. In the Field Properties pane, click in the **Input Mask** box.
- Click the **Build** button  to start the Input Mask Wizard. If necessary, select **Phone Number**.
- Click **Next** to start the phone number Input Mask Wizard.
Access suggests the format !(999) 000-0000. This means that the area code is optional and will be enclosed in parentheses. The rest of the phone number is required and will have a dash between the two parts. The exclamation mark specifies that characters should be typed from left to right.
- Click **Next** to accept the format.
- Access asks if you want to store the symbols with the data. Select **With the symbols in the mask, like this**.
- Click **Next**, and then click **Finish**.

SIDE NOTE

Semicolons in Mask

The semicolons indicate that there are three sections of the mask. The dash in the last section shows the placeholder.

Input mask



Figure 14 Finished input mask

- h. **Save**  the table design. On the DESIGN tab, in the Views group, click the **View** arrow, and then select **Datasheet View**.
- i. Notice that the columns are not wide enough for the entire heading text to show. Move your mouse pointer to the border between **CompanyName** and **StreetAddress** until it becomes the Horizontal resize pointer , and then double-click the **border** to widen the column.
- j. Double-click the **border** after the **StreetAddress** and **PhoneNumber** headings to widen the columns.
- k. Click in the **append row** for **CompanyName**, and then type **Tesuque Mirage Market**. Press **Tab** to move to **StreetAddress**.
- l. Continue entering the records as follows.

CompanyName	StreetAddress	City	State	ZipCode	PhoneNumber
Tesuque Mirage Market	8 Tesuque Mirage Rd	Santa Fe	NM	87506	(505) 555-1111
Hotel Playa Real	125 Madison Avenue	Santa Fe	NM	87508	(505) 555-1800
Bouzouki Museum	716 Camino Cercano	Santa Fe	NM	87505	(505) 555-1200
McDoakes Restaurant	2017 High St	Santa Fe	NM	87501	(505) 555-1000
Benson & Diaz	1953 A Piazza Pl, Suite 101	Santo Domingo	NM	87052	(505) 555-2000

- m. **Close**  the tblCorporate table, and then in the Microsoft Access dialog box click **Yes** to save the layout.

SIDE NOTE

Masks Save Keystrokes

Notice that the phone number mask that you entered means that you do not need to type the parentheses and dashes in the phone number.

Formatting

In a table design, you can define a Format field property that customizes how data is displayed and printed in tables, queries, reports, and forms. The **Format** property tells Access how data is to be displayed. It does not affect the way the data is stored. For example, you can specify that currency fields are displayed in dollars, such as \$1,234.56 in American databases, or in euros, such as €1.234,56 in European databases. Formats are available for Date/Time, Number, Currency, and Yes/No data types. You can also define your own custom formats for Short Text and Long Text fields.

QUICK REFERENCE

Format Field Property

Data Type	Format	Example
Date/Time	General Date	11/9/2015 10:10:10 PM
	Long Date	Wednesday, November 9, 2015
	Medium Date	9-Nov-15
	Short Date	11/9/2015
	Long Time	10:10:10 PM
	Medium Time	10:10 PM
	Short Time	22:10
Number and Currency	General Number	Display the number as entered
	Currency	Follows the regional settings preset in Windows. In the United States: \$1,234.56. In much of Europe, €1.234,56.
	Euro	Uses the euro symbol regardless of the Windows setting.
	Fixed	Displays at least one digit after the decimal point. In the Decimal Places property, you choose how many fixed digits to show after the decimal point.
	Standard	Use the regional settings preset in Windows for the thousands divider. 1,234 in the United States; 1.234 in much of Europe.
	Percent	Multiply the value by 100 and follow with %.
	Scientific	Use standard scientific notation, for example, 4.5E + 13.
Yes/No	Yes/No	Yes or No display options.
	True/False	True or False display options.
	On/Off	On or Off display options.

A02.12



To Define a Date Field

- In the Navigation Pane, right-click **tblOrder**, and then select **Design View**.
- In the first **blank row**, in the Field Name column, type **OrderDate**. Select a Data Type of **Date/Time**, and then enter a Description of **Date order was placed**.
- Click in the **Format** box in the Field Properties pane.
- Click the **Format** arrow, and then select **Short Date**.

Notice that the Property Update Options button  appears. Clicking it would display an option to change the format of OrderDate wherever else it appears. Because it does not appear anywhere else yet, you do not need to click the button.

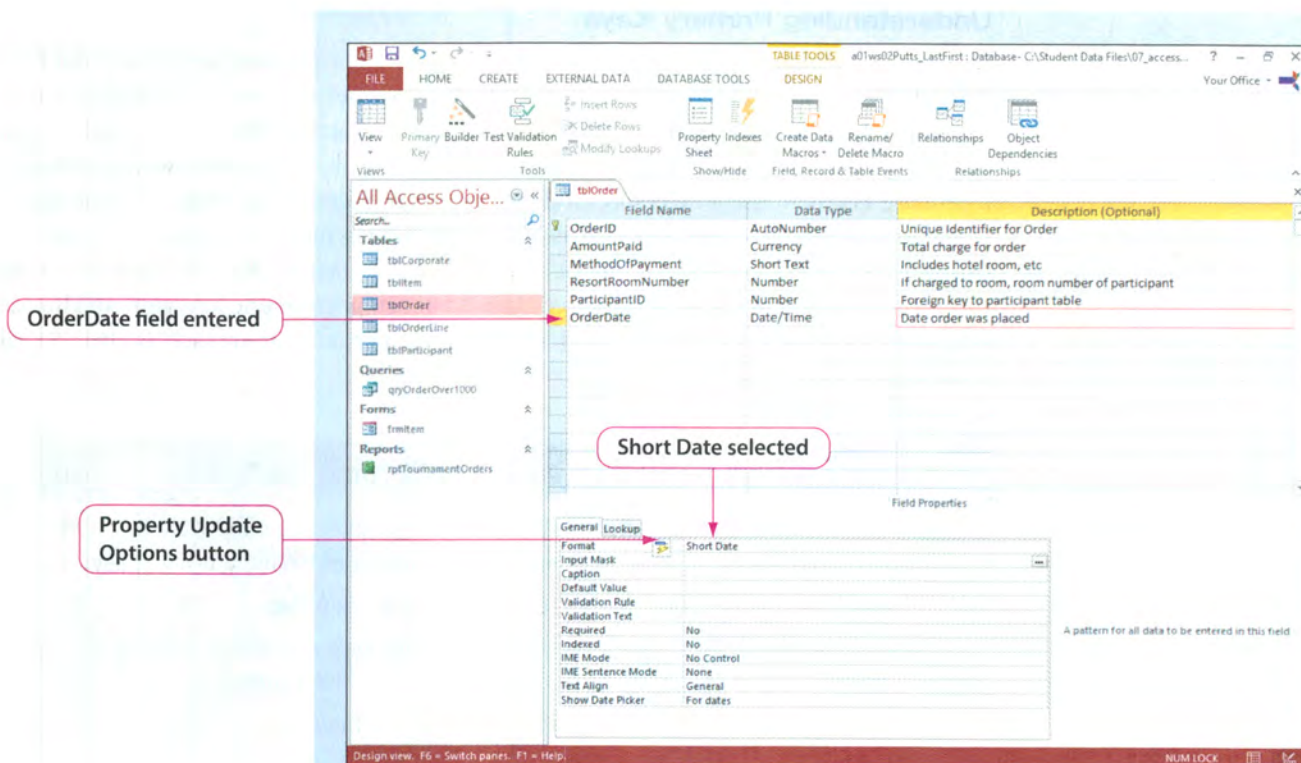


Figure 15 Adding a Short Date field

- e. **Save** the table design, and then in the Views group, click the **View** button to switch to Datasheet view.
The orders were placed on May 4, 2015, but no date was entered.
- f. For the first order, in the OrderDate field type **May 4, 2015**. Press to move to the next record. Notice the display changes to **5/4/2015**, the short date format.
- g. For the second order, type **05/04/2015** and then press to move to the next record. Again, the display changes to the new format.
- h. For the next order, type **May 4 15** and then press to move to the next record. Once again, the display changes to 5/4/2015.
- i. Continue typing **May 4 15** for all the orders.
- j. **Close** the table.

CONSIDER THIS

Database Design Principles

Some principles for database design are shown in Table 2. How do field sizes, formatting, and input masks facilitate these principles? When would you use a format? When would you use an input mask?

Understand and Designate Keys

Each table should have a field that uniquely identifies each of the records in the table. This field is called the primary key. If you know the primary key, you know exactly what record you want. Another type of key is a **foreign key**. A foreign key is a value in a table that is the primary key of another table. The primary and foreign keys form the common field between tables that allow you to form a relationship between the two tables.

Understanding Primary Keys

Each row of a table represents a single person or item. The primary key field is the field that identifies each person or item. It uniquely identifies the record. Remember that a primary key field should be a field that has values that will not change. When you define a primary key for a table, the field cannot be blank. A common way of defining a primary key is to use a field specifically designed to identify the entity. This is sometimes an arbitrary **numeric key** that is assigned to represent an individual item, such as CustomerID or ProductID. A numeric key is often assigned an AutoNumber data type that Access will fill as the data is entered. Instead of using a numeric key, you can also use an already existing field that uniquely identifies the person or item such as their Social Security number.

REAL WORLD ADVICE

Do You Need a Primary Key?

While Access does not require a primary key for every table, you almost always want to give the table a primary key. What are the advantages of having a primary key?

- It helps organize your data. Each record is uniquely identified.
- Primary keys speed up access to your data. Primary keys provide an index to a record. In a large table, that makes it much faster to find a record.
- Primary keys are used to form relationships between tables.

Understanding Foreign Keys

A foreign key is a field in a table that stores a value that is the primary key in another table. It is called foreign because it does not identify a record in this table; it identifies a record in another—foreign—table. For example, you have two tables, tblParticipant and tblOrder, in your database. You want to know which participants have placed certain orders. The primary key for your Participant table is ParticipantID. You can add a field called ParticipantID to the Order table that indicates which participant placed the order. ParticipantID is the foreign key in the tblOrder table; it identifies the participant in the tblParticipant table. Figure 16 illustrates this relationship. Foreign keys do not need to be unique in the table. Participants can place several orders.

You will use the ParticipantID to form a relationship between the two tables later in this workshop.

ParticipantID is primary key in the tblParticipant table

John Trujillo's ParticipantID 2

ParticipantID	LastName	FirstName	StreetAddress	City	State	ZipCode	ContactPhoneNumber
2	Trujillo	John	427 Kanengiser Rd	Santa Ana Pueblo	NM	87045	(505) 555-8217
3	McShane	Ian	823 4th St NW	Albuquerque	NM	87106	(505) 555-4149
5	Fresquez	Marge	534 Asiento Blvd	Pueblo	NM	81232	(505) 555-3800
8	Maestas	Marcus	83 Vuelta Rancho	Santa Fe	NM	87508	(505) 555-2525
9	Marquardt	Keith	228 E Alejo Rd	Palm Springs	CA	92262	(760) 555-4836
15	Reed	Thomas	743 Windstone Dr.	Albuquerque	NM	87105	(505) 555-7943
16	Reid	Cynthia	158A Calle Derecho	Las Vegas	NM	87701	(505) 555-0247
17	Romero	Joseph	819 Calle Don Roberto	Santa Fe	NM	87502	(505) 555-3242
19	Sanchez	Ricardo	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 555-6243
20	Sanchez	Julie	158 Tesuque Village Rd	Agua Fria	NM	87508	(505) 555-9244
21	Schilling	John	15365 Sombra Del Monte	Santa Fe	NM	87508	(505) 555-3227
24	Thomas	Joe	4355 Celsior St	Brougham	CA	92267	(760) 555-1227
26	Trent	Eileen	433 Tortuga Ln	Las Cruces	NM	88003	(505) 555-4101
27	Brevard	Jacque	23 Calle Montoya	Bernanillo	NM	87001	(505) 555-1328
29	Winston	Mary	157 Green Galliard Rd	Agua Fria	NM	87506	(505) 555-1756
30	Fox	Jeff	1509 Las Cruces Drive	Las Cruces	NM	88003	(505) 555-8786
31	Silva	Jackie	1509 Main Street	Santa Ana Pueblo	NM	87044	(505) 555-3355
32	Ortiz	Luis	1801 Brilliant Sky Dr	Santa Fe	NM	87508	(505) 555-1722
33	Ramirez	Alice	124 Nana Lou St.	Avondale	CO	81022	(719) 555-9247
34	Victor	Lisa	988 Elguitarra Rd	Santa Fe	NM	87507	(505) 555-2757
40	Levant	Ronald	672 N Mesquite St	Las Cruces	NM	88001	(505) 555-3878
41	Dearman	Seth	1717 Junior Hills Rd	Santa Ana Pueblo	NM	87044	(505) 555-9217
42	Reed	Thomas	743 Windstone Dr.	Albuquerque	NM	87105	(505) 555-7943

Figure 16 Relationship between tblParticipant and tblOrder tables

Continued

Continued

ParticipantID is
the foreign key in
the tblOrder table

OrderID	AmountPaid	MethodOfPayment	ResortRoomNumber	ParticipantID	OrderDate
1	\$2,550.00	CC		2	5/4/2015
2	\$2,000.00	CC		3	5/4/2015
3	\$1,000.00	CC		17	5/4/2015
4	\$2,850.00	CC		5	5/4/2015
5	\$400.00	ROOM	217	24	5/4/2015
6	\$200.00	CC		29	5/4/2015
7	\$3,000.00	CC		15	5/4/2015
8	\$550.00	ROOM	283	9	5/4/2015
9	\$0.00			16	5/4/2015
10	\$0.00			8	5/4/2015
11	\$850.00	CC		19	5/4/2015
12	\$200.00	CC		1	5/4/2015

Figure 16 Relationship between tblParticipant and tblOrder tables

Composite Keys

Sometimes, two fields are needed to uniquely identify a record. In that case, both fields are used to create the key and are called a **composite key**. For example, a university might identify a class by subject area and course number. The university could have classes Math 101, Math 102, and MIS 101. It takes both subject and course number to identify a single course. The combination of the two fields is called a composite key.

A typical use of a composite key is on an order form. Figure 17 shows a paper form that the golf tournament organizers used before they used Access. To uniquely identify the items that have been ordered, a composite key can be made combining the order number with the line number of the order form. You notice that this composite key is used for orders in the golf tournament database.

Putts for Paws

Order number → Order: 100

Line number →

LINE NUMBER	ITEM ORDERED	TYPE OF ITEM	COST PER ITEM	QUANTITY ORDERED	TOTAL COST
1	CTEAM	Corporate Team of 4	\$ 850.00	1	\$ 850.00
2	CART	Cart Sponsor	\$2000.00	1	\$ 2000.00
					BALANCE DUE: \$ 2850.00

Figure 17 Composite key on a paper order form

A02.13



To Identify a Composite Key

- In the Navigation Pane, right-click the **tblOrderLine** table, and then select **Design View**. Notice that there are two fields marked as a key: OrderID and LineNum.
- Close the tblOrderLine table.

Field Name	Data Type	Description (Optional)
OrderID	Number	Order identifier
LineNum	Number	Line number within order
ItemID	Short Text	Identifier of item purchased
Quantity	Number	Quantity of this item purchased

Figure 18 Composite key in the tblOrderLine table

Understanding Natural vs. Numeric Keys

Sometimes your data will have a unique identifier that is a natural part of your data. When that is true, you can use the field as a **natural primary key**. If you already identify orders by order number, that would make a good primary key.

The important point is that the natural primary key is a value that will not change. You might start by thinking that telephone number is a natural way to identify a customer. But people change their telephone numbers. When the natural key might change, it is better to use an arbitrary unique number to identify the customer. When natural keys do exist, they are favored over numeric keys.

You can use the data type AutoNumber for the primary key. In that case, Access will automatically assign a unique value for every record. You can also define a key as numeric, and fill the key values yourself.

You decide that you need to create a numeric primary key for your tblCorporate table named CorporateID. You will let Access automatically create the key by using an AutoNumber data type.

CONSIDER THIS

Social Security Number as a Primary Key

While a Social Security number seems like the perfect primary key, it is seldom used. What privacy concerns might arise in using Social Security numbers? Are there other issues that might arise with using Social Security numbers?

A02.14



To Define a Primary Key

- In the Navigation Pane, right-click **tblCorporate**, and then select **Design View**.
- On the DESIGN tab, in the Tools group, click **Insert Rows**. Because CompanyName was the active field, a blank row is added above **CompanyName**.
- Type **CorporateID** in the Field Name column.
- Select **AutoNumber** as the Data Type. The field size is set to Long Integer.
- Type **Unique corporate identifier** in the Description column.

- f. With the CorporateID row still selected, on the DESIGN tab, in the Tools group, click **Primary Key** to make "CorporateID" the primary key. A key icon is displayed in the record selector bar.

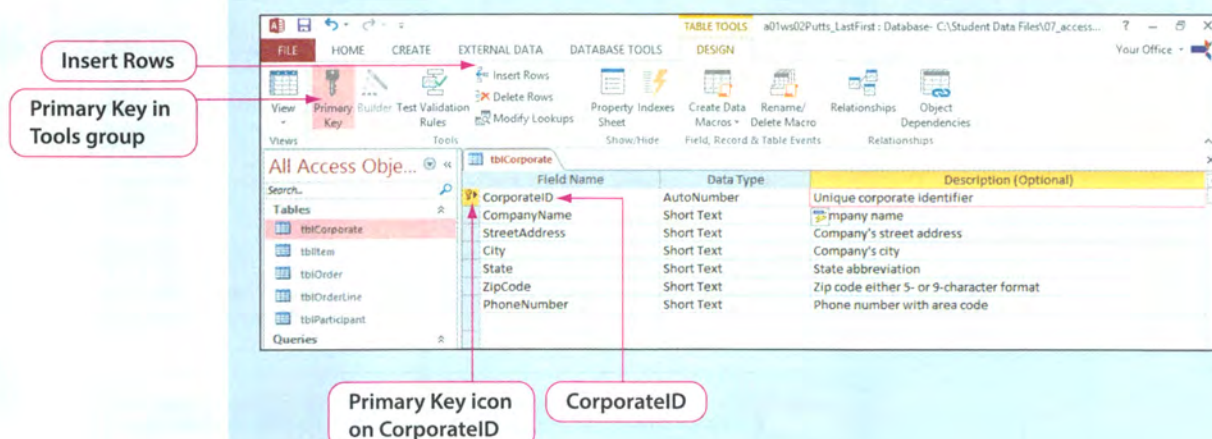


Figure 19 Defining a primary key

- g. **Save** your table design. Click the **HOME** tab, and then in the Views group, click **View**. Notice that Access has populated the CorporateID field with automatic numbers starting at 1 and going through 5.
- h. **Close** the tblCorporate table.

REAL WORLD ADVICE

Read Your Error Messages

The error message "Index or primary key cannot contain a Null value" is one example of an error message that Access displays when you make changes to an Access database that would break the rules you set up in your table design. You should read the error message carefully to understand what it is telling you.

If you get the error message "Index or primary key cannot contain a Null value," that means that one of your records has no entry in the primary key field. Enter the primary key. Often the issue is that you accidentally entered data in the append record. If you do not want that record to be created, press **[ESC]** to cancel the addition of the record.

Understanding Relational Databases

One of the benefits of using Access is the ability to add relationships to the tables. This allows you to work with two or more tables in the same query, report, or form. For the tournament database, when you relate tables together, you can ask such questions as "What golfers are playing for the Tesuque Mirage Market?", "Did the market agree to purchase any other items?", and "Have they paid for those items yet?"

Relationships in a relational database are created by joining the tables together. A join is created by creating a relationship between two tables based upon a common field in the two tables, as shown in Figure 20. The tblParticipant table has a field—column—named ParticipantID. tblOrder also has a field named ParticipantID. When you create the relationship, Access will match the ParticipantIDs between the two tables to find those participants that placed an order. Looking at the table, you can mentally join the two tables to see that John Trujillo has placed an order for \$2,550. When Access runs a query, it uses

an existing join to find the results. In this section, you will form relationships between tables, create a report, and check to make sure the relationships you are creating between tables make sense.

tblParticipant

ParticipantID	LastName	FirstName	StreetAddress	City	State	ZipCode	ContactPhoneNumber	Click to Add
1	Last	First	1563 Catalina Dr	Santa Fe	NM	87508	(505) 555-1754	
2	Trujillo	John	427 Kanengiser Rd	Santa Ana Pueblo	NM	87045	(505) 555-8217	
3	McShane	Ian	823 4th St NW	Albuquerque	NM	87106	(505) 555-4149	
5	Fresquez	Marge	534 Asiento Blvd	Pueblo	NM	81232	(505) 555-3800	
8	Maestas	Marcus	83 Vuelta Rancho	Santa Fe	NM	87508	(505) 555-2525	
9	Marquardt	Keith	228 E Alejo Rd	Palm Springs	CA	92262	(760) 555-4836	
15	Reed	Thomas	743 Windstone Dr.	Albuquerque	NM	87105	(505) 555-7943	
16	Reid	Cynthia	158A Calle Derecho	Las Vegas	NM	87701	(505) 555-0247	
17	Romero	Joseph	819 Calle Don Roberto	Santa Fe	NM	87502	(505) 555-3242	
19	Sanchez	Ricardo	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 555-6243	
20	Sanchez	Julie	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 555-6243	
21	Schilling	John	15365 Sombra Del Monte	Santa Fe	NM	87508	(505) 555-9244	
24	Thomas	Joe	4355 Celsior St	Brougham	CA	92267	(760) 555-3227	
26	Trent	Eileen	433 Tortuga Ln	Las Cruces	NM	88003	(505) 555-4101	
27	Brevard	Jacque	23 Calle Montoya	Bernadillo	NM	87001	(505) 555-1828	

tblOrder

OrderID	AmountPaid	MethodOfPayment	ResortRoomNumber	ParticipantID	OrderDate	Click to Add
1	\$2,550.00	CC		2	5/4/2015	
2	\$2,000.00	CC		3	5/4/2015	
3	\$1,000.00	CC		17	5/4/2015	
4	\$2,850.00	CC		5	5/4/2015	
5	\$400.00	ROOM	217	24	5/4/2015	

Figure 20 Tables joined between primary and foreign keys

Understand Basic Principles of Normalization

When you work with tables in Access, you want each table to represent a single entity and have data only about that entity. For example, you want a `tblParticipant` table to have data about participants and nothing else. You do not want to have data about the corporation they represent or the order they placed. You want the data about the participant to be in the participant table and no data about any other entity in the `tblParticipant` table as shown in Figure 20. There is no data that is about any other entity in the `tblParticipant` table. This is why you deleted the `CorporatePhoneNumber` field earlier in the exercise.

Representing Entities and Attributes

Recall that an entity is a person, place, or item that you want to keep data about. The data you keep about an entity are called attributes. An entity is generally stored in a single table in a relational database. The attributes form the fields or columns of the table. **Normalization** is the process of minimizing the duplication of information in a relational database through effective database design. If you know the primary key of an entity in a normalized database, each of the attributes will have just one value. When you normalize a database, you will have multiple smaller tables, each representing a different thing. There will be no redundant data in the tables. A complete discussion of normalization is beyond the scope of this workshop, but the following sections will give you an idea of why you normalize your tables.

Table 3 shows a nonnormalized view of `tblParticipant`. Suppose John Trujillo places two orders, Order 1 for \$2,550 and Order 2 for \$500. You can easily fill in his name and address. However, when you get to the order fields, you cannot fill in the attributes with just one value. You want to enter Order 1 for Order ID and Order 2 for Order ID. You want to enter \$2,550 for AmountPaid and \$500 for AmountPaid. But you only have one field for each.

Participant ID	Last Name	First Name	Street Address	Other Address Fields	Order ID	Amount Paid
2	Trujillo	John	427 Kanengiser Rd		?????	???

Table 3 Nonnormalized tblParticipant table

For each record's ParticipantID, you do not have a single value for OrderID and AmountPaid because each participant may make several orders. You could have a column for OrderID1 and OrderID2. But, how many columns would you make? What if this was for a grocery store where one transaction might contain hundreds of items? Any time you do not know how many columns to repeat, the table is not normalized and you need another table. Thus, this table does not fit the principles of normalization. It has two entities in the table: participants and orders.

CONSIDER THIS | Why Is a Nonnormalized Table Undesirable?

If you have a table as shown in Table 3, you could simply enter a record for each item. So, if you had five items, you would enter five records in the table. What kind of redundancy does that create? If you used this method, is there a primary key?

Minimizing Redundancy

Table 4 shows a nonnormalized view of the tblOrder table. In this case, when you know the OrderID, you do know the value of each field.

OrderID	Amount Paid	Method of Payment	Last Name	First Name	Address	Other Address Fields
1	\$2,550.00	CC	Trujillo	John	427 Kanengiser Rd	
12	\$500.00	CC	Trujillo	John	427 Kanengiser Rd	

Table 4 Nonnormalized tblOrder table

However, the table has redundant data. **Redundancy** occurs when data is repeated several times in a database. All of the data about John Trujillo is repeated for each order he makes. That means that the data will need to be entered multiple times. Beyond that, if the data changes, it has to be changed in multiple places. If his address or phone number changes, it will need to be changed on all his order records. Forgetting to change it in one place will lead to inconsistent data and confusion. Again, this table is not normalized because it contains data about two different entities: participant and orders.

In a normalized database, redundancy is minimized. The foreign keys are redundant, but no other data about the entity is repeated.

Understand Relationships Between Tables

To normalize the database, you need to have two tables: one for participants and one for orders. How then do you form a relationship between them? A table represents an entity—or the nouns—in the database. The relationship represents the verb that connects the two nouns. In the example, the two nouns are “participant” and “order.” Is there a relationship between these two nouns? Yes. You can say that a participant places an order.

Once you determine that there is a relationship between the entities, you need to describe the relationship. You do that by asking yourself two questions starting with each entity in the relationship:

- Question 1, starting with the Participant entity: If you have one participant, what is the maximum number of orders that one participant can place? The only two answers to consider are one or many. In this case, the participant can place many orders.
- Question 2, starting with the Order entity: If you have one order, what is the maximum number of participants that can place that order? Again, the only answers to consider are one or many. An order is placed by just one participant.

The type of relationship where one question is answered “one” and the other is answered “many” is called a one-to-many relationship. A **one-to-many relationship** is a relationship between two tables where one record in the first table corresponds to many records in the second table. One-to-many is called the cardinality of the relationship. **Cardinality** indicates the number of instances of one entity that relates to one instance of another entity.

Using the Relationships Window

Access stores relationship information in the Relationships window as shown in Figure 21.

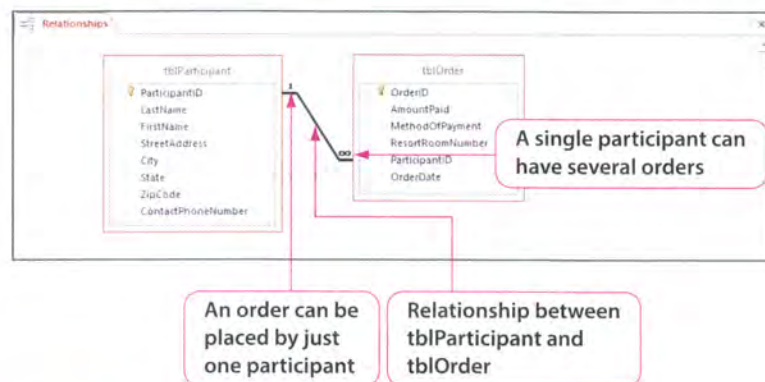


Figure 21 Relationships window

The Relationships window shows tables and the relationships between those tables. Notice the join line between **tblParticipant** and **tblOrder**. There is an infinity symbol on the line next to **tblOrder**. The infinity symbol indicates that a single participant can have several orders. There is a “1” on the line next to **tblParticipant**. The “1” indicates that an order can be placed by just one participant. Access indicates a one-to-many relationship in this way, putting a “1” on the one side of the join line and an infinity symbol on the many side.

REAL WORLD ADVICE

Other Uses for the Relationships Window

The Relationships window gives you an overview of all your tables and the relationships between them. It also shows all the fields in all the tables. It is often helpful to return to the Relationships window when developing queries and reports.

A02.15



To Open the Relationships Window

- Click the **DATABASE TOOLS** tab, and then in the Relationships group, click **Relationships**. The Relationships window opens. The window shows tables and the relationships between those tables.

Determining Relationship Types

The relationship between tblParticipant and tblOrder is a one-to-many relationship. There are other types of relationships. Consider the relationship between tblOrder and tblItem. There is a relationship: an item can be on an order. What is the cardinality? You need to ask yourself the two questions to determine the cardinality:

- Question 1, starting with the Order entity: If you have one order, what is the maximum number of items that can be part of that order? You care only about two answers: one or many. In this case, the order can contain many items. For example, a golfer could buy an entry into the tournament and a T-shirt.
- Question 2, starting with the Item entity: If you have one item, what is the maximum number of orders that that item can be part of? Again, the only answers to consider are one or many. Obviously you want more than one person to be able to order an entry to the tournament. Therefore, you say that an item can be on many orders.

With both answers being many, this is a many-to-many relationship. A **many-to-many relationship** is a relationship between tables in which one record in one table has many matching records in a second table, and one record in the related table has many matching records in the first table. Because these two tables in the charity database do not have a common field, in Access this kind of many-to-many relationship must have an additional table in between these two. This intermediate table is referred to by several synonymous terms: “intersection,” “junction,” or “link table.” You will look at this later in the workshop.

A one-to-one relationship occurs when each question is answered with a maximum of one. A **one-to-one relationship** is a relationship between tables where a record in one table has only one matching record in the second table. In a small business, a department might be managed by no more than one manager, and each manager manages no more than one department. That relationship in that business is a one-to-one relationship.

There are three types of relationships: one-to-many, many-to-many, and one-to-one. The relationship type is based upon the rules of the business. In the charity golf tournament, the relationship between the order and the item is many-to-many, but in another business it might not be. For example, consider a business that sells custom-made jewelry where each item is one of a kind. In this case, an item can appear on just one order. Thus, the relationship between order and item in that business would be one-to-many.

REAL WORLD ADVICE

Use of One-to-One Relationships

When you have a one-to-one relationship, you could combine the two tables into a single table. A single table is simpler than two tables with a one-to-one relationship between them.

- You could keep the two tables separate when the two tables are obviously two different things like manager and department. You might want to keep private information about the manager in the manager table. Additionally, this would be easier to change if business rules change and multiple managers might manage the same department.
- You should combine the two tables when there are just a few attributes on one of the tables. For example, suppose you only wanted to keep the manager’s name in the manager table with no other information about the manager. Then you might consider the manager’s name to be an attribute of the department.

Create a One-to-Many Relationship

Consider the relationship between tblParticipant and tblOrder. This is a one-to-many relationship. To form a relationship between two tables, you need the tables to have a field in common. The easiest way to accomplish this is to put the primary key from the table on the

one side in the table on the many side. In this case, this means that you use the ParticipantID from the one side table and add it as a field to the tblOrder table. The field that you add to the many side is called a foreign key because it is a key to another, or foreign, table. ParticipantID is already a field on the many side table, so you can use it to form the relationship.

QUICK REFERENCE

Creating a One-to-Many Relationship in Access

Creating a one-to-many relationship in Access takes three steps:

1. Make sure the two tables have a field in common. Use the primary key from the one side, and add it as a foreign key in the many side table.
2. Form the relationship in the Relationships window. This is done by connecting the primary key of the one side table to the foreign key in the many side table.
3. Populate the foreign key by adding data to the foreign key in the many side table.

Forming the Relationship

Because the tblParticipant and tblOrder tables already have a field in common, you can form the relationship. You will connect the primary key of the one side table to the foreign key on the many side table.

A02.16



To Form a Relationship

- a. On the DATABASE TOOLS tab, in the Relationships group, click **Show Table**, click **tblParticipant**, and then click **Add**.
- b. Click **Close** to close the Show Table dialog box, and then drag the **tblParticipant** table to appear below tblOrder in the Relationships window.
- c. Use your pointer to resize **tblParticipant** by dragging the corner of the field list so all fields show. Drag **tblOrder** to the right.

SIDE NOTE

Adding Tables to the Relationships Window

You can also add tables to the Relationships window by clicking on a table in the Navigation Pane and dragging it to the window.

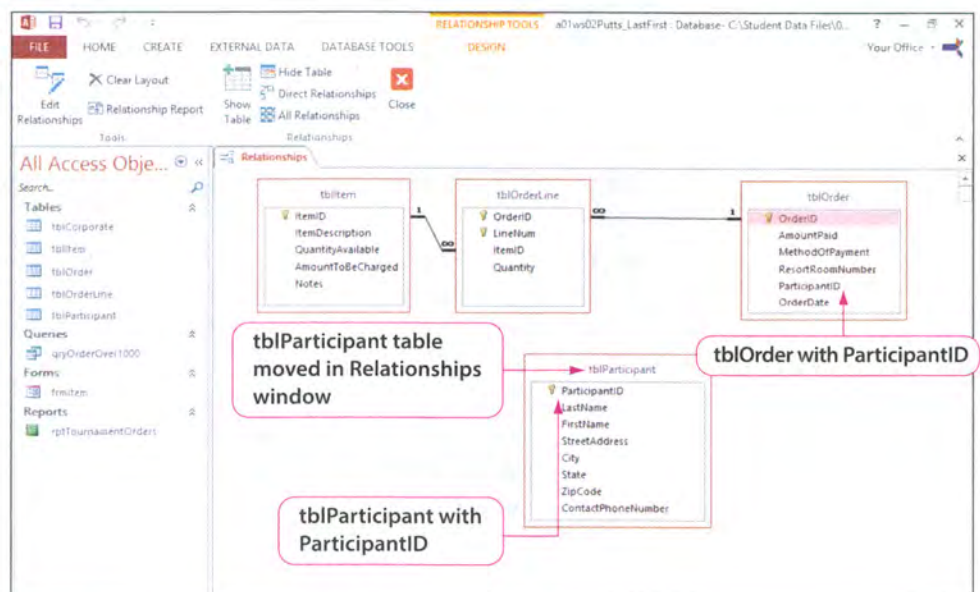


Figure 22 Move the table in the Relationships window

SIDE NOTE**Tables in the Relationships Window**

Do not add a table twice to Relationships. If you do, close the window without saving and start over. A hidden table is still there.

- d. Drag the primary key, **ParticipantID**, from tblParticipant to **ParticipantID** in tblOrder. Alternatively, you could drag from ParticipantID in tblOrder to ParticipantID in tblParticipant.

The Edit Relationships dialog box is displayed. Check that the fields shown in the box are both ParticipantID.

Troubleshooting

If you do not see two fields named ParticipantID in the Edit Relationships dialog box, click Cancel and retry Step d.

Notice that Access calls the relationship a one-to-many relationship. This is because the relationship is between a primary key and a foreign key.

- e. Click **Enforce Referential Integrity** to select it, and then click **Create**. Later in the workshop you will look further at what referential integrity accomplishes.

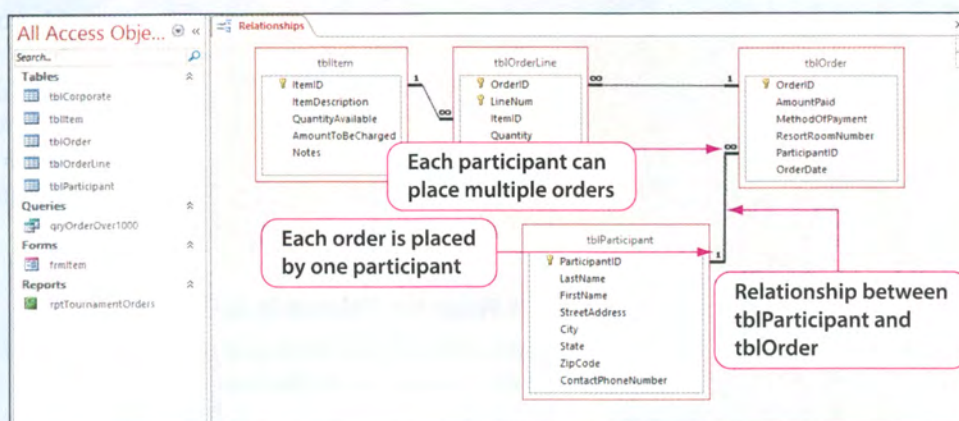


Figure 23 tblParticipant and tblOrder relationship

- f. **Save** your relationships, and then **close** the Relationships window.

Troubleshooting

If you get the error message "The database engine could not lock table 'tblParticipant' because it is already in use by another person or process," this means that the tblParticipant table is still open. Close the table, and try again to form the relationship. You should get in the habit of closing tables when you are done with them.

If you get the error message "Relationship must be on the same number of fields with the same data type," this means that the data types for the primary key and the foreign key are different. For example, they must be both Numeric and Long Integer or both Text. Make sure that you are creating the relationship between the correct fields. If you are, check the table designs, and fix the field with the wrong data type.

If you add a relationship that you do not want, right-click the join line and click Delete. If you want to edit a relationship, right-click the join line and click Edit Relationship.

QUICK REFERENCE

Three Types of Relationships

Type of Relationship	Alternate Notations	Meaning
One-to-many	1:N or 1:M 1-to-N	A relationship between two tables where one record in the first table corresponds to many records in the second table; however, each record in the second table corresponds to just one record in the first table.
Many-to-many	M:N M-to-N	A relationship between two tables where one record in the first table corresponds to many records in the second table; and, each record in the second table corresponds to many records in the first table.
One-to-one	1:1 1-to-1	A relationship between two tables where a record in one table has only one matching record in the second table; and, each record in the second table corresponds to just one record in the first table.

Using Two Related Tables in a Report

The reason you create a relationship is to join two tables for queries, reports, and forms. You will create a simple report showing participants and their orders.

A02.17



To Create a Report from Two Tables

- Click the **CREATE** tab, and then in the Reports group, click **Report Wizard**.
- In the Report Wizard dialog box, click the **Tables/Queries** arrow, and then select **Table: tblParticipant**. Select the **LastName** field, and then click **One Field** . Select the **FirstName** field, and then click **One Field** .
- Click the **Tables/Queries** arrow, and then select **Table: tblOrder**. Select the **OrderID** field, and then click **One Field** . Select the **AmountPaid** field, and then click **One Field** .

Troubleshooting

If you clicked Next instead of selecting the tblOrder fields, you can go back a step in the wizard by clicking Back.

- Click **Next**.
You can see a preview of how your report will look if you group the participants by tblParticipant. Access uses the "one" side of a one-to-many relationship as the default for the grouping. This is the grouping you want.
- Click **Next**. The wizard asks if you want more grouping levels; however, you do not want any other grouping levels.
- Click **Next**.

- g. Use the arrow to select **OrderID**. Ascending sort order is already selected. Click **Next**.
The wizard asks you to choose a layout and orientation for your report. You will accept the default layout and orientation.
- h. Click **Next**.
- i. Title your report **rptParticipantOrders_initialLastname** using your first initial and last name. Click **Finish**.
Access connects the participants and orders in a report.
- j. Right-click anywhere on the report, and then select **Layout View** from the shortcut menu.

Troubleshooting

If the Field List shows on the right side of the Access window, close it so you can see the entire report layout.

- k. Double-click the **title** of the report. Change the report title to **Participant and Orders by initial Lastname** using your first initial and last name and press **Enter**. **Save**  your report.



LastName	FirstName	OrderID	AmountPaid
Last	First		
Trujillo	John	12	\$200.00
McShane	Ian	1	\$2,550.00
Fresquez	Marge	2	\$2,000.00
Maestas	Marcus	4	\$2,850.00
		10	\$0.00

Figure 24 Complete report

- l. If your instructor directs you to print the report, right-click anywhere on the report, switch to **Print Preview**, click **Print** in the Print group, and then click **OK**.
- m. **Close**  your report.

Create a Many-to-Many Relationship

Unless you are connecting a common field such as a foreign key to the same foreign key in a different table, Access cannot form a many-to-many relationship with a single relationship. Instead you need to make two one-to-many relationships to represent the many-to-many relationship. As stated before, **tblOrder** and **tblItem** have a many-to-many relationship. An order can have many items on it. Each item can be on many orders. To form this relationship, a new table, **tblOrderLine** needs to be added. Both **tblOrder** and **tblItem** are related to the new table. The third table is called a junction table. A **junction table** breaks down the many-to-many relationship into two one-to-many relationships.

Look at the relationship between **tblOrder** and **tblOrderLine** in Figure 25. It is a one-to-many relationship with orders having many order lines but each order line on just one order. There is also a relationship between **tblOrderLine** and **tblItem**. It also is a one-to-many relationship with each order line having just one item but an item able to be on many order lines as shown in Figure 25.

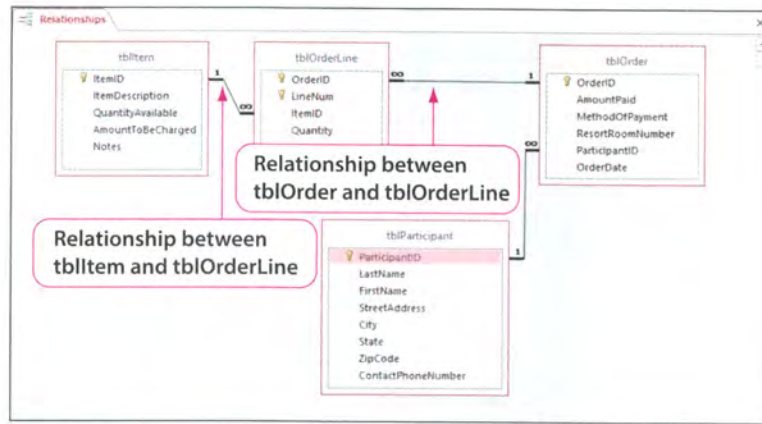


Figure 25 Relationship between tblOrder and tblItem with tblOrderLine

As shown in Figure 26, OrderID 4 has two order lines: one with an item of a corporate team and one with a cart. By traveling left to right across the three tables, you see that OrderID 4 has many items on it. OrderID 6 has one line: an entry to the tournament. By traveling from right to left across the three tables, you see that an entry to the tournament can be on many orders. Hence the junction table tblOrderLine forms a many-to-many relationship between tblOrder and tblItem.

tblOrder	tblOrderLine	tblItem
OrderID	LineNum	ItemID
1	1	CART
2	2	TEAM
3	1	CART
4	1	FLAG
4	2	HOLE
4	3	CTEAM
4	4	CART
5	1	G1
6	1	G1
7	1	CART
7	2	HOLE
7	3	FLAG
8	1	TEAM
9	1	G1
10	1	G1
11	1	CTEAM
12	1	G1

tblItem
ItemID
CART
CTEAM
FLAG
G1
HOLE
TEAM

Figure 26 Data in tblOrder, tblOrderLine, and tblItem

tblOrderLine has foreign keys to tblOrder and tblItem. This allows the relationships to be formed. Notice that the relationship between tblOrder and tblOrderLine is formed with OrderID in tblOrder joined to OrderID in tblOrderLine. Similarly the relationship between tblItem and tblOrderLine is formed from ItemID in tblItem to ItemID in tblOrderLine.

The junction table, tblOrderLine, has one field beyond the key fields: Quantity. This indicates the quantity of each item on the order. As shown in Figure 26, OrderID 5 included two entries to the tournament.

Forming a New Many-to-Many Relationship

Consider the relationship between your new table, tblCorporate, and tblParticipant. There is a relationship: a participant can represent a corporation. A participant can be a golfer for a corporation, the corporate representative, or a donor. What is the cardinality? You need to ask yourself the two questions to determine the cardinality:

- Question 1, starting with the Corporate entity: If you have one corporation, what is the maximum number of participants that can represent that corporation? You care only about two answers: one or many. In this case, the corporation could be represented by many participants. A corporate team might have four golfer participants.
- Question 2, starting with the Participant entity: If you have one Participant, what is the maximum number of roles that Participant can represent for the corporation? Again, the only answers to consider are one or many. A Participant could be a golfer representing the corporation and also be a corporate representative.

QUICK REFERENCE

Creating a Many-to-Many Relationship in Access

Creating a many-to-many relationship in Access takes four steps:

1. Create a junction table. Create a primary key that will be a unique field for the junction table, and add two foreign keys, one to each of the many-to-many tables. Alternatively you can create a composite key made up of the two foreign keys.
2. Determine if there are any fields that you want to add to the junction table beyond the keys.
3. Form two relationships in the Relationships window. This is done by connecting the primary key of one of the original tables to the appropriate foreign key of the junction table. Repeat for the second of the original tables. The junction table is on the many side of both relationships.
4. Populate the junction table.

Creating a Junction Table

Because the relationship between tblCorporate and tblParticipant is many-to-many, you need a junction table. Recall that the junction table breaks down the many-to-many relationship into two one-to-many relationships. In this case, the junction table will indicate the role that the participant has for the corporation. The primary key for the junction table will be ParticipantRoleID, an AutoNumber field. You will have two foreign keys, the CorporateID field and the ParticipantID field. You will also add a field named Role that describes the role of the participant. Because the table represents roles, you will call the table tblParticipantRole.



To Create a Junction Table in Table Design View

- Click the **CREATE** tab, and then in the Tables group, click **Table Design**.
Access opens a blank table in Design view. You will enter each field in the appropriate row.
- In the Field Name column, type **ParticipantRoleID**. Press **[Tab]** to move to the Data Type column, click the **arrow**, and then select the **AutoNumber** data type.
Alternatively, you can type the "A," and "AutoNumber" will appear.
- Notice that Field Size in the Field Properties pane defaults to Long Integer. Press **[Tab]** to move to the Description column, and then type **Primary key for tblParticipantRole**.
- On the DESIGN tab, in the Tools group, click **Primary Key** to make the ParticipantRoleID field the primary key.
- Press **[Tab]** to move to the next field. Continue filling in the table with the following information, being sure to enter the field size in the Field Properties pane.

Field Name	Data Type	Description	Field Size
CorporateID	Number	Foreign key to tblCorporate	Long Integer
ParticipantID	Number	Foreign key to tblParticipant	Long Integer
Role	Short Text	Role that this participant fills for the corporation	40

- Close **[X]** the table, and then in the Microsoft Access dialog box click **Yes**. Name the table **tblParticipantRole** and then click **OK**.

Creating Two One-to-Many Relationships

The many-to-many relationship will turn into two one-to-many relationships between each of the original tables and the junction table. The rule is that the junction table is on the many side of the two relationships. But you can ask yourself the two questions to determine the cardinality:

- Question 1, starting with the Corporate entity: If you have one corporation, what is the maximum number of participant roles that can represent that corporation? You care only about two answers: one or many. In this case, the corporation could be represented by many participant roles. A corporation could have golfers and corporate contacts.
- Question 2, starting with the ParticipantRole entity: If you have one ParticipantRole, what is the maximum number of corporations that the participant can represent? Again, the only answers to consider are one or many. A ParticipantRole is for a single participant.

Thus tblCorporate to tblParticipantRole is a one-to-many relationship with Corporate on the "one" side.

You can ask the same questions between tblParticipant and tblParticipantRole.

Populating the Junction Table

To complete the many-to-many relationship, you need to populate the junction table.

A02.20



To Populate the Junction Table

- Double-click **tblParticipantRole** to open the table in Datasheet view.
- Click in the **CorporateID** append row. Enter a CorporateID of **1**, a ParticipantID of **5** and a Role of **Corporate Contact**. Access automatically numbers ParticipantRoleID as "1".
- Because the last field is not totally visible, place your pointer in the **border** on the right of the **Role** column heading. When your pointer is a double-headed arrow , double-click the **border** to resize the column. This resizing is called AutoFitting. Repeat for each field.

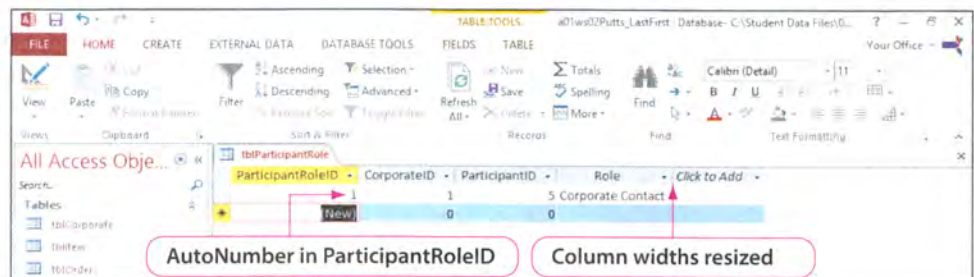


Figure 28 tblParticipantRole columns resized

- Enter the following data in the records as follows.

ParticipantRoleID	CorporateID	ParticipantID	Role
Let Access number as 2 for you	1	5	Golfer
Let Access number as 3 for you	1	26	Golfer
Let Access number as 4 for you	2	1	Golfer
Let Access number as 5 for you	2	3	Golfer
Let Access number as 6 for you	2	54	Corporate Contact
Let Access number as 7 for you	2	54	Golfer

- Close  the table, and then in the Microsoft Access dialog box click **Yes** to save the changes to the table layout.

Defining One-to-One Relationships

One-to-one relationships in Access are formed very similarly to one-to-many relationships. You can put a foreign key in either table and establish the relationship by dragging with the primary key in one table joined to the foreign key. You can also make both tables have the same primary key.

Understand Referential Integrity

Referential integrity is a database concept that ensures that relationships between tables remain consistent. When one table has a foreign key to another table, the concept of referential integrity states that you may not add a record to the table that contains the foreign key unless there is a corresponding record in the linked table. Recall that when you created the relationship between tblParticipant and tblOrder, you told Access to enforce referential integrity.

Enforcing Referential Integrity

Enforcing referential integrity ensures that the following rules will be applied when you define the fields in Design view:

- The values in the field on the one side of the relationship is unique in the table. You must either use the primary key of the one side in the relationship or a field that you have set as unique in the table.
- You cannot add a foreign key value in the many side that does not have a matching primary key value on the one side.
- The matching fields on both sides of the relationship are defined with the same data types. For example, if the primary key is numeric and Long Integer, the foreign key must be numeric and Long Integer too. (For purposes of relationships, an AutoNumber primary key is considered Long Integer.)

If these rules are violated, when you try to form the relationship, you will get the following error message: "Relationship must be on the same number of fields with the same data type."

Double-check how you defined the relationship between tblParticipant and tblOrder.

A02.21



To Check and Test Referential Integrity

- Click the **DATABASE TOOLS** tab, and then in the Relationships group, click **Relationships**. The Relationships window is displayed. Notice the relationship that was formed between ParticipantID in tblParticipant and ParticipantID in tblOrder.
- Click **Close** the Relationships window.
- Right-click **tblParticipant**, and then select **Design View**. Notice that ParticipantID is defined as Number and Long Integer. Click **Close** tblParticipant, right-click **tblOrder**, select **Design View**, and then click the **ParticipantID** field. Notice that ParticipantID is also defined as Number and Long Integer in the tblOrder table.
Referential integrity means that Access will also enforce rules when you work with the data in the tables. You cannot enter a value in the foreign key field on the "many" side table that is not a primary key value on the "one" side table. For example, you cannot add a participant that does not exist in tblParticipant to a team. However, you can leave the foreign key unfilled, indicating that this participant is not part of a team.
- Click the **HOME** tab, and then in the Views group, click the **View** button to switch to Datasheet View for tblOrder.
- In the ParticipantID for the last record in the table, type **70** and then press **Enter** twice. Access responds with the error message "You cannot add or change a record because a related record is required in table tblParticipant." That is, you cannot add an order to participant 70 because there is no participant 70.
- Click **OK**, and then change the ParticipantID for the last order back to **1**. Press **Enter** twice. ParticipantID 1 is a valid participant so you can make that change.
- Click **Close** the tblOrder table.

CONSIDER THIS

Why Enforce Referential Integrity?

You can decline to enforce referential integrity on a relationship. What are the pros and cons of enforcing referential integrity? What are the pros and cons of not enforcing referential integrity?

If you enforce referential integrity, you cannot delete a record from the “one” side table if matching records exist in the “many” side table. If you want to delete the record, you must delete the matching records or use Cascade Delete as explained later.

A02.22



To Understand Relationships Between the One and Many Side Tables

- a. In the Navigation Pane, double-click **tblParticipant** to open it in Datasheet view.
- b. Click the **record selector** of the second row, John Trujillo.
- c. Click the **HOME** tab, and then in the Records group, click **Delete**.
Access responds that “The record cannot be deleted or changed because table ‘tblOrder’ includes related records.” That means John Trujillo has placed an order.
- d. Click **OK**.
- e. **Close**  the tblParticipant table.
- f. **Close**  the database and Access.

You also cannot change the primary key value in the “one” side table if that record has related records.

QUICK REFERENCE

Referential Integrity

Access enforces the following rules on defining a relationship with referential integrity:

1. The primary key field values on the one side of the relationship must be unique in the table.
2. The foreign key values on the many side of the relationship must exist as the primary key field for a record on the one side of the relationship.
3. The matching fields on both sides of the relationship are defined with the same data types.

The following rules are applied to data changes when referential integrity is enforced:

1. You cannot enter a value in the foreign key field on the “many” side table that is not a primary key on the “one” side table. However, you can leave the foreign key unfilled, indicating that this record is not in the relationship. It is not good practice to do this however.
2. You cannot delete a record from the “one” side table if matching records exist in a “many” side table, unless Cascade Delete has been selected for the relationship, in which case all the matching records on the many side are deleted.
3. You cannot change a primary key value in the “one” side table if that record has related records in the “many” side, unless Cascade Update has been selected for the relationship, in which case all the matching records on the many side have their foreign key updated.

Selecting Cascade Update

When you ask Access to enforce referential integrity, you can also select whether you want Access to automatically cascade update related fields or cascade delete related records. These options allow some deletions and updates that would usually be prevented by referential integrity. However, Access makes these changes and replicates or cascades the changes through all related tables so referential integrity is preserved.

If you select Cascade Update Related Fields when you define a relationship, then when the primary key of a record in the one side table changes, Access automatically changes the foreign keys in all related records. For example, if you change the ItemID in the tblItem table, Access automatically changes the ItemID on all order lines that include that item. Access makes these changes without displaying an error message.

If the primary key in the “one” side table was defined as AutoNumber, selecting Cascade Update Related Fields has no effect, because you cannot change the value in an AutoNumber field.

Selecting Cascade Delete

If you select Cascade Delete Related Records when you define a relationship, any time that you delete records from the one side table, the related records in the many side table are also deleted. For example, if you deleted a tblParticipant record, all the orders made by that participant are automatically deleted from the tblOrder table. Before you make the deletion, Access warns you that related records may also be deleted.

CONSIDER THIS

Should You Cascade Delete Related Records?

Should you cascade delete related records? Consider a customer who has made many orders. If the customer asks to be removed from your database, do you want to remove his or her past orders? How do you think the accountants would feel?

Concept Check

1. What is an entity? What is an attribute? What is a relationship? p. 626
2. If you have data in an Excel worksheet, what methods could you use to move the data in Excel to Access? How would you decide between the methods? p. 629–636
3. Why is it important to type a new record in the blank (append) row rather than on top of another record? p. 638
4. What data types would you use for the following fields: price, phone number, street address, ZIP code, and notes about product usage? p. 640–641
5. What is a mask used for? What is a format used for? Which can affect the way that data is stored? p. 644–647
6. What is the purpose of a primary key? p. 647–648
7. Why is redundancy of data undesirable? p. 652–653
8. What does it mean to say that there is a relationship between two tables? p. 653–655
9. How do you create a one-to-many relationship in Access? p. 655–657
10. How do you create a many-to-many relationship in Access? p. 659–661
11. What does it mean for a relationship to have referential integrity enforced? p. 664–666

Key Terms

Attribute 626
Cardinality 654
Composite key 649
Data type 629
Delimiter 634
Entity 626
Field size 641
Foreign key 647

Format 645
Input mask 644
Join 651
Junction table 659
Many-to-many relationship 655
Natural primary key 650
Normalization 652
Number data type 629

Numeric key 648
One-to-many relationship 654
One-to-one relationship 655
Primary key 640
Redundancy 653
Relationship 626
Text data type 629

Visual Summary

Import a named range (p. 633)

View table design view (p. 628)

Understand relationships between the one and many side tables (p. 666)

Delete data in datasheet view (p. 638)

Create a report from two tables (p. 658)

Import from a text file (p. 635)

Import an Excel spreadsheet (p. 631)

Copy and paste data from Excel (p. 630)

Import data from other sources (p. 629)

ParticipantID	LastName	FirstName	StreetAddress	City	State	ZipCode	Contact
1	Trujillo	John	1563 Catalina Dr	Santa Fe	NM	87508	(505) 5
2	McShane	Ian	823 4th St NW	Albuquerque	NM	87106	(505) 5
3	Fresquez	Marge	534 Asiento Blvd	Pueblo	NM	81232	(505) 5
4	Maestas	Marcus	83 Vuelta Rancho	Santa Fe	NM	87508	(505) 5
5	Marquardt	Keith	228 E Alejo Rd	Palm Springs	CA	92262	(760) 5
6	Reed	Thomas	743 Windstone Dr.	Albuquerque	NM	87105	(505) 5
7	Reid	Cynthia	158A Calle Derecho	Las Vegas	NM	87701	(505) 5
8	Romero	Joseph	819 Calle Don Roberto	Santa Fe	NM	87502	(505) 5
9	Sanchez	Ricardo	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 5
10	Sanchez	Julie	158 Tesuque Village Rd	Agua Fria	NM	87507	(505) 5
11	Schilling	John	15365 Sombra Del Monte	Santa Fe	NM	87508	(505) 5
12	Thomas	Joe	4355 Celsior St	Brougham	CA	92267	(760) 5
13	Trent	Eileen	433 Tortuga Ln	Las Cruces	NM	88003	(505) 5
14	Brevard	Jacque	23 Calle Montoya	Bernanillo	NM	87001	(505) 5
15	Winston	Mary	157 Green Galliard Rd	Agua Fria	NM	87506	(505) 5
16	Fox	Jeff	1509 Las Cruces Drive	Las Cruces	NM	88003	(505) 5
17	Silva	Jackie	1509 Main Street	Santa Ana Pueblo	NM	87044	(505) 5
18	Ortiz	Luis	1801 Brilliant Sky Dr	Santa Fe	NM	87508	(505) 5
19	Ramirez	Alice	124 Nana Lou St.	Avondale	CO	81022	(719) 5
20	Victor	Lisa	988 Elguitarra Rd	Santa Fe	NM	87507	(505) 5
21	Levant	Ronald	672 N Mesquite St	Las Cruces	NM	88001	(505) 5
22	Dearman	Seth	1717 Junior Hills Rd	Santa Ana Pueblo	NM	87044	(505) 5
23	Reed	Thomas	743 Windstone Dr.	Albuquerque	NM	87105	(505) 5
24	Druplet	Brenda	1522 Watson Ln	Las Cruces	NM	88001	(505) 5
25	Maestas	Marcus	83 Vuelta Rancho	Santa Fe	NM	87508	(505) 5
26	Marquardt	Keith	228 E Alejo Rd	Palm Springs	CA	92262	(760) 5

Define a date field (p. 646)

Change a data type (p. 644)

Identify a composite key (p. 650)

Enter data in datasheet view (p. 637)

Enter data manually (p. 637)

Check and test referential integrity (p. 665)

Understand referential integrity (p. 664)

OrderID	AmountPaid	MethodOfPayment	ResortRoomNumber	ParticipantID	OrderDate
1	\$2,550.00	CC			5/4/2015
2	\$2,000.00	CC			5/4/2015
3	\$1,000.00	CC			5/4/2015
4	\$2,850.00	CC			5/4/2015
5	\$400.00	ROOM		217	5/4/2015
6	\$200.00	CC			5/4/2015
7	\$3,000.00	CC			5/4/2015
8	\$550.00	ROOM		283	5/4/2015
9	\$0.00				5/4/2015
10	\$0.00				5/4/2015
11	\$850.00	CC			5/4/2015
12	\$200.00	CC			5/4/2015

Understand and designate keys (p. 647)

Define a primary key (p. 650)

Create a table in Design view (p. 640)

Create a table in Design view (p. 642)

Create an input mask (p. 644)

Understand masks and formatting (p. 644)

Field Name	Data Type	Description (Optional)
CorporateID	AutoNumber	Unique corporate identifier
CompanyName	Short Text	Company name
StreetAddress	Short Text	Company's street address
City	Short Text	Company's city
State	Short Text	State abbreviation
ZipCode	Short Text	Zip code either 5- or 9-character format
PhoneNumber	Short Text	Phone number with area code

Field Properties

Property	Value
Field Size	14
Format	
Input Mask	!(999) 000-0000,0_
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	No
Allow Zero Length	Yes
Indexed	No
Unicode Compression	Yes
IME Mode	No Control
IME Sentence Mode	None
Text Align	General

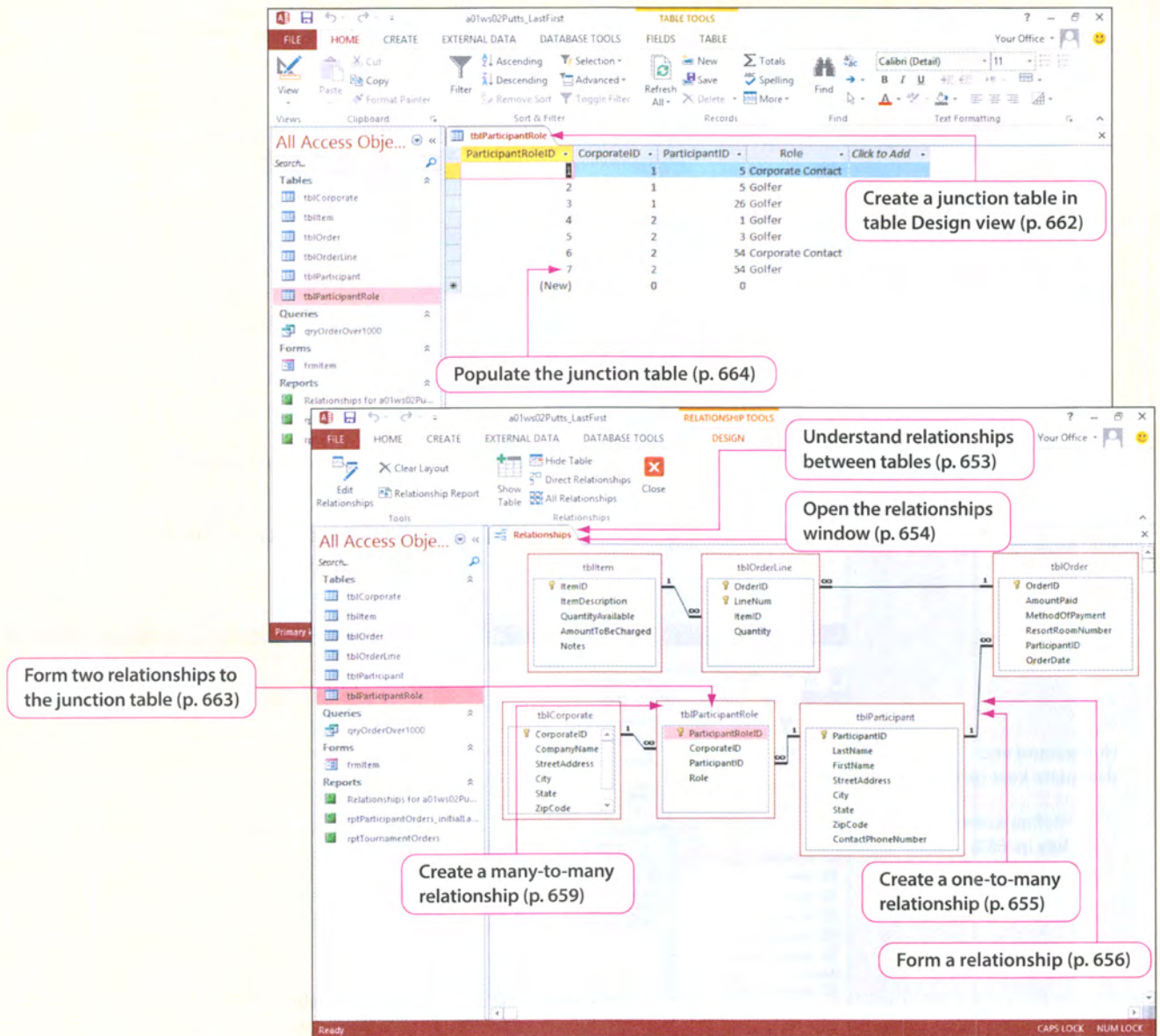


Figure 29 Putts for Paws Charity Tournament Imported Data Final Database

Practice 1

Student data files needed:

- a01ws02Giftshop.accdb
- a01ws02Products.xlsx
- a01ws02Customers.xlsx

You will save your file as:

- a01ws02Giftshop_LastFirst.accdb

Painted Treasures Gift Shop



Sales &
Marketing

The Painted Treasures Gift Shop sells many products for the resort patrons including jewelry, clothing, and spa products. You will create a database of customers and their purchases. The three tables that you need are customers, purchases, and products. What are the relationships between these three tables? You will need to add a junction table between the two tables with a many-to-many relationship.

- a. You will import the tblProduct table from Excel. When you import a new table from Excel, you need to change the field definitions in Access.
 - Start **Access**, and then open **a01ws02Giftshop**.

- Click the **FILE** tab, and save the file as an Access database in the location where you are saving your files with the name **a01ws02Giftshop_LastFirst** using your last and first name. If necessary, enable the content.
- Click the **EXTERNAL DATA** tab, and then in the Import & Link group, click **Excel**.
- Click **Browse**. Navigate to your student data files, select **a01ws02Products**, and then click **Open**. Make sure **Import the source data into a new table in the current database** is selected, and then click **OK**.
- In the Import Spreadsheet Wizard, note that **tblProduct** is selected, and then click **Next**.
- Be sure that the **First Row Contains Column Headings** check box is selected, click **Next**, and then click **Next** again.
- Select **Choose my own primary key**, click the **Primary Key** arrow, select **ProductID**, and then click **Next**.
- In the **Import to Table** box, keep the entry **tblProduct**, click **Finish**, and then click **Close**.
- Right-click **tblProduct**, and then select **Design View**.
- Change the data types as shown in the following table. Enter descriptions and change field sizes as noted.

Field Name	Data Type	Description	Field Size/Format
ProductID	Number	Unique identifier for product	Change Field Size to Long Integer
ProductDescription	Short Text	Description of product	Change Field Size to 40
Category	Short Text	Product category	Change Field Size to 15
QuantityInStock	Number	Quantity of product in stock	Change Field Size to Integer
Price	Change to Currency	Price to charge customer	Change format to Currency
Size	Short Text	Size of product	Change Field Size to 10
Color	Short Text	Color of product	Change Field Size to 15

- Save the table. Access tells you that some data might be lost because you are making fields shorter in length. Accept this by clicking **Yes**, and then close the table.
- b.** You will create a table named **tblCustomer** in Design view and import data to populate it.
- Click the **CREATE** tab, and then click **Table Design**. Access opens a blank table in Design view.
 - Fill in the fields and change field sizes as noted.

Field Name	Data Type	Description	Field Size
CustomerID	AutoNumber	A unique ID that identifies each customer	Long Integer
LastName	Short Text	The customer's last name	25
FirstName	Short Text	The customer's first name	20
StreetAddress	Short Text	Street address	40
City	Short Text	City address	25
State	Short Text	State abbreviation	2
ZipCode	Short Text	Five-digit zip code	5
ResortHotelRoom	Short Text	Leave blank if not guest	6

- Highlight the **CustomerID** row by clicking the record selector to the left of the field, and then in the Tools group, click **Primary Key** to make CustomerID the primary key.
 - Save your table design, naming it **tblCustomer**, click **OK**, and then close your table.
 - Click the **EXTERNAL DATA** tab, and then in the Import & Link group, click **Excel**.
 - Click **Browse**. Navigate to your student data files, click **a01ws02Customers**, and then click **Open**.
 - Click **Append a copy of the records to the table** if necessary, click the arrow to select **tblCustomer**, and then click **OK**.
 - Click **Next** twice, and then in the Import Spreadsheet Wizard dialog box, under Import to Table, in the Import to Table box accept the name **tblCustomer**. Click **Finish**, and then click **Close**. Double-click **tblCustomer** to open it in Datasheet view.
 - In the first record in the table, change the **LastName** and **FirstName** fields to your **last name** and **first name**. Close the table.
- c. Create relationships between your tables.
- Click the **DATABASE TOOLS** tab, and then in the Relationships group, click **Relationships**, and then click **Show Table**, if necessary.
 - Add all four tables in the order **tblCustomer**, **tblPurchase**, **tblPurchaseLine**, and **tblProduct** to the Relationships window, and then close the Show Table dialog box.
 - Drag the primary key **CustomerID** from **tblCustomer** to **CustomerID** in **tblPurchase**.
 - Click **Enforce Referential Integrity**, and then click **Create**.
 - Drag the primary key **PurchaseID** from **tblPurchase** to **PurchaseID** in **tblPurchaseLine**. Click **Enforce Referential Integrity**, and then click **Create**.
 - Drag the primary key **ProductID** from **tblProduct** to **ProductID** in **tblPurchaseLine**. Click **Enforce Referential Integrity**, and then click **Create**.
 - Click **Relationship Report**, and then save the report, accepting the name **Relationships for a01ws02Giftshop_LastFirst**. If your instructor directs you to print your results, print the report.
 - Close the report, and then close the Relationships window.
- d. Create a report of the customers, purchases, and products.
- Click the **CREATE** tab, and then in the Reports group, click **Report Wizard**.
 - In the Report Wizard dialog box, click the **Tables/Queries** arrow, and then select **Table: tblCustomer**. Select the **LastName** and **FirstName** fields.
 - Click the **Tables/Queries** arrow, click **Table: tblPurchase**, and then select **PurchaseDate**.
 - Click the **Tables/Queries** arrow, click **Table: tblPurchaseLine**, and then select **Quantity**.
 - Click the **Tables/Queries** arrow, click **Table: tblProduct**, select **ProductDescription**, and then click **Next**.
 - Accept grouping by **tblCustomer** and then by **PurchaseDate** by clicking **Next**.
 - You do not want any other grouping levels, click **Next**.
 - Click the **arrow** to sort your report by ascending **ProductDescription**, and then click **Next**.
 - Change the Orientation to **Landscape**, and then click **Next**.
 - Title your report **rptCustomerPurchases_initialLastname** using your first initial and last name, and then click **Finish**.

- Switch to Layout view.
- Change the title of your report to **Customer and Purchases by initial Lastname** using your first initial and last name.
- Click the **column heading** for Quantity, press **[Shift]**, and then click the **first value** for Quantity so both the column heading and values are selected. With your pointer, move the right border to the left of the dotted blue line. Save your report.
- If your instructor directs you to print your results, print the report.
- Close the report, and then exit Access. Submit your file as directed by your instructor.

Problem Solve 1

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Homework 1



Production &
Operations

Student data files needed:

- a01ws02Cupcake.accdb
- a01ws02CupcakeSes.xlsx

You will save your file as:

- a01ws02Cupcake_LastFirst.accdb

Managing Employees at Jellybean's Cupcakes

You are the manager of the Human Resources Department of Jellybean's Cupcakes, a bakery franchise specializing in traditional and trendy cupcakes. You need to create a database that will help you track current employees along with training efforts for all of the bakeries' employees. You have a database with employee data. You will add the training sessions from an Excel spreadsheet. You will have to create a relationship between employees and training sessions. Each employee can take many training sessions, and each training session can be attended by many employees, so you will need to create a junction table.

- Start **Access**, and then open **a01ws02Cupcake**. Click the **FILE** tab, and then save the file as **a01ws02Cupcake_LastFirst** using your last and first name. If necessary, enable the content.
- Open the **tblEmployee** table, and then change the name in record 25 to your name.
- Switch to Design view, and then add two new fields to **tblEmployee**.

Field Name	Data Type	Description	Field Size/Format
MobilePhone	Short Text	The employee's cell phone number	14
DOB	Date/Time	The employee's date of birth	Short Date

- Add an input mask for MobilePhone. Use a mask that will show phone numbers as **(555) 555-5555** with a place holder "-" and then save with the symbols in the mask.
- Import a new table, **tblSessions**, from the Excel workbook **a01ws02CupcakeSes**. Do not set a primary key during the import. Make the following changes to the table in Design view.
 - Add a new field **SessionID** and then assign a data type of **AutoNumber**. Make this field a primary key.
 - Make the changes shown to Data Type, Description, and Field Size/Format.

Field Name	Data Type	Description	Field Size/Format
SessionID		The key that identifies each training session	
SessionName		The name of the training session	50
Description	Long Text	The description of the training session	
SessionDate		The date this session was held	Short Date

- f. Create a new table in Design view. This table will serve as the junction table. Add the following fields, data types, and descriptions.

Field Name	Data Type	Description	Field Size
EmpTrnID	AutoNumber	The key that identifies each training session and employee	
SessionID	Number	The foreign key to tblSessions	Long Integer
EmployeeID	Number	The foreign key to tblEmployee	Long Integer

Assign **EmpTrnID** as the primary key, and then save the table as **tblEmployeeTraining**.

- g. Open the **Relationships** window, and then create a one-to-many relationship between **EmployeeID** in **tblEmployee** and **EmployeeID** in **tblEmployeeTraining**. Enforce referential integrity.
- h. Create a one-to-many relationship between **SessionID** in **tblSessions** and **SessionID** in **tblEmployeeTraining**, and then enforce referential integrity. Do not cascade update or cascade delete.
- i. Create a relationship report, accepting the default report name.
- j. Enter the following data into **tblEmployeeTraining**.

EmpTrnID	SessionID	EmployeeID
Let Access autonumber as 1	1	13
Let Access autonumber as 2	1	21
Let Access autonumber as 3	1	18
Let Access autonumber as 4	2	5
Let Access autonumber as 5	2	25
Let Access autonumber as 6	10	3
Let Access autonumber as 7	10	5
Let Access autonumber as 8	10	25
Let Access autonumber as 9	10	21
Let Access autonumber as 10	10	4

- k. Create a query named **qryChocolate101_initialLastname** that selects **LastName**, **FirstName**, **HomePhone**, and **SessionName**. Select those employees that signed up for **Chocolate 101**, and then sort by **LastName** and **FirstName**.
- l. Close your database. Submit your file as directed by your instructor.

Perform 1: Perform in Your Career

Student data files needed:

-  a01ws02Interns.accdb
-  a01ws02InternsCo.xlsx

You will save your file as:

-  a01ws02Interns_LastFirst.accdb

Internship Coordinator



Production &
Operations

You take a job with an organization that matches students from Indiana schools to internship opportunities. You have a database with a table of information about interns and an Excel spreadsheet with companies that offer internships. You want to create a record of each intern's interviews. An intern can have many interviews, but an interview is with just one intern. A company can schedule many interviews, but an interview is with just one company.

- a. Start **Access** and then open **a01ws02Interns**. Click the **FILE** tab, and save the file as an Access Database in the location where you save your files with the name **a01ws02Interns_LastFirst**.
- b. Open **tblIntern**, familiarize yourself with the fields, add yourself as a new intern, and then close the table.
- c. Start **Excel**, and then open **a01ws02InternsCo**. Familiarize yourself with the fields, and then close the workbook.
- d. Import the companies from Excel into Access, creating a new table for companies called **tblCompany**. Fix data types and field sizes as appropriate. Add descriptions, and then set the **CompanyID** field as primary key.
- e. Add a contact phone number field to the table formatted appropriately. Populate the phone number with the following information:

Company Name	Contact Phone Number
FreeMarkets	(408) 555-2049
BNY Mellon	(202) 555-8000
Adobe Systems, Incorporated	(408) 555-6799
Kraft Foods, Incorporated	(847) 555-9100
Oracle Corporation	(650) 555-3200

- f. Design a table for interviews that will have the date of the interview and whatever primary keys and foreign keys you need. Create this table naming it **tblInterview**.
- g. Form the relationships you need, and then create a relationship report accepting the default name.
- h. Populate the interview table with the following information:
 - Gloria Perry has an interview with BNY Mellon on **2/16/2015**.
 - You have an interview with Oracle Corporation on **2/13/2015**.
 - Thomas Jackson has an interview with Oracle Corporation on **2/13/2015**.
 - You have an interview with Adobe Systems, Incorporated, on **2/20/2015**.
 - Gloria Perry has an interview with FreeMarkets on **3/2/2015**.
- i. Create a report showing all companies and the interviews that are scheduled. Save the report as **rptCompanyInterviews_initialLastname**. Fix the columns as necessary to show them all.
- j. Submit your file as directed by your instructor.



Additional
Cases

Additional Workshop Cases are available on the companion website and in the instructor resources.

MODULE CAPSTONE

More Practice 1

Student data files needed:

-  a01mpRecipe.accdb
-  a01mpRecipePrep.xlsx
-  a01mpRecipeIng.xlsx
-  a01mpRecipeJunc.csv

You will save your file as:

-  a01mpRecipe_LastFirst.accdb



Production &
Operations

Indigo5 Restaurant

Robin Sanchez, the chef of the resort's restaurant, Indigo5, wants to keep track of recipes and the ingredients that they include in an Access database. This will allow her to plan menus and get reports and queries on the ingredients that are needed. Ingredients have already been stored in Excel worksheets and can be imported from Excel into Access. The dish preparation instructions can be copied from Excel and pasted into Access. Other data will need to be entered. Complete the following tasks:

- a. Start **Access**, and then open the student data file **a01mpRecipe**. Click the **FILE** tab, and then save the file as an Access database in the location designated by your instructor with the name **a01mpRecipe_LastFirst** using your last and first name. If necessary, enable the content.
- b. Create a new table in **Design** view. This table will store specific recipe items.
 - Add the following fields, data types, and descriptions. Change field sizes as noted.

Field Name	Data Type	Description	Field Size
RecipeID	Short Text	The recipe ID assigned to each menu item (primary key)	6
RecipeName	Short Text	The recipe name	30
FoodCategory	Short Text	The food category	15
TimeToPrepare	Number	Preparation time in minutes	Integer
Servings	Number	The number of servings this recipe makes	Integer
Instructions	Long Text	Cooking instructions	

- Designate **RecipeID** as the primary key. Save the new table as **tblRecipes** and then close the table.
- c. Create a form to enter recipes. Select **tblRecipes**, click the **CREATE** tab, and then in the Forms group, click **Form**. Save the form as **frmRecipes_initialLastname** using your first initial and last name.
 - Enter the following data into **frmRecipes_initialLastname** in Form view.

RecipeID	RecipeName	FoodCategory	TimeToPrepare	Servings
REC001	Chicken Soup	Soup	45	8
REC002	Black Beans	Beans	90	6

- d. Start Excel, and then open **a01mpRecipePrep**. For each recipe, copy the **Cooking Instructions** from the Excel worksheet and paste the recipe instructions into the Access field **Instructions**. Close the form, and then close Excel.

- e. Import Excel file **a01mpRecipeIng**, appending it to **tblIngredients**. Use the **Ingredients** worksheet. There are headers in the first row of this worksheet. Do not save the import steps.
- f. Create a new table in **Design** view. This table will serve as the junction table between the **tblIngredients** and **tblRecipes** tables.
 - Add the following fields, data types, and descriptions, in this order. Change field sizes as noted.

Field Name	Data Type	Description	Field Size
RecipeIngredientID	AutoNumber	The recipe ingredient ID automatically assigned to each recipe ingredient (primary key)	
RecipeID	Short Text	The recipe ID from tblRecipes (foreign key)	6
IngredientID	Number	The ingredient ID from tblIngredients (foreign key)	Long Integer
Quantity	Number	The quantity of the ingredient required in the recipe	Double

- Assign **RecipeIngredientID** as the primary key.
 - Save the new table as **tblRecipeIngredients**.
 - Close the table.
- g. Open the **Relationships** window and add all three tables to the window.
 - Create a one-to-many relationship between **RecipeID** in **tblRecipes** and **RecipeID** in **tblRecipeIngredients**. Enforce referential integrity. Do not cascade update or cascade delete.
 - Create a one-to-many relationship between **IngredientID** in **tblIngredients** and **IngredientID** in **tblRecipeIngredients**. Enforce referential integrity. Do not cascade update or cascade delete.
 - Create a relationships report accepting the default name.
 - Save the relationships, and then close the Relationships window.
 - h. The Recipe Ingredients junction data were stored in a comma-separated values file or csv file. This is a comma-delimited format that can be read by Excel. Access treats a csv file as a text file. Import **a01mpRecipeJunc** as **Text** appending it to **tblRecipeIngredients**. Select **Delimited**, **Comma**, and **First Row Contains Field Names**. Do not save the import steps.
 - i. Use the Simple Query Wizard and the data in **tblRecipes**, **tblRecipeIngredients**, and **tblIngredients** to create a query that displays the ingredients for each dish. The query results should list **RecipeName**, **Quantity**, **Ingredient**, and **Units**. This will be a **Detail** query. Run your query. Adjust the width of the query columns as necessary. Save your query as **qryRecipeIngredients_initialLastname**.
 - j. Create a report with the source **qryRecipeIngredients_initialLastname** using the Report Wizard. Select all fields, group by **RecipeName**, and then sort by **Ingredient**. Accept all other defaults. Name your report **rptRecipeIngredients_initialLastname** and then modify the report title to be your **Recipe Ingredients Report by initial Lastname**. Adjust the report columns as necessary.
 - k. Close the database. Submit the file as directed by your instructor.

Problem Solve 1

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Homework 1



Production &
Operations

Student data files needed:

-  a01ps1Hotel.accdb
-  a01ps1HotelGuest.accdb
-  a01ps1HotelRes.xlsx
-  a01ps1HotelRooms.csv

You will save your file as:

-  a01ps1Hotel_LastFirst.accdb

Hotel Reservations

The main portion of the resort is the hotel. The hotel wants to store information about hotel guests, reservations, and rooms. You will design tables, import data from Access and Excel, and create relationships. Then you will be able to create queries and reports from the data. Complete the following tasks:

- a. Start **Access**, and then open **a01ps1Hotel**. Click the **FILE** tab, and save the file as an Access database with the name **a01ps1Hotel_LastFirst** using your last and first name. If necessary, enable the content.
- b. Import a table from the Access database **a01ps1HotelGuest**, selecting the **tblGuests** table. Do not save the import steps.
- c. Open **tblGuests**, and then change the guest name in record **25** to your first and last name. Close the table.
- d. Create a new table in **Design** view. This table will store reservations.
 - Add the following fields, data types, and descriptions, in this order. Change field sizes as noted.

Field Name	Data Type	Description	Field Size/ Format
ReservationID	AutoNumber	A unique identifier for the reservation (primary key)	Long Integer
GuestID	Number	The guest ID from tblGuests (foreign key)	Long Integer
RoomNumber	Short Text	The room number from tblRooms (foreign key)	30
CheckInDate	Date/Time	The date the guest will check in	Short Date
NightsStay	Number	How many nights the guest will stay	Integer
NumberOfGuests	Number	The number of guests on this reservation	Integer

- Assign **ReservationID** as the primary key.
 - Save the new table as **tblReservations**.
- e. Import **a01ps1HotelRes** from Excel, appending it to **tblReservations**. The Excel column headers match the Access field names.
 - f. Select **tblReservations**, click the **CREATE** tab, and then in the Forms group, click **Form** to create a form to enter reservations. Save it as **frmReservations_initialLastname**, using your first initial and last name.
 - Enter the following data in the new (blank) record in frmReservations_initialLastname.

ReservationID	GuestID	RoomNumber	CheckInDate	NightsStay	NumberOfGuests
AutoNumber	25	105	4/20/2015	8	1

- g. Create a new table in **Design** view. This table will store information about the hotel rooms.
- Add the following fields, data types, and descriptions, in this order. Change field sizes as noted.

Field Name	Data Type	Description	Field Size
RoomNumber	Short Text	The resort's room number or name (primary key)	30
RoomType	Short Text	The type of room this is	20

- Assign **RoomNumber** as the primary key.
 - Save the new table as **tblRooms**.
- h. The Hotel Rooms data was stored in a comma-separated values file or csv file. This is a comma-delimited format that can be read by Excel. Access treats a csv file as a text file. Import **a01ps1HotelRooms** as text, appending it to **tblRooms**. Select **Delimited**, **Comma**, and **First Row Contains Field Names**. Do not save the import steps.
- i. Open the **Relationships** window, add **tblGuests**, **tblReservations**, and **tblRooms**. Create a one-to-many relationship between **GuestID** in **tblGuests** and **GuestID** in **tblReservations**. Enforce referential integrity. Do not cascade update or cascade delete.
- j. Create a one-to-many relationship between **RoomNumber** in **tblRooms** and **RoomNumber** in **tblReservations**. Enforce referential integrity. Do not cascade update or cascade delete. Create a relationships report accepting the default name.
- k. Use the Simple Query Wizard to create a query. The query results should list **GuestID**, **GuestFirstName**, **GuestMiddleInitial**, **GuestLastName**, **CheckInDate**, **NightsStay**, and **RoomType**. This query should show every field of every record.
- l. Save your query as **qryMyReservations_initialLastname**. Run the query.
- m. In Design view for **qryMyReservations_initialLastname**, select the guest with **GuestID = 25**. Sort by **CheckInDate**. Run the query.
- n. Use the Report Wizard to create a report showing **ReservationID**, **CheckInDate**, **NightsStay**, and **RoomType**. View by **tblRooms** and sort by **CheckInDate** and **ReservationID**. Name your report **rptReservations_initialLastname**. Change the title to **Reservations Report by initial Lastname**. Adjust the report columns as necessary.
- o. Close the database. Submit the file as directed by your instructor.

Problem Solve 2

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Human
Resources

Student data files needed:

- a01ps2HotelStaff.accdb
- a01ps2HotelEmp.xlsx
- a01ps2HotelAreas.accdb

You will save your file as:

- a01ps2HotelStaff_LastFirst.accdb

Hotel Reservations

The Hotel general manager needs a human resource database to store information on employees, the areas they work in, and the hours they are scheduled to work. The database will have three new tables: **tblHotelAreas**, **tblEmployee**, and **tblSchedule**.

Complete the following tasks:

- a. Start **Access**, and then open the student data file **a01ps2HotelStaff**. Click the **FILE** tab, and save the file as an Access Database in the location designated by your instructor with the name **a01ps2HotelStaff_LastFirst** using your first and last name. If necessary, enable the content.
- b. Create a new table in **Design** view. This table will store employees.
 - Add the following fields, in this order. Where necessary, you decide upon data types and field sizes.

Field Name	Data Type	Description	Field Size
EmployeeID	AutoNumber	A unique identifier for the employee (primary key)	
ArealID	Number	The area ID from tblHotelAreas (foreign key)	Long Integer
FirstName	Pick appropriate type	The employee's first name	30
LastName	Pick appropriate type	The employee's last name	30
StreetAddress	Pick appropriate type	Home street address	40
City	Pick appropriate type	City	30
State	Pick appropriate type	State abbreviation	Pick appropriate size
ZipCode	Pick appropriate type	Zip code (5 digit)	Pick appropriate size
Phone	Pick appropriate type	Home phone number	14
HireDate	Pick appropriate type	Date employee was hired	Short Date
JobTitle	Pick appropriate type	Employee job title	30

- Make sure you have assigned the most appropriate field to be the primary key.
 - Save the new table as **tblEmployee**.
 - Define an input mask for the phone number. Use a mask that will show phone numbers as (555) 555-5555 with a place holder of "-" and save with the symbols in the mask.
- c. Import **a01ps2HotelEmp** from Excel, using the **Employee** worksheet and appending it to **tblEmployee**. Change the name and street address of the last employee to your name and address.
 - d. Import the **tblHotelAreas** table from the **a01ps2HotelAreas** Access database and create a new table.
 - e. Import **a01ps2HotelEmp** from Excel, using the **Area** worksheet and appending it to **tblHotelAreas**.

- f. Create a new table in **Design** view. This table will store information about an employee's schedule.
- Add the following fields, data types, and descriptions, in this order.

Field Name	Data Type	Description	Field Size
ScheduleID	AutoNumber	A unique identifier for the schedule (primary key)	Long Integer
ScheduleDay	Date/Time	The day the schedule applies to	ShortDate
StartTime	Date/Time	Starting time for the shift	MediumTime
HoursScheduled	Number	Number of hours on shift	Integer
EmployeeID	Number	The person being scheduled	Long Integer

- Make sure you have assigned the most appropriate primary key.
 - Save the new table as **tblSchedule**.
- g. Import **a01ps2HotelEmployees** from Excel, using the **Schedule** worksheet, and appending it to **tblSchedule**.
- h. Open the **Relationships** window, add the tables **tblSchedule**, **tblEmployee**, and **tblHotelAreas**. Create a one-to-many relationship between **EmployeeID** in **tblEmployee** and **EmployeeID** in **tblSchedule**. Enforce referential integrity. Do not cascade update or cascade delete.
- i. Create a one-to-many relationship between **AreaID** in **tblHotelAreas** and **AreaID** in **tblEmployee**. Enforce referential integrity. Do not cascade update or cascade delete. Create a relationships report accepting the default name.
- j. Create a form for **tblEmployee**. Notice that Access automatically includes the related records from **tblSchedule** at the bottom of the form. Save the form as **frmEmployeeSchedule_initialLastname**.
- k. Using **frmEmployeeSchedule_initialLastname**, add a new schedule for yourself to work on **January 3, 2015**, starting at **8 am** and working for **8** hours.
- l. Use data in **tblHotelAreas**, **tblEmployee**, and **tblSchedule** to create a schedule query. The query results should list **AreaID**, **AreaName**, **FirstName**, **LastName**, **ScheduleDay**, **StartTime**, and **HoursScheduled**. Save your query as **qryCoffeeShopSchedule_initialLastname**.
- m. In Design view for **qryCoffeeShopSchedule_initialLastname**, select only the data from **AreaID 4**. Run the query.
- n. Create a report from **qryCoffeeShopSchedule_initialLastname**. Select these fields: **FirstName**, **LastName**, **ScheduleDay**, **StartTime**, and **HoursScheduled**. View by **tblSchedule**. Sort by **ScheduleDay**, **StartTime** and **LastName**, and then change to **Landscape** orientation. Name your report **rptCoffeeShopSchedule_initialLastname**. Modify the report title to be **Coffee Shop Schedule by initial Lastname**.
- o. Close the database. Submit the file as directed by your instructor.

Perform 1: Perform in Your Life

Student data file needed:

 Blank Access database

You will save your file as:

 a01pf1Club_LastFirst.accdb



Track Events for Your Organization

Pick an organization that you belong to. You want to track the members of the organization, events, and member attendance at the events. Because a member can attend many events and an event can be attended by many members, you will need a junction table. You will start by creating three tables, the relationships between the tables, and reports on attendance. Next, you will decide on one other table that makes sense for your organization, define that table, and relate it to one of the already existing tables.

- a. Start **Access**, and then click **Blank desktop database**. Browse to where you are storing your data files, and name your database **a01pf1Club_LastFirst**.
- b. Design a table to store members. Choose appropriate fields that would describe the members of your organization.
 - Assign a field to be primary key, and then make it **AutoNumber**. For all fields, enter appropriate data types, descriptions, field sizes, and masks. Save your table as **tblMember**.
- c. Enter yourself and a friend into the table. Enter as many other members as you wish.
- d. Design a table to store events. Use the following fields: **EventID**, **EventName**, **EventDate**, and **PlaceName**. You may add other fields as appropriate.
 - Assign EventID to be primary key, and then make it an AutoNumber. Enter appropriate data types, descriptions, and field sizes. Save your table as **tblEvent**.
- e. Enter two events that you attended into the table. Enter as many other events as you wish.
- f. Design a junction table to relate members and attendance at events. Use the following fields: EventID and the primary key of your member table.
 - EventID is a foreign key and should be Number, Long Integer. Enter an appropriate description.
 - Use the primary key of your member table as a foreign key in this table. Enter an appropriate type and description.
 - Create a composite primary key using both EventID and the primary key from your member table.
 - Save your table as **tblAttendance**.
- g. Create relationships as appropriate for the tblMember, tblAttendance, and tblEvent tables.
- h. Enter the following data into tblAttendance.

EventID	MemberID
Use the EventID for the first event	Your primary key in the member table
Use the EventID for the first event	Your friend's primary key in the member table
Use the EventID for the second event	Your primary key in the member table

- i. Create a report on Events using **EventName**, **EventDate**, and **PlaceName**. Sort by **EventDate**. Name your report **rptEventReport_initialLastname** and then modify the report title to be **Event Report by initial Lastname**.
- j. Create a query on Events including **EventName**, **EventDate**, and **PlaceName**. Save the query as **qryEventName_initialLastname** and then modify the query design to select the **EventName** for the first event. Run the query.
- k. Create a report on event attendance. Use **EventName** and **EventDate** from **tblEvent** and the member's name. Group the report by **Event**. Sort the report by **LastName** and **FirstName**. Name your report **rptEventAttendance_initialLastname** and then modify the report title to be **Event Attendance by initial Lastname**.
- l. Determine one additional table that would make sense for your organization to keep data in.
- m. Design this table and the appropriate fields. Make sure to assign a primary key.
- n. Enter data into the new table. Create relationships between this new table and your existing tables as appropriate. Ask yourself the two questions to determine the relationships. Create a relationships report accepting the default name.
- o. Create a report showing data from your new table and data from another table that it is related to.
- p. Submit the file as directed by your instructor.

Perform 2: Perform in Your Career

Student data file needed:

 Blank Access database

You will save your file as:

 a01pf2PetStore_LastFirst.accdb



Sales &
Marketing

Pet Store

A pet store owner wants to create a database for the store. The database needs to include information about animals and the breeds of the animals. An animal is of one breed. The pet store can have many animals of each breed. The pet owner will want to keep records of the purchases and the customers that bought each animal. You will need to decide what tables you need to record purchases and customers. You will also need to decide what relationships you want to create.

- a. Start **Access**, and then click **Blank desktop database**. Browse to where you are storing your data files, and name your database **a01pf2PetStore_LastFirst**.
- b. Design a table to store breeds. Use the following fields: **BreedID**, **AnimalType**, **BreedName**, **MaximumSize** (in pounds), **LengthOfLife** (in years).
 - Assign **BreedID** to be primary key with the AutoNumber data type.
 - For all fields, enter appropriate data types, descriptions, and field sizes. Save your table as **tblBreed**.

- c. Enter the following data into the table, in this order.

BreedID	AnimalType	BreedName	MaximumSize	LengthOfLife
1	Dog	Akita	110	12
2	Dog	Papillon	9	15
3	Cat	Devon	7	18
4	Cat	Birman	10	19
5	Chinchilla	Silver Mosaic	1	15

- d. After entering those five breeds, pick another breed and add it to the table.
- e. Design a table to store animals. Use the following fields: **AnimalID**, **DateOfBirth**, **Price**, **Weight**, **Color**, **Sex**, and **BreedID**.
- Assign **AnimalID** to be primary key with the AutoNumber data type.
 - BreedID is the foreign key to tblBreed.
 - For all fields, enter appropriate data types, descriptions, and field sizes.
 - Save your table as **tblAnimal**.
- f. Enter the following data into tblAnimal, in this order.

AnimalID	DateOfBirth	Price	Weight	Color	Sex	BreedID
1	6/17/2014	\$125.00	28	White	M	1
2	6/17/2014	\$125.00	30	White	M	1
3	7/25/2014	\$610.00	4	Tan	F	2
4	8/7/2014	\$610.00	3	White	F	2
5	8/7/2014	\$550.00	3	White	M	2
6	5/10/2014	\$225.00	2	Blue	F	3
7	5/10/2014	\$225.00	2	Gray	M	3
8	6/26/2014	\$150.00	2	White	F	4
9	7/17/2014	\$125.00	2	Gray	M	4
10	8/18/2014	\$ 30.00	1	Silver	F	5

- g. After adding the 10 animals, add another animal which is of the breed you entered for the prior table.
- h. Open the Relationships window. Create a one-to-many relationship between BreedID in tblBreed and BreedID in tblAnimal. Enforce referential integrity. Do not cascade update or cascade delete.
- i. Determine the tables that the store owner would need to keep store customers and their purchases.
- Design these tables and the appropriate fields. Make sure to assign primary keys.
 - Create relationships between these new tables and your existing tables as appropriate. Ask yourself the two questions to determine the relationships. Add foreign keys as appropriate. Create a relationships report accepting the default name.
- j. Enter the appropriate customer and purchase data to capture the following events.
- You bought the chinchilla with AnimalID = 10 yesterday.
 - A friend bought the Birman cat with AnimalID = 9 and the Akita with Animal ID = 1 today.

- k. Create a report showing animals by breed. Show **AnimalType**, **BreedName**, **AnimalID**, **DateOfBirth**, and **Price**. Select correct groupings and sort orders.
- l. Create a query to find out who purchased AnimalID = 10. Show **Customer name** (FirstName and LastName), **AnimalID**, **AnimalType**, and **BreedName**.
- m. Create a report showing the animals purchased on all dates. Group and sort appropriately.
- n. Submit the file as directed by your instructor.

Perform 3: Perform in Your Team

Student data files needed:

-  Blank Access database
-  Blank Word document

You will save your files as:

-  a01pf3Music_TeamName.accdb
-  a01pf3MusicPlan_TeamName.docx



Production &
Operations

Independent Music Label

The owner of an independent music label needs to keep track of the groups, musicians, and their music. You have been asked to create a database for the label.

The label owner would like to be able to get a list of groups with all musicians, get a list of groups with albums, select an album and see all songs in the album, and select a group and see their albums with all songs in the album. You will need to design tables, fields, relationships, queries, and reports for the label.

Because databases can only be opened and edited by one person at a time, it is a good idea to plan ahead by designing your tables in advance. You will use a Word document to plan your database and to plan which team member will do what. You will use SkyDrive to store your Word document and Access database.

- a. Select one team member to set up the Word document and Access database by completing Steps b–e.
- b. Open your browser and navigate to <https://www.skydrive.live.com>, create a new folder, and name it **a01pf3MusicFolder_TeamName**. Replace TeamName with the name assigned to your team by your instructor.
- c. Start **Access**, and then click **Blank desktop database**. Create a blank database, and then name it **a01pf3Music_TeamName**. Replace TeamName with the name assigned to your team by your instructor. Click the **Create** button to create the database.
- d. Upload the **a01pf3Music_TeamName** database to the **a01pf3MusicFolder_TeamName** folder, and then share the folder with the other members of your team. Verify that the other team members have permission to edit the contents of the shared folder and that they are required to log in to SkyDrive to access it.
- e. Create a new Word document in the assignment folder in SkyDrive, and then name it **a01pf3MusicPlan_TeamName**. Replace TeamName with the name assigned to your team by your instructor.
- f. In the Word document, each team member must list his or her first and last name as well as a summary of their planned contributions. As work is completed on the database, this document should be updated with the specifics of each team member's contributions.
- g. Use the Word document to list the fields you need in each table, the primary keys for each table, and the foreign keys.

- h. In Access, your team members will need to complete the following steps.
- Design your tables.
 - Enter data for three music groups into your tables.

Groups	Group Members	Albums	Songs
Clean Green, an Enviro-Punk band	Jon Smith (vocalist and guitar) Lee Smith percussion and keyboard)	Clean Green	Esperando Verde Precious Drops Recycle Mania Don't Tread on Me
		Be Kind to Animals	It's Our Planet Too Animal Rag Where Will We Live?
Spanish Moss, a Spanish Jazz band	Hector Caurendo (guitar) Pasquale Rodriguez (percussion) Perry Trent (vocalist) Meredith Selmer (bass)	Latin Latitude	Attitude Latitude Flying South Latin Guitarra Cancion Cancion
Your band	Your team members	You decide	You decide

- Create your relationships. Create a relationships report.
 - Create a report showing all groups with all musicians.
 - Create a report showing all groups, the group type, and their albums.
 - Create a query to select an album from your band and see all songs in the album.
 - Create a query to select your band and see all your albums with all songs in the albums.
- i. Once the assignment is complete, share the **a01pf3MusicFolder_TeamName** folder with your instructor. Make sure that your instructor has permission to edit the contents of the folder.

Perform 4: How Others Perform

Student data file needed:

 a01pf4Textbook.accdb

You will save your files as:

 a01pf4Textbook_LastFirst.accdb
 a01pf4Textbook_LastFirst.docx

College Bookstore



Production &
Operations

A colleague has created a database for your college bookstore. He is having problems creating the relationships in the database and has come to you for your help. What problems do you see in his database design? He has three tables in his database: one for sections of courses, one for instructors, and one for textbooks, as shown in Figures 1, 2, and 3.

- Start **Access**, and then open the student data file **a01pf4Textbook**. Save the file as **a01pf4Textbook_LastFirst**. You do not need to make changes to this database, but you will want to look at the database in more detail than is shown in the figures.
- Create a Word document named **a01pf4Textbook_LastFirst** where you will answer the remaining questions.
- Are there any errors in the way that fields are defined or named in the tables? In your **a01pf4TextbookAnswers_LastFirst** Word document, list your errors by table.
- Are there any errors in the way that tables are named or defined? In your **a01pf4TextbookAnswers_LastFirst** Word document, list your errors by table.

- e. He wants to define these relationships. How would you want to define the relationships?
- An instructor can teach many sections; a section is taught by just one instructor.
 - A section can have many textbooks; a textbook can be used in many sections.
- f. In your a01pf4TextbookAnswers_LastFirst Word document, describe how you would define the relationships.

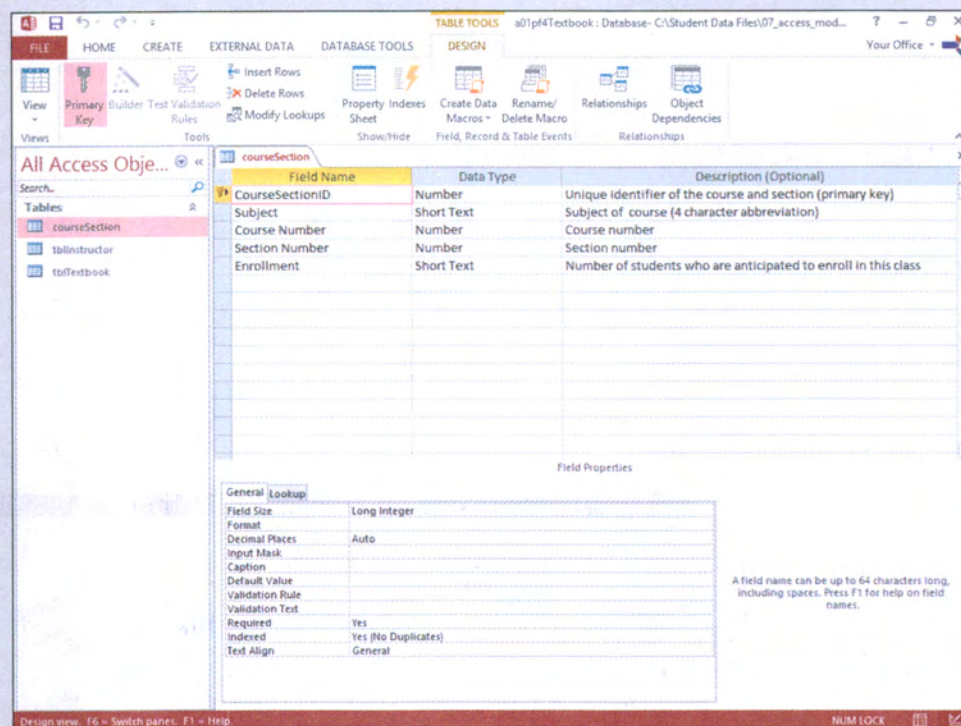


Figure 1 Table design for courseSection

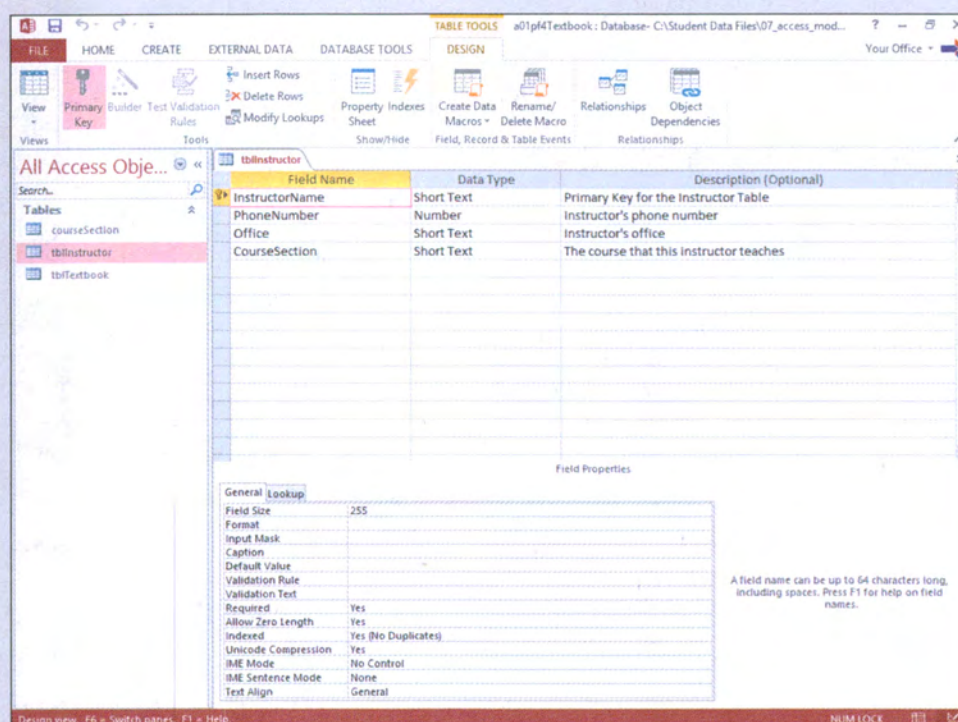


Figure 2 Table design for tblInstructor

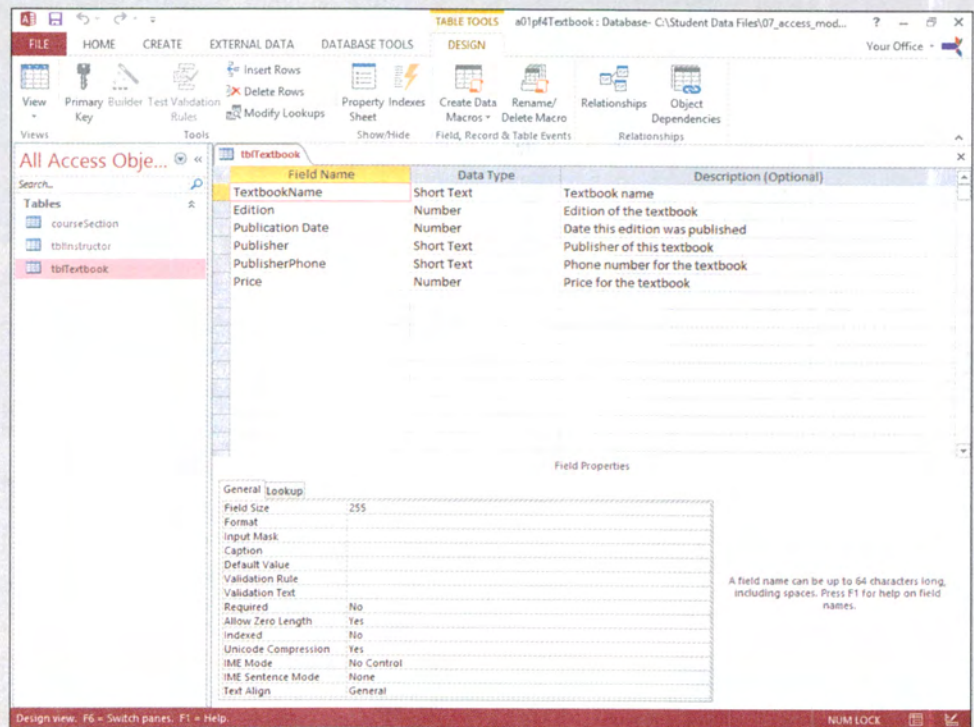


Figure 3 Table design for tblTextbook

- g.** Submit the files as directed by your instructor.

Microsoft Office Access 2013

Module 2

Accessing, Maintaining, and Presenting Information

WORKSHOP 3 | QUERIES AND DATA ACCESS

OBJECTIVES

1. Find and replace records in the datasheet p. 690
2. Modify datasheet appearance p. 695
3. Run query wizards p. 697
4. Create queries in Design view p. 699
5. Sort query results p. 706
6. Define selection criteria for queries p. 708
7. Create aggregate functions p. 723
8. Create calculated fields p. 729

Prepare Case

Turquoise Oasis Spa Data Management

The Turquoise Oasis Spa has been popular with resort clients. The owners have spent several months putting spa data into an Access database so they can better manage the data. You have been asked to help show the staff how best to use the database to find information about products, services, and customers. For training purposes, not all the spa records have been added yet. Once the staff is trained, the remaining records will be entered into the database.



Production & Operations



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REAL WORLD SUCCESS



"My company sells luxury appliances. Sometimes, we run out of products and don't have time to wait for the supplier. In the past, I'd have to get on the phone and call all our other locations in the region to see if they had extra that they could spare. Now, I run a query and in less than a minute I know who has it and when they need it. The queries are so popular that I've shared them with all of the managers."

- David, alumnus and procurement specialist

Student data file needed for this workshop:

 a02ws03Spa.accdb

You will save your file as:

 a02ws03Spa_LastFirst.accdb

Working with Datasheets

Datasheets are used to view all records in a table at one time. Each record is viewed as a row in the table. Records can be entered, edited, and deleted directly in a datasheet. When a table becomes so large that all the records and fields are no longer visible in the datasheet window without scrolling, the Find command can be used to quickly find specific values in a record. In this section, you will find records in a datasheet as well as modify the appearance of a datasheet.

Find and Replace Records in the Datasheet

The Navigation bar allows you to move to the top and bottom of a table or scroll to a specific record; however, this can be inefficient if your table is large. To manage larger tables, Access provides ways for you to quickly locate information within the datasheet. Once that information is found, it can then be easily replaced with another value using the **Replace** command.

If you do not know the exact value you are looking for because you do not know how it is spelled or how someone entered it, you can use a wildcard character. A **wildcard character** is used as a placeholder for an unknown part of a value or to match a certain pattern in a value. For example, if you know the value you are looking for contains the word "market" you can use a wildcard character at the beginning and end such as `*market*`.

Opening the Starting File

The owners of the spa have spent several months entering spa data into an Access database so they can better manage the data. You have been asked to help show the staff how best to use the database to find information about products, services, and customers. For training purposes, not all the spa records have been added yet.

A03.00



To Open the a02ws03Spa Database

- Start **Access**, and then open the student data file **a02ws03Spa**.
- On the **FILE** tab, save the file as an **Access Database** in the location designated by your instructor with the name **a02ws03Spa_LastFirst** using your first and last name. If necessary, enable the content.

Finding Records in a Table

In Datasheet view, you can use the **Find** command to quickly locate specific records using all or part of a field value. For this project, a staff member found a book left by one of the guests. A first name was printed on the inside of the book cover. The staff member remembers helping a gentleman named Guy who said he was from North Carolina, but is not certain of his last name. You will show the staff how to use the Find command to quickly navigate through the table to search for this guest.

A03.01



To Find Records in the Datasheet

- In the Navigation Pane, double-click **tblCustomer** to open the table.
- Add a record at the end of the table with your first name, last name, address, city, state, phone and e-mail address. Press **Tab** until the record selector is on the next row and your record has been added to the table.

SIDE NOTE**Find Shortcut**

Ctrl+F is the keyboard shortcut for Find.

SIDE NOTE**Spelling Counts**

Spelling counts in Access, so if you enter a search item and Access cannot find it, your search value may be spelled wrong.

- c. On the Navigation bar, click **First Record**  to go to the first record in the table. On the HOME tab, in the Find group, click **Find** to open the Find and Replace dialog box.
- d. Replace the text in the Find What box with **Guy**. Click the **Look In** arrow, and then select **Current document**.

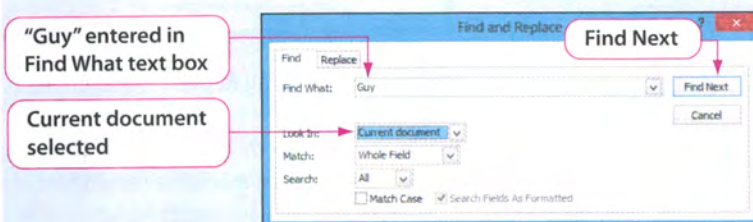


Figure 1 Find and Replace dialog box to find all records for "Guy"

- e. Click **Find Next**. Access highlights the first record found for Guy Bowers from Derby, North Carolina (NC). This is a possibility, but there might be a second Guy.
- f. Click **Find Next** again to check for more records with Guy. Guy Blake from Suffolk, Wisconsin, is found.
- g. Click **Find Next** again to check for more records with Guy. When Access is done searching and cannot find any more matches, you will see the message "Microsoft Access finished searching the records. The search item was not found."
- h. Click **OK**, and then click **Cancel** to close the Find and Replace dialog box.

Troubleshooting

If you did not get the results shown above, go back and carefully check the settings in the Find and Replace dialog box. Make sure Match Case is not checked. When Match Case is checked, the search will be case sensitive. Also check to make sure the Look In box shows Current document. If the Look In box shows Current field, Access will only look in the field selected.

Finding and Replacing Data in a Datasheet

Not only can you find records using the Find command, but you can also replace records once you find them with the Replace command. In a large table, it is helpful to locate a record using the Find command, and then replace the data using the Replace command.

For this project, the receptionist receives a notice from Erica Rocha about her upcoming marriage. The receptionist wants to go through the database and find any records related to Erica and change her last name to her married name, Muer. You will show the receptionist how to find Erica in the database and replace her last name of Rocha with Muer.

A03.02**To Find and Replace Records**

- a. On the HOME tab, in the Find group, click **Find** to open the Find and Replace dialog box.
- b. In the Find and Replace dialog box, click the **Replace** tab. In the Find What box, type **Rocha** and then in the Replace With box, type **Muer**.
- c. Verify that Look in: Current document is selected. Leave all other options as they are.

SIDE NOTE

Data Is Automatically Saved

Access automatically saves data changes when you close the table without prompting you to save it.

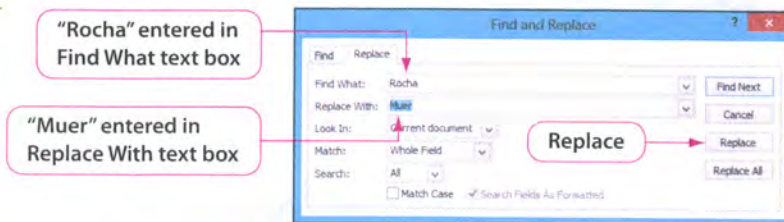


Figure 2 Find and Replace box options

- d. Click **Find Next**. Notice the first record found has the last name Rocha, but the first name is Emily. Click **Find Next** again. Notice this is the record for Erica Rocha. Click **Replace**. Click **OK** when you get the message that Microsoft Access has finished searching the records. The Last Name should now be Muer instead of Rocha. Click **Cancel** to close the Find and Replace dialog box.
- e. Close  the table.

Using a Wildcard Character

A wildcard character, as shown in Table 1, is used as a placeholder for an unknown part of a value or to match a certain pattern in a value. A wildcard character can replace a single character or multiple characters and both text and numbers.

Wildcard Character	Example
*	To match any number of characters; to search for a word that starts with "ar" you would enter ar* .
#	To match any single numeric character; to search for a three-digit number that starts with "75" you would enter 75# .
?	To match any single character; to search for a three-letter word that starts with "t" and ends with "p" you would enter t?p .
[]	To match any single character within the brackets; to search for a word that starts with "e," contains any of the letters "a" or "r," and ends with "r," you would enter e[ar]r and get "ear" or "err" as a result.
!	To match any single character NOT within the brackets; to search for a word that starts with "e," contains any letter other than "a" or "r," and ends with "r," you would enter e[!ar]r to get anything except "err" or "ear".
-	To match any range of characters in ascending order—"a" to "z"; to search for a word beginning with "a" and ending in "e" with any letter between "b" and "t" in between, you would enter a[b-t]e .

Table 1 Wildcard characters

For this project, the staff is looking for products with the word "butter" in the name so they can put together a weekly promotion for all these products. You will show them how to use a wildcard character to find the products.

A03.03



To Use a Wildcard Character to Find a Record

- Double-click **tblProduct** to open the table.
- In the first record, click the **ProductDescription** field. In the Find group, click **Find** to open the Find and Replace dialog box. Replace the text in the Find What box with ***butter***. Click the **Look In** arrow, and then click **Current field**.

Wildcard character
at beginning and
end of text

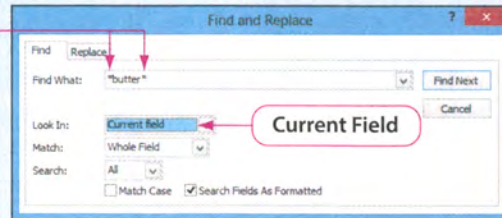


Figure 3 Find records with "butter" in the ProductDescription field

- Click **Find Next**. The first record found is for ProductID P018 Cocoa Body Butter. Click **Find Next** again to find the record for ProductID P021 Lemon Body Butter.
- Click **Find Next** again until Access has finished searching the records. When Access is done searching and cannot find any more matches, you will see the message "Microsoft Access finished searching the records. The search item was not found." Click **OK**, and then click **Cancel** to close the Find and Replace dialog box.

Troubleshooting

If Access highlights a record in the table and you cannot see it, drag the Find and Replace dialog box to another area of the screen.

- Click **Close** the table.

Applying a Filter to a Datasheet

A **filter** is a condition you apply temporarily to a table or query. All records that do not match the filter criteria are hidden until the filter is removed or the table is closed and reopened. A filter is a simple technique to quickly reduce a large amount of data to a much smaller subset of data. You can choose to save a table with the filter applied so when you open the table later the filter is still available.

You can filter a datasheet by selecting a value in a record and telling Access to filter records that contain some variation of the record you choose, or you can create a custom filter to select all or part of a field value.

Filtering by Selection

When you **filter by selection**, you select a value in a record and Access filters the records that contain only the values that match what you have selected. For this exercise, a customer came into the spa and stated that she was from Minnesota and had previously been a spa customer but was just browsing today. She left her glasses on the counter, and the staff wants to return them to her. You will help the staff members find all customers from Minnesota to see if they recognize the customer's name.

A03.04



To Select Specific Records Using a Selection Filter

SIDE NOTE

How to Clear Filters

To delete filters from the table, click **Advanced** in the Sort & Filter group, and select **Clear All Filters**.

- Double-click **tblCustomer** to open the table, locate the first record with an address in the state of Minnesota (MN), and then click the **State** field. In the Sort & Filter group, click **Selection**, and then click the **Equals "MN"** option.

Access displays three records where all states are MN for Minnesota. The **Toggle Filter** in the Sort & Filter group allows you to go back and forth between viewing the filtered records and all the records in the table. To remove the filter, click **Toggle Filter** in the Sort & Filter group. To show the filter again, click **Toggle Filter** in the Sort & Filter group.

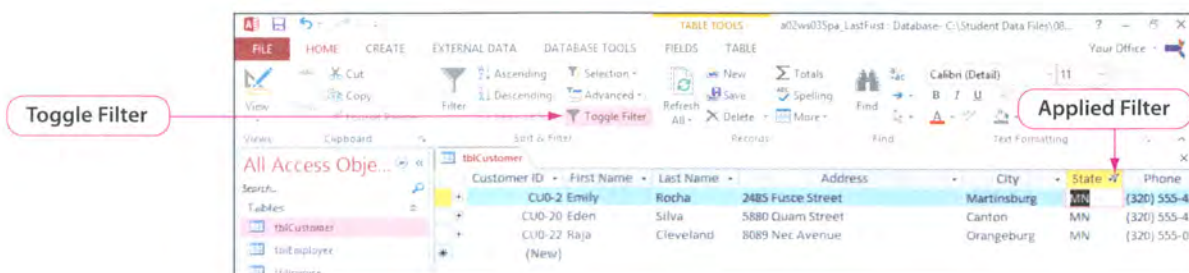


Figure 4 Filtered table for all records containing a state of MN

- The filter is temporary unless you choose to save it with the table or query. If you do save it, the next time you open the table or query, you only have to click **Toggle Filter** to see the records from the state of Minnesota. Click **Save** on the Quick Access Toolbar. This saves the table with the filter. Close the table.
- Double-click **tblCustomer** to open the table. On the **HOME** tab, in the Sort & Filter group, click **Toggle Filter** to see the filtered records. Close the table.



CONSIDER THIS

Finding Records

You have now found records using Find and Replace and using a selection filter. What are the advantages of each method? When would you use each?

Using a Text Filter

Text filters allow you to create a custom filter to match all or part of the text in a field that you specify. For this exercise, the staff wants to create a mailing of sample products but cannot send the products to customers with a post office box. You will help the staff find all customers who have "P.O. Box" as part of their address.

A03.05



To Select Specific Records Using a Text Filter

- Double-click **tblCustomer** to open the table. Select the entire **Address** column by clicking the column name. In the column heading, click the **filter** arrow in the column heading, point to **Text Filters**, and then click **Begins With**.

- b. In the Custom Filter dialog box, type **P** and then click **OK**.

Access retrieves the nine records where the addresses contain a P.O. box number. Notice that Toggle Filter in the Sort & Filter group is selected and the Filtered indicator in the Navigation bar is highlighted. You can toggle between the filtered table and the whole table by clicking on either Toggle Filter or the Filtered indicator. The filter indicator in the column heading indicates whether a filter is currently applied.

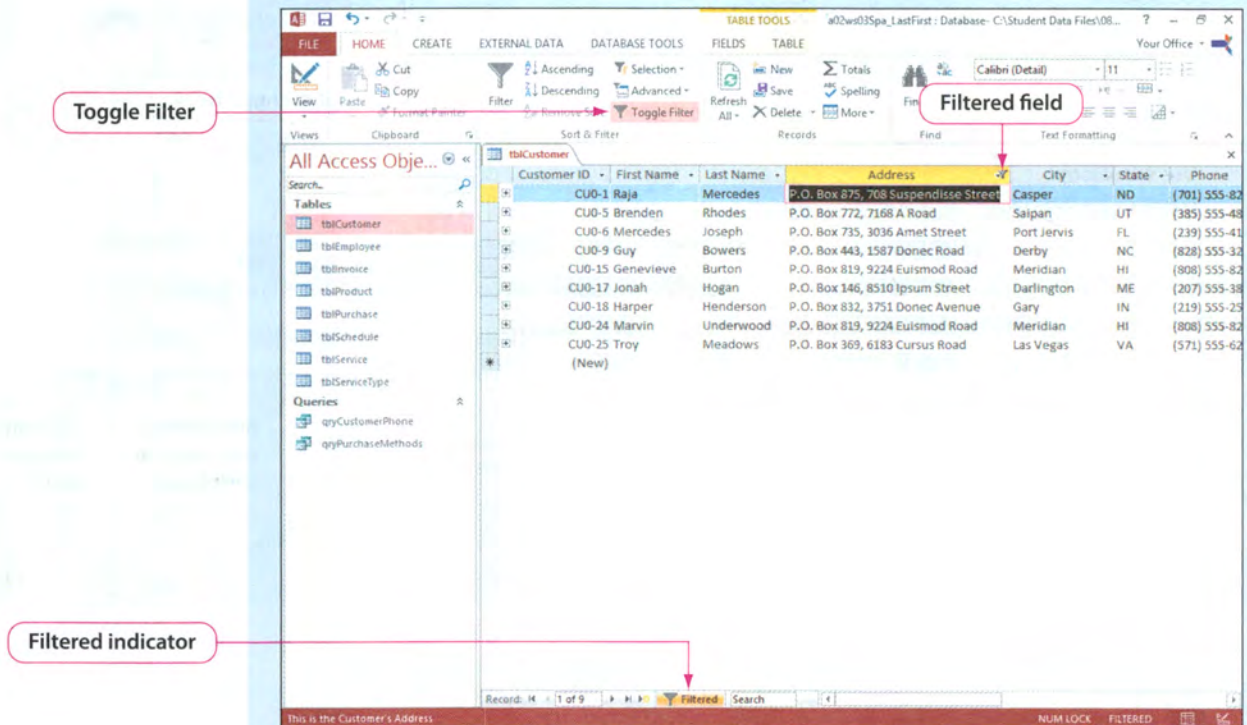


Figure 5 Results of the filter

- c. Click **Save** to save the table with the new filter applied. **Close** the table.

Modify Datasheet Appearance

You can change the appearance of your datasheet by changing the font type, font size, column widths, and background colors to make it more readable. **AutoFit** is a feature that can change the column width of the data to match the widest data entered in that field. That allows you to see all the data in a particular field.

Changing the Look of a Datasheet

For this exercise, the manager is upset because the font is too small and she cannot see all the field headings in the invoice table. You will show her how to make the text larger and the columns wider.

A03.06



To Change Font Size, Column Width, and Alternating Row Colors

- a. Double-click **tblInvoice** to open the table.
- b. In the Text Formatting group, click the **Font Size** arrow **11**, and then click **14**.

SIDE NOTE

Alternate Method for Changing Column Width

You can also drag a column border to make the column wider.

- c. Point to the **right border** of the first field name and double-click. The AutoFit feature resizes the column to best fit the data. Repeat this action for all the columns.
- d. In the Text Formatting group, click the **Alternate Row Color** arrow , and then under Theme Colors select **Olive Green, Accent 3, Lighter 40%**. This is the seventh column and the fourth row under Theme Colors. The rows will still be alternating colors, but they will be changed to olive green.
- e. **Close**  the table, and then when prompted to save the changes, click **Yes**.

Use AutoFit on columns for best fit

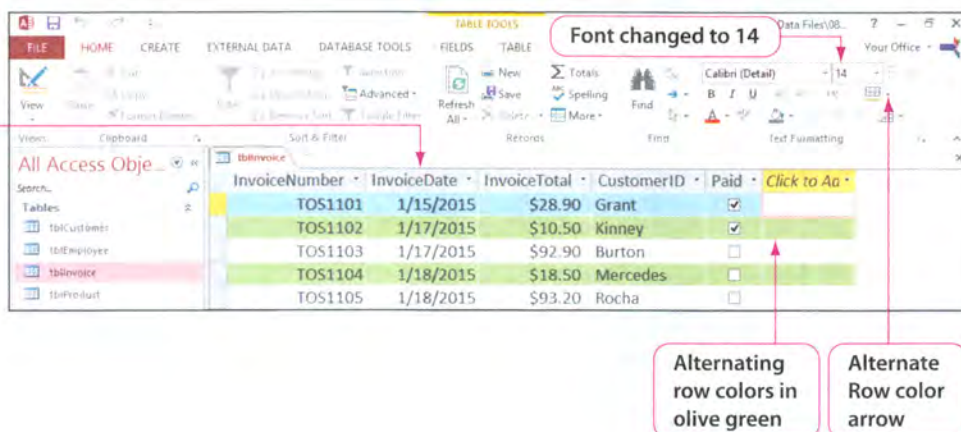


Figure 6 Modified table

Querying the Database

While the Find and Filter features can quickly help you find data, a query can be created for data that you may need to find again in the future. If you recall, the Simple Query Wizard is used to display fields from one or more tables or queries with the option to choose a detailed or summary query if working with more than one table. The Simple Query Wizard does not provide the opportunity to select data criteria.

In addition to the Simple Query Wizard, there are three additional query wizards available to make quick, step-by-step queries.

1. **Crosstab:** Used when you want to describe one field in terms of two or more fields in the table. Example: summarizing information or calculating statistics on the fields in the table.
2. **Find Duplicates:** Used when you want to find records with the same specific value. Example: duplicate e-mail addresses in a customer database.
3. **Find Unmatched:** Used when you want to find the rows in one table that do not have a match in the other table. Example: identifying customers who currently have no open orders.

Queries can also be created in Query Design view, which not only allows you to choose the tables and fields to include in the query, but also allows you to select criteria for the field values, create calculated fields, and select sorting options.

In this section, you will create and define selection criteria for queries and create aggregate functions and calculated fields as well as sort query results.

Run Query Wizards

Two other query wizards, the Find Duplicates Query Wizard and the Find Unmatched Query Wizard, allow you to find duplicate records or identify orphans by selecting criteria as part of the wizard steps. An **orphan** is a foreign key in one table that does not have a matching value in the primary key field of a related table.

Creating a Find Duplicates Query

The **Find Duplicates Query Wizard** finds duplicate records in a table or a query. You select the fields that you think may include duplicate information, and the wizard creates the query to find records matching your criteria.

For this exercise, the spa receptionist sends out mailings and reminders to spa customers throughout the year. She wants to be able to prevent multiple mailings to the same address to help reduce costs. You will show her how she can use a Find Duplicates query to check for duplicate addresses.

A03.07



To Find Duplicate Customer Information

- Click the **CREATE** tab, and then in the Queries group, click **Query Wizard**. Access displays the New Query dialog box and lists the different queries you can select.
- Select **Find Duplicates Query Wizard**, and then click **OK**.
- Select **Table: tblCustomer** as the table to search for duplicate field values, and then click **Next**.

Troubleshooting

If you get a Security Notice, click Open.

- Under Available fields, click **CustAddress**, and then click the **One Field** button . Access moves the CustAddress field to the Duplicate-value fields list. This is the field you think may have duplicate data.

CustAddress moved to Duplicate-value fields list

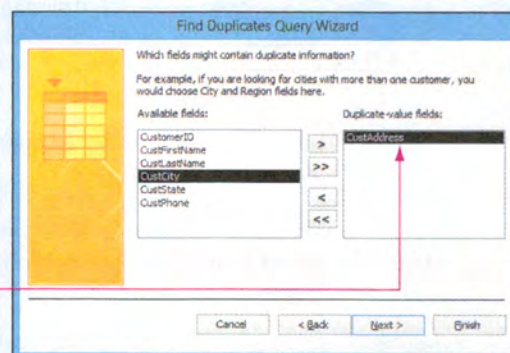


Figure 7 Select the field that may have duplicate data

- Click **Next**. Click the **All Fields** button to move all available fields to the Additional query fields list to display all the fields in the query results. Click **Next**.
- Under "What do you want to name your query?", type **qryDuplicateCustomers_initialLastname**, using your first initial and last name, and then click **Finish**. The result of the query should have two records with the same address.

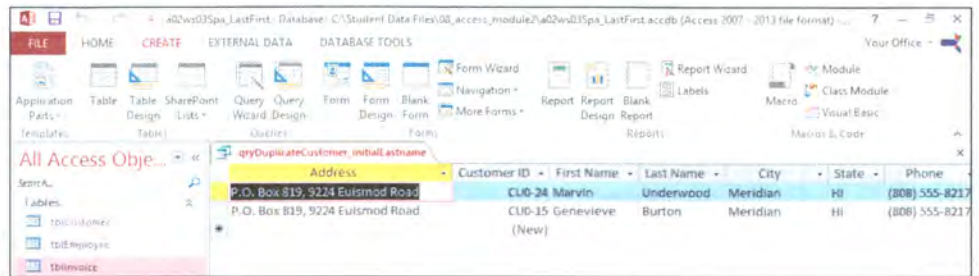


Figure 8 Results from the Find Duplicates query

g. Close  the query.

Creating a Find Unmatched Query

The Find Unmatched Query Wizard is designed to find records in a table or query that have no related records in a second table or query. This can be very helpful if you want to contact inactive customers or mail a notice to past clients who are still listed in the database. The wizard uses the primary key from the first table and matches it with the foreign key in the second table in order to determine if there are unmatched records. If a one-to-many relationship exists between the two tables, then the wizard will join the two correct fields automatically.

The wizard will try to match the primary key field and the foreign key field if there is a one-to-many relationship between the two tables. If there is not a one-to-many relationship, you can select the fields to be matched manually.

For this project, spa management would like to identify customers who have used the spa's services in the past but do not have a current appointment. This means a record for the customer would be listed in the customer table but not in the schedule table as shown in Figure 9.

Customer Table			Schedule Table		
First Name	Last Name	Address	First Name	Last Name	Appointment
Suzie	James	124 Marlow Dr	Suzie	James	3/6/15
Allison	Williams	617 Burton Ln	Matt	Grofton	4/12/15
Matt	Grofton	1258 8 th St			

Figure 9 Tables in a Find Unmatched query

Notice Allison Williams is a past customer so she is listed in the customer table, but she does not have an appointment scheduled in the schedule table. Her record would be found in a Find Unmatched query comparing the customer and schedule tables.

A03.08



To Find Unmatched Records

- Click the **CREATE** tab, and then in the Queries group, click **Query Wizard**.
- Select **Find Unmatched Query Wizard**, and then click **OK**.
- Select **Table: tblCustomer**, and then click **Next**. This is the table you think has past customers with no upcoming appointments.

SIDE NOTE**Manually Select Fields to Match**

If your tables are not in a one-to-many relationship, select the fields manually and use the button to move them to the Matching fields box.

- d. Select **Table: tblSchedule**, and then click **Next**. This is the table that has customers with upcoming appointments you want to compare to the main tblCustomer table.
- e. Under Fields in 'tblCustomer', verify **CustomerID** is selected, and then under Fields in 'tblSchedule', verify **Customer** is selected. This is the common field that the wizard will use to compare the tables.

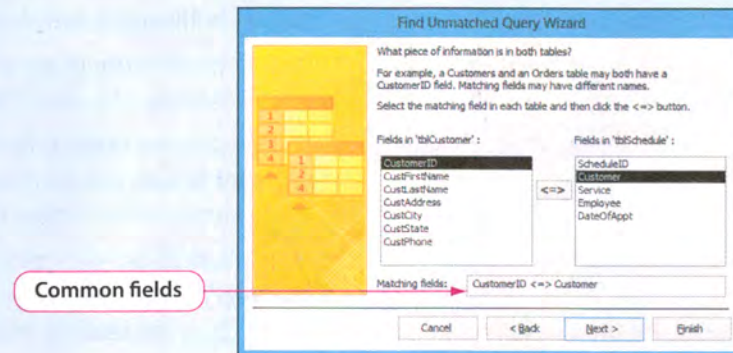


Figure 10 Compare the two tables using their common field

- f. Click **Next**, click the **All Fields** button **>>** to add all the fields to the Selected fields list, and then click **Next**.
- g. Under "What would you like to name your query?", type **qryCustomersWithout Appointments_initialLastname**, using your first initial and last name, and then click **Finish**. You should see the names and e-mails of three customers who do not currently have appointments at the spa including yourself. **Close** **X** the query.

Create Queries in Design View

The query wizards work by prompting you to answer a series of questions about the tables and fields to display and then creating the query based upon your responses. Alternatively, you can use Design view to manually create queries. The query window in Design view allows you to specify the data you want to see by building a **query by example**. A query by example provides a sample of the data you want to see in the results. Access takes that sample of data and finds records in the tables you specify that match the example. In the query window, you can include specific fields, define criteria, sort records, and perform calculations. When you use the query window, you have more control and more options available to manage the details of the query design than with the Simple Query Wizard.

When you open Design view, by default, the Show Table dialog box opens with a list of available tables and queries to add. You can either select a table name and click Add, or you can double-click the table name. Either way the table will be added to the query window. If the Show Table dialog box is closed, you can drag a table or query from the Navigation Pane to the query window to add it to the query.

The next step in building your query is to add the fields you want to include from the various tables selected to the query design grid. There are a number of ways to add fields to the query design grid.

QUICK REFERENCE**Methods to Add Fields to a Query Design Grid**

Action	Description
Drag	Once you click the field name, drag it to any empty column in the query design grid.
Double-click field name	Double-click the field name to add it to the first empty column in the query design grid.
Select from list	Click in the first row of any empty column, click the selection arrow, and select the field name from the list.
Double-click the title bar	Double-click the title bar for the table with the fields you want to add, and all the fields will be selected. Drag the fields to the first empty column.
Click, Shift, Click	Click a field name, press and hold down the [Shift] key, and then click another name to select a range of field names. Drag the selected fields to the query design grid.

If you add a field to the wrong column in the query design grid, you can delete the column and add it again, or you can drag it to another position in the grid.

All fields that have values you want included in a query—either for the criteria or to show in the results—must be added to the query design grid. For example, you may want to find all customers from New Mexico, but not necessarily show the state field in the query results. You can use the Show check box to indicate which fields to show in the results and which fields not to show.

REAL WORLD ADVICE**Increasing Privacy Concerns**

There are many instances where the person running the query does not have the right to see confidential information in the database. An example of this is Social Security numbers. Although companies are doing away with this practice, many existing databases still use Social Security numbers as a unique identifier. You can include a Social Security number in query criteria, but uncheck the Show box so the actual value does not show in the query results.

Creating a Single-Table Query

A single-table query is a query that is based on only one table in your database.

For this exercise, the manager of the spa needs your help to print out a price list for all the products. She wants to see the product description, size, and price for each product, and she wants to see all the records. You will show her how to add only the fields she wants to the query.

A03.09



To Create a Single-Table Query

- a. Click the **CREATE** tab, and then in the Queries group, click **Query Design** to open the query window with the Show Table dialog box.
- b. In the Show Table dialog box, select **tblProduct**, and then click **Add**. Click **Close** to close the Show Table dialog box.

Troubleshooting

If you cannot see the query design grid at the bottom of the query design window, use the pointer  to drag the top border of the grid up.

SIDE NOTE

Seeing All Fields in a Table

Alternatively, you can scroll down to see all the fields.

- c. Use your pointer to drag the lower border of **tblProduct** down to see all the fields.
- d. Double-click **ProductDescription** to add it to the first column of the query design grid. Repeat for **Price** and **Size**.

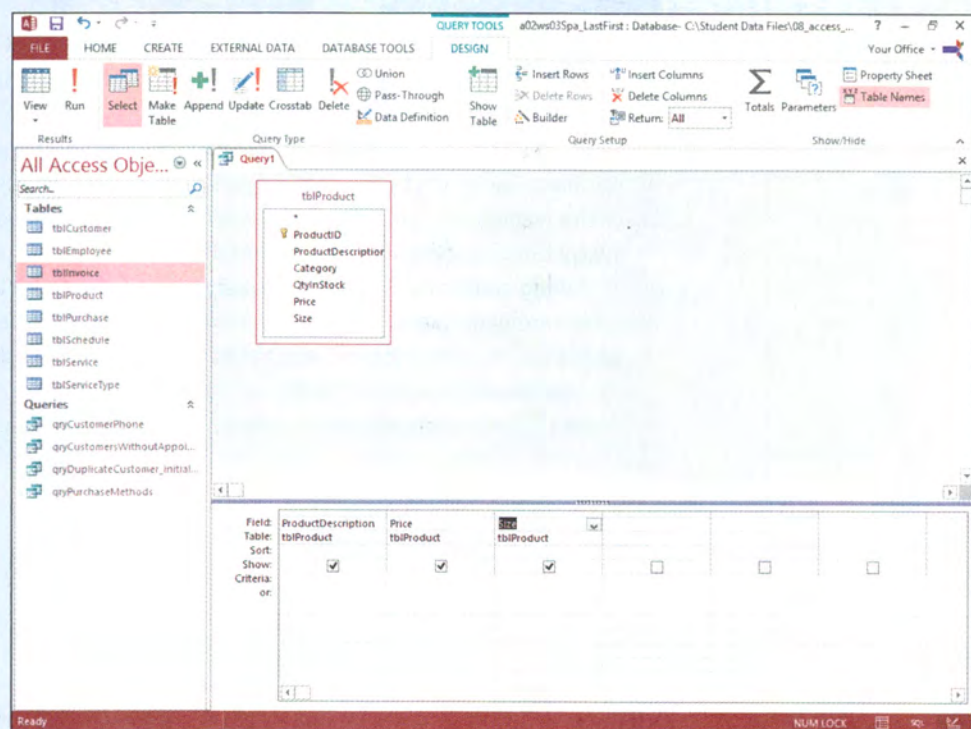


Figure 11 Fields from **tblProduct** added to the query design grid

- e. In the Results group, click **Run** to run the query. You should have 25 records showing the ProductDescription, Price, and Size (ounces) fields.
- f. In the Views group, click the **View** arrow, and then click **Design View**. To move the Size field to the left of the ProductDescription field, click the **top border** of the **Size** field to select the column. Again pointing to the top border of the field, drag the **Size** field to the left of the **ProductDescription** field. In the Results group, click **Run** to run the query again. The query will still have 25 records, but the field order will be Size, ProductDescription, and Price.
- g. Click **Save**  on the Quick Access Toolbar. In the Save As dialog box, type **qryProductPriceList_initialLastname**, using your first initial and last name, and then click **OK**. Close  the query.

QUICK REFERENCE

Opening or Switching Views

Access gives you several methods to open objects in different views or to switch views.

1. To open an object in default view, double-click it in the Navigation Pane.
2. To open an object in design view, right-click it in the Navigation Pane, and select Design View.
3. To switch views for an already open object, on the Home tab, in the Views group, click the View arrow, and then select your preferred view.
4. To switch views for an already open object, right-click the object tab, and then select the preferred view.
5. To switch views for an already open object, the right side of the status bar has small icons for each available view. Hover over the icon to see the ScreenTip. Click the icon to switch to the preferred view.

REAL WORLD ADVICE

The Importance of Knowing Your Data

Many times databases are shared by many users. Different people may enter data differently causing errors or inconsistency. Inconsistent data entry can affect the validity of query results. By misspelling a value or abbreviating a value that should be spelled out, a query may not find the record when it searches using criteria. You must know what your data looks like when you create queries. A quick scan of the records, or using Find with a wildcard for certain values, may help you find misspellings or other data entry errors before you run your query.

Having some idea of what the query results should look like will also help make sure your query has found the right record set. For example, if you query all customers from New Mexico and think there should be a dozen, but your query shows 75, you should check your table records and your query criteria to see why there might be such a big discrepancy from what you expected.

Viewing Table Relationships

A multiple-table query retrieves information from more than one table or query. For Access to perform this type of query, it uses relationships between the tables, or the common field that exists in both tables to “connect” the tables.

If two tables do not have a common field, Access will join the two tables by combining the records, regardless of whether they have a matching field. This is called the **multiplier effect**. For example, if one table has 10,000 records and another table also has 10,000 records, and if these two tables do not have a common field, all records in the first table will be matched with all records in the second table for a total of 100,000,000 records! Depending on the processing power and memory on the computer, Access could take a long time to run the query or even become nonresponsive.

You can view how your tables are related in the Relationships window. **Join lines** are the lines connecting the tables that represent relationships. The field that the line is pointing to in each table represents the common field between the tables. It is helpful to understand how tables are related before you try and create a multiple table query.

A03.10



To View Table Relationships

- a. On the **DATABASE TOOLS** tab, in the Relationships group, click **Relationships**. Click the **Shutter Bar Open/Close button** to hide the Navigation Pane and display the whole Relationships window. Take a moment to study the table relationships.

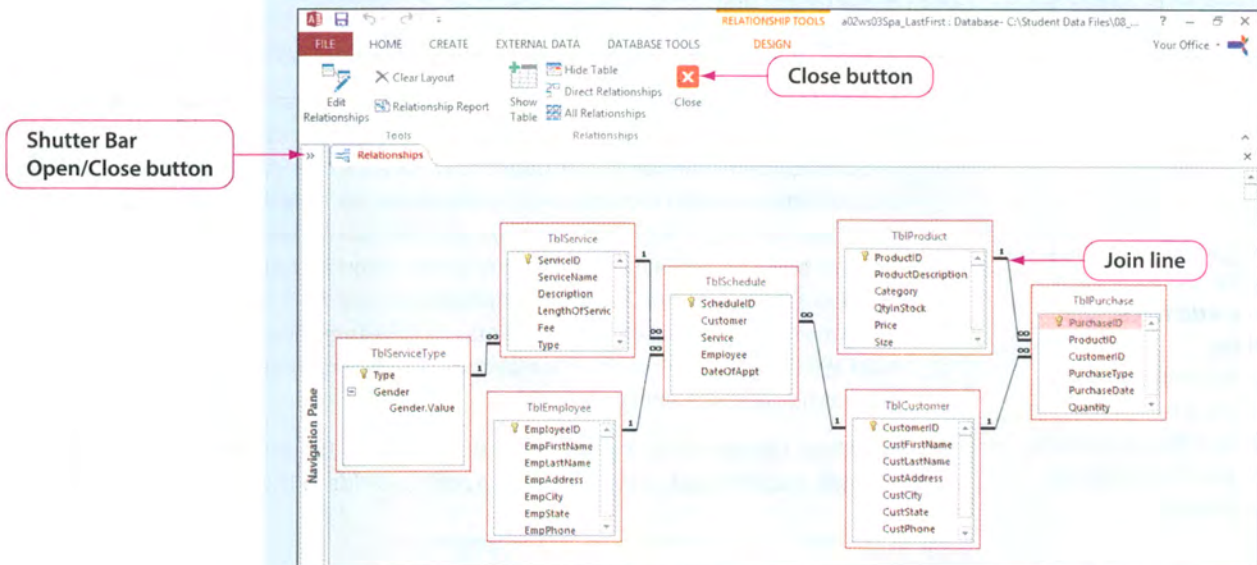


Figure 12 Spa Database table relationships

- b. Click the **DATABASE TOOLS** tab, and then in the Relationships group, click **Close** to close the Relationships window. Click the **Shutter Bar Open/Close button** to show the Navigation Pane again.

REAL WORLD ADVICE

Which Tables to Choose?

You should only select the tables you need when creating a query in the query window. Access treats all the tables selected as part of the query when it executes the query, which means unnecessary tables added to the query may cause performance problems or incorrect results. Best practice is to do the following:

- Understand the table structure and relationships before you construct your query—refer to the Relationships window often.
- Choose only those tables from which you need data.
- If no data from a table is needed, do not add the table. The exception to this rule is if a table is required to link the many-to-many relationship together. In other words, no table will be left unconnected and tables can be added to create that connection.

Creating a Query from Multiple Tables

All tables added to a query should be connected by relationships and have a common field. For this project, the staff would like to see one recordset that includes the services scheduled for each employee. tblEmployee includes the employee names, and tblSchedule lists the services scheduled for each employee. You will create a query that combines the two tables into one query.

SIDE NOTE

Adding Tables from the Navigation Pane

Remember, in addition to selecting tables from the Show Table dialog box, you can also drag tables from the Navigation Pane.

SIDE NOTE

Only Add Necessary Tables

Adding a table to a query without adding fields changes the query results, and the results may not make sense.

A03.11



To Create a Query from Multiple Tables

- Click the **CREATE** tab, and then in the Queries group, click **Query Design**, click **tblEmployee**, and then click **Add**. Close the Show Table dialog box.
- Double-click **EmpFirstName** and **EmpLastName** in that order to add the fields to the query design grid.
- In the Results group, click **Run**. Notice there are 14 employee records.
- Switch to **Design** view. From the Navigation Pane, drag **tblSchedule** to the query window. In the Results group, click **Run** to run the query again.

Scroll through the table and notice there are 53 records in the query results now and employees names are repeated. Employee names have been matched up with each scheduled service, of which there are 53, but you cannot see any information about the services because no fields from that table have been added. The relationship between the two tables dictates that each employee be listed for each service he or she has scheduled. The relationship also prevents employees without a scheduled appointment from appearing in the results. For example, Mariah Paul does not appear here because she has no appointments scheduled.
- Switch to **Design** view. In the **tblSchedule** table, in the following order, double-click **Service**, **DateOfAppt**, and **Customer** to add the fields to the query design grid.

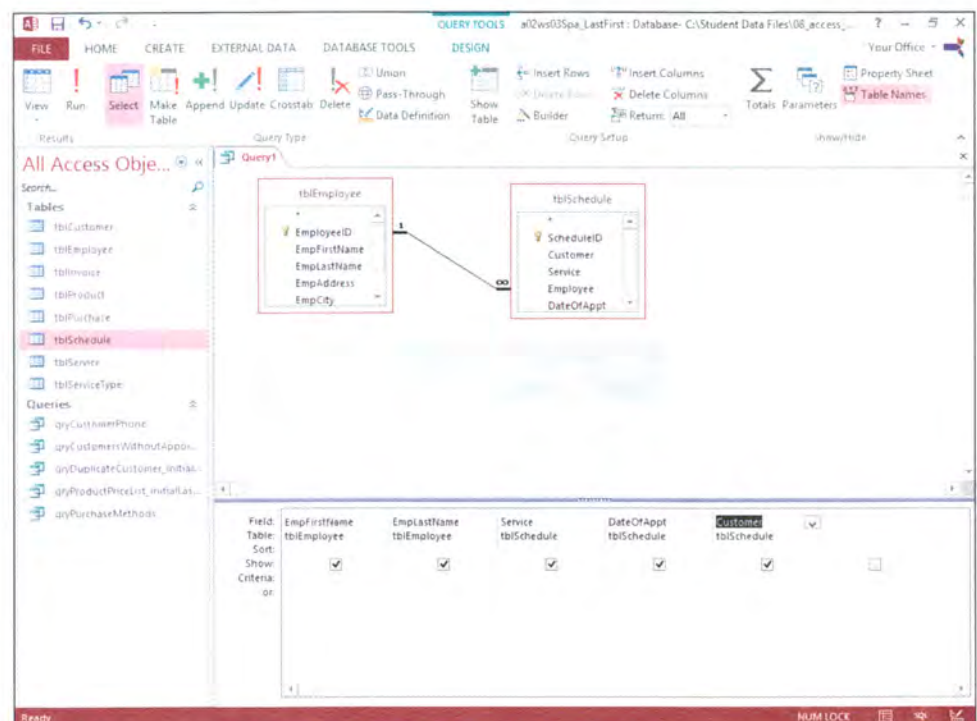


Figure 13 Query window for multiple-table query

- In the Results group, click **Run** to run the query.

Notice there are 53 records again for each service scheduled, but now the detail for those services are included in the query because you added the fields to the query design grid.
- Click **Save** on the Quick Access Toolbar, under Query Name type **qryEmployeeSchedule_initialLastname** using your first initial and last name, and then click **OK**. Close the query.

Removing a Table from a Query to Fix an Undesirable Multiplier Effect

When two tables without a common field are used in a query, you will see the multiplier effect. Recall that the multiplier effect occurs when each record in the first table is matched to each record in the second table.

For this exercise, someone in the spa wanted to find the phone number for each customer, but they created a multiple table query using two tables without a common field. One table has 25 records and the other has 26, so the multiplier effect caused the query result to have 650 records! You will run their query, and then fix it by removing the second table from the query.

A03.12



To Remove a Table from a Query

- a. Double-click **qryCustomerPhone** to run the query.

Notice there are 650 records because every customer name is matched with every product. Since there are 25 products, each of the 26 customers is matched with every product for $25 \times 26 = 650$ records.

650 records

Each customer matched to every product

Figure 14 Query with multiplier effect

- b. Switch to **Design** view. Notice there is no relationship between **tblProduct** and **tblCustomer**, which caused the multiplier effect. You will remove **tblProduct** from the query.
- c. Right-click **tblProduct** in the query window, and then select **Remove Table**. The table is removed from the query window, and the **ProductDescription** is removed from the fields.

Right-click tblProduct to remove it

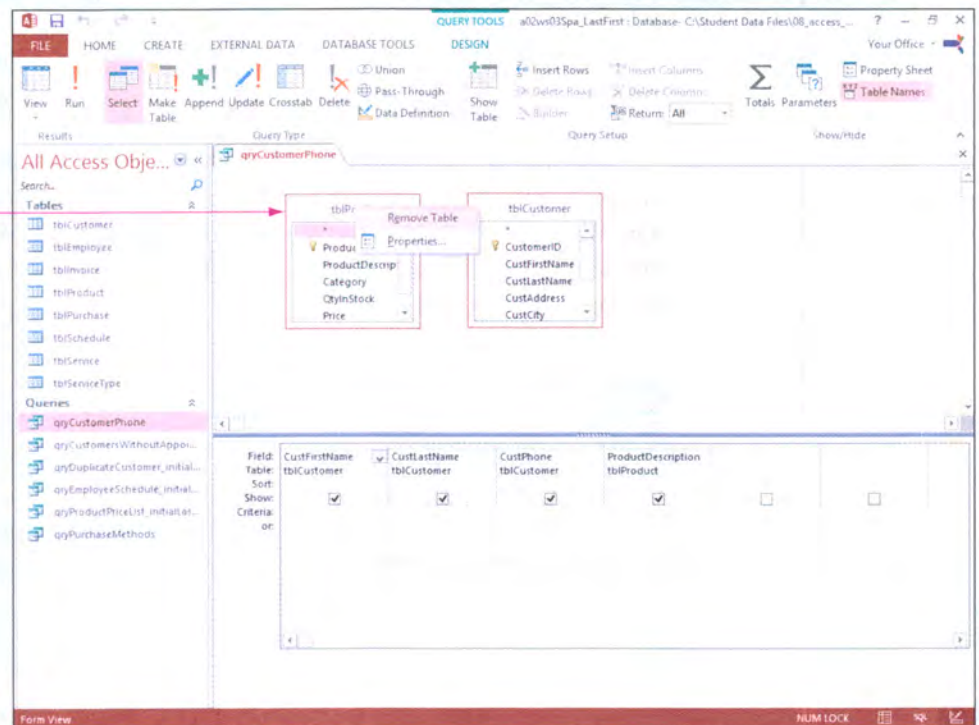


Figure 15 Remove table from query

- d. Click **Run** to run the query.
Notice there are now only 26 records.
- e. On the **FILE** tab, select **Save As**, click **Save Object As**, click **Save As**, under Save 'qryCustomerPhone' to, type **qryCustomerPhone_initialLastname** using your first initial and last name, and then click **OK**. Close **X** the query.

Sort Query Results

Sorting is the process of rearranging records in a specific order. By default, records in a table or query are sorted by the primary key field. You can change the sort order of a table in a query, which will not affect how the data is stored, only how it will appear in the query results.

Sorting by One Field

To sort records, you have to select a **sort field**, or a field used to determine the order of the records. The sort field can be a Short Text, Long Text, Number, Date/Time, Currency, AutoNumber, Yes/No, or Lookup Wizard field as shown in Table 2. A field may be sorted either in ascending order or descending order.

Type of Data	Sorting Options
Short and Long Text	Ascending (A to Z); Descending (Z to A)
Numbers (including Currency & AutoNumber)	Ascending (lowest to highest); Descending (highest to lowest)
Date/Time	Ascending (oldest to newest); Descending (newest to oldest)
Yes/No	Ascending (yes, then no values); Descending (no, then yes values)

Table 2 Methods for sorting data

If you have numbers that are stored as text—phone numbers, Social Security numbers, zip codes—then the characters 1 to 9 come before A to Z in the appropriate order sorted as alphanumeric text.

A table may be sorted by a single field in Datasheet view. When a table is sorted using a single field, a sort arrow will appear in the field name so you can see that it is sorted. For this project, you will show the spa manager how to sort the `tblProduct` table by category.

SIDE NOTE

Alternative Method to Sorting Fields

Alternatively, you can select the field to be sorted and click Ascending or Descending on the Home tab in the Sort & Filter group.

A03.13



To Sort a Table by a Single Field

- a. Double-click **tblProduct** to open the table.
- b. Click the Category column heading arrow, and then click **Sort A to Z**. This will sort the records by the Category field in ascending order.
- c. Click **Close** ☒ the table, and then click **Yes** when prompted to save the changes.

Sorting by More than One Field

You can also sort by multiple fields in Access. The first field you choose to sort by is called the **primary sort field**. The second and subsequent fields are called **secondary sort fields**.

In datasheet view, you can sort multiple fields by selecting all the fields at one time and using the Sort & Filter group sorts, but there are some restrictions. First, the fields in datasheet view must be next to each other and the sort is executed left to right; that is, the far-left field is the primary sort field, the next field is a secondary sort field, and so on. Secondly, you can only sort in ascending or descending order for all fields, you cannot have one field sorted in ascending order and another in descending order. These two restrictions do not exist if sorting is set in Design view. Thus, it is more efficient to create a query and sort by multiple fields using Design view.

Using Design view to sort records allows you to sequence the fields from left to right in an order that makes sense for your desired sort results and allows you to combine ascending and descending sorts. You can also sort in an order different than left to right by adding a field multiple times and clearing the Show check box. For this exercise, you will show the staff how to sort the `tblSchedule` table by Employee, then Date, and then Service by creating a query from the table and setting up the sort options.

A03.14



To Sort a Query by More than One Field

- a. Click the **CREATE** tab, and then in the Queries group, click **Query Design**. Double-click **tblEmployee** and **tblSchedule** to add the tables to the query. Click **Close** to close the Show Table dialog box.
- b. Double-click **EmpLastName**, **EmpFirstName**, and **EmpPhone** from `tblEmployee` to add those fields to the query design grid. Double-click **DateOfAppt**, **Service**, and **Customer** from `tblSchedule` to add those fields to the query design grid.
- c. Click the **Sort** row for **EmpLastName**, click the **selection** arrow, and then click **Ascending**. Click **Ascending** for the **EmpFirstName**, **DateOfAppt**, and **Service** fields.
Notice that unlike sorting in Datasheet view, your sorting fields do not need to be next to each other to be sorted in a query.

SIDE NOTE

How Many Fields Is Too Many?

You may choose up to 10 fields to sort by in Design view.

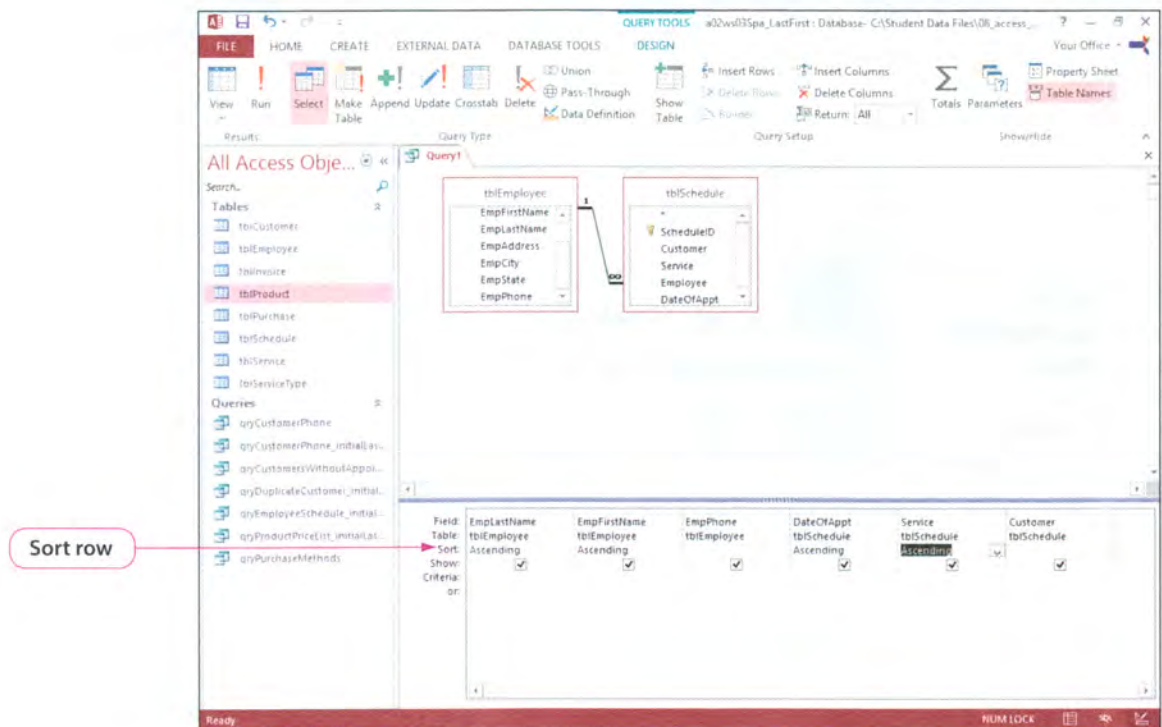


Figure 16 Sort options selected

- d. Click **Run** to run the query. The table should be sorted by Employee, then Date, then Service.
- e. Click **Save** on the Quick Access Toolbar, name the query **qryEmployeeAppointments_initialLastname** using your first initial and last name, and then click **OK**. **Close** the query.

Define Selection Criteria for Queries

Databases, including Access, provide a robust set of selection criteria that you can use to make your queries well focused. You can use the different kinds of operators described below to choose criteria for one or more fields in one or more tables.

Using a Comparison Operator

Comparison operators compare the values in a table or another query to the criteria value you set up in a query. The different comparison operators, descriptions, and examples are shown in Table 3. Comparison operators are generally used with numbers and dates to find a range or a specific value. Equal to and not equal to can also be used with text to find an exact match to criteria. For example, to find all states that are not NY you could enter `<>"NY"` for the state criteria.

In query criteria, text is identified by quotation marks around it and dates with # in front of and at the end of the date. For example, 1/1/16 would appear as #1/1/16#. Access adds the necessary quotation marks and pound signs, but it is a good idea to double-check.

Operator	Description
=	Equal to
<=	Less than or equal to
<	Less than
>	Greater than
>=	Greater than or equal to
<>	Not equal to

Table 3 Comparison operators

For this project, the manager of the spa wants to see all products \$10 and under so she can plan an upcoming special on the spa's lower-priced products. You will show her how to use a comparison operator in a query to find those products.

A03.15



To Use a Comparison Operator in a Query

- Click the **CREATE** tab, and then in the Queries group, click **Query Design**, click **tblProduct**, and then click **Add**. Click **Close** to close the Show Table dialog box.
- In the following order, double-click **ProductID**, **ProductDescription**, **Size**, **Category**, **QtyInStock**, and **Price** to add the fields to the query design grid.
- Click in the **Criteria** row for the **Price** field, and then type **<=10**.
- Click **Run** to run the query. The results should show six records all with prices \$10 or less.
- Click **Save** on the Quick Access Toolbar, under Query Name type **qryLowPriceProducts_initialLastname** using your first initial and last name, and then click **OK**. Click the query.

Hiding Fields That Are Used in a Query

For a field to be used in a query, it must be added to the query grid. If you just want to use the field to define criteria but do not want to see the results of that field in the query, it cannot be removed from the query grid, but it can be hidden from the results.

For this project, the manager is happy with the results of the low-price products query you created above, but she would like to post a list of the products without the prices so she can advertise the list as all under \$10. You tell her that is possible by using the Show check box in the query design grid.

A03.16



To Use a Field Value in a Query but Not Show the Field in the Results

- Open **qryLowPriceProduct_initialLastname** in Design view.
- In the Price field, click the **Show** check box to clear the check mark.

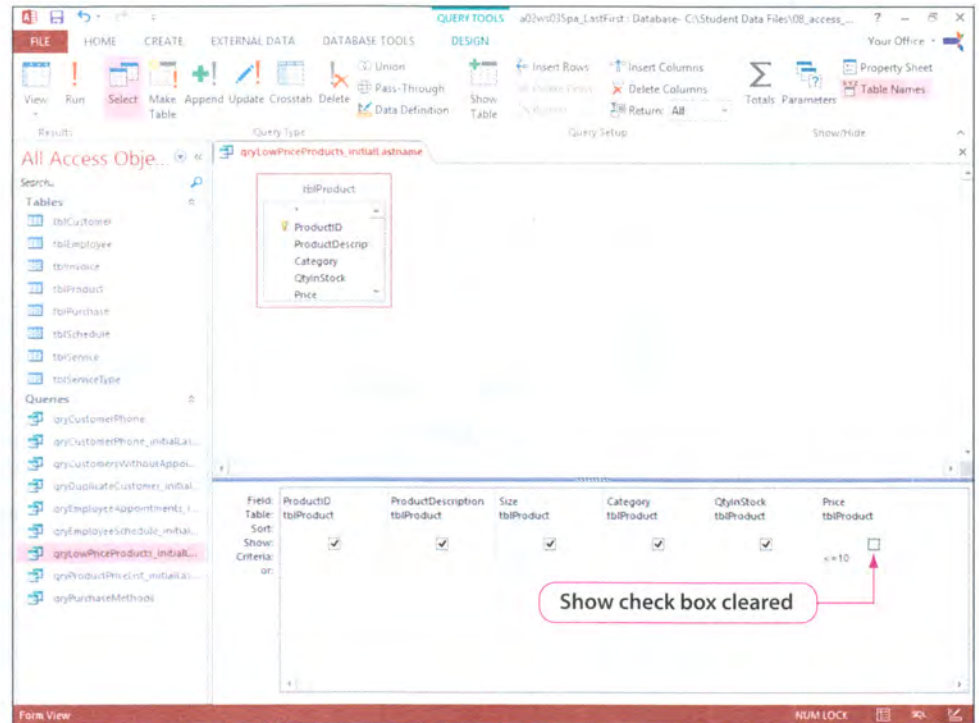


Figure 17 Clearing the Show check box

- In the Results group, click **Run** to run the query. The results should show the same six records you found in the previous query, but without the price field showing.
- On the **FILE** tab, select **Save As**, select **Save Object As**, and then click **Save As**. In Save 'qryLowPriceProducts_initialLa...' to: type **qryTenAndUnder_initialLastname** using your first initial and last name, and then click **OK**. **Close** the query.

Sorting on a Field That You Do Not Show

The manager liked the employee schedule query you created, but she would like it to show employee first name first in the query results. If you put first name first in the grid and then last name, Access will sort by first name first. You will show her how to add a field multiple times to the query design grid to sort fields one way but display them another way.

A03.17



To Sort a Query by Multiple Fields in a Different Sort Order

- Click the **CREATE** tab, and then in the Queries group, click **Query Design**. Double-click **tblEmployee** and **tblSchedule** to add the tables to the query. Click **Close** to close the Show Table dialog box.
- Double-click **EmpFirstName** and **EmpLastName** from **tblEmployee** to add those fields to the query design grid. Double-click **DateOfAppt**, **Service**, and **Customer** from **tblSchedule** to add those fields to the query design grid.
- Click the **Sort** row for **EmpFirstName**, click the **selection** arrow, and then click **Ascending**. Click **Ascending** for the **EmpLastName**, **DateOfAppt**, and **Service** fields.
- In the Results group, click **Run** to run the query.
Notice that the results are sorted by first name and not last name, for example, Alex Weaver is shown before Amanda Johnson. You will need to add another first name field to fix the sort order.
- Switch to **Design** view. Double-click **EmpFirstName** in **tblEmployee** to add it to the query design grid. Click at the top of the second **EmpFirstName** field to select it, and then drag it to the right of **EmpLastName**.
- Click the **Sort** row for the first **EmpFirstName**, and then change it to **(not sorted)**. Click the **Sort** row for the second **EmpFirstName**, and then change it to **Ascending**. Click the **Show** check box under the second **EmpFirstName** field in the third column to clear it.

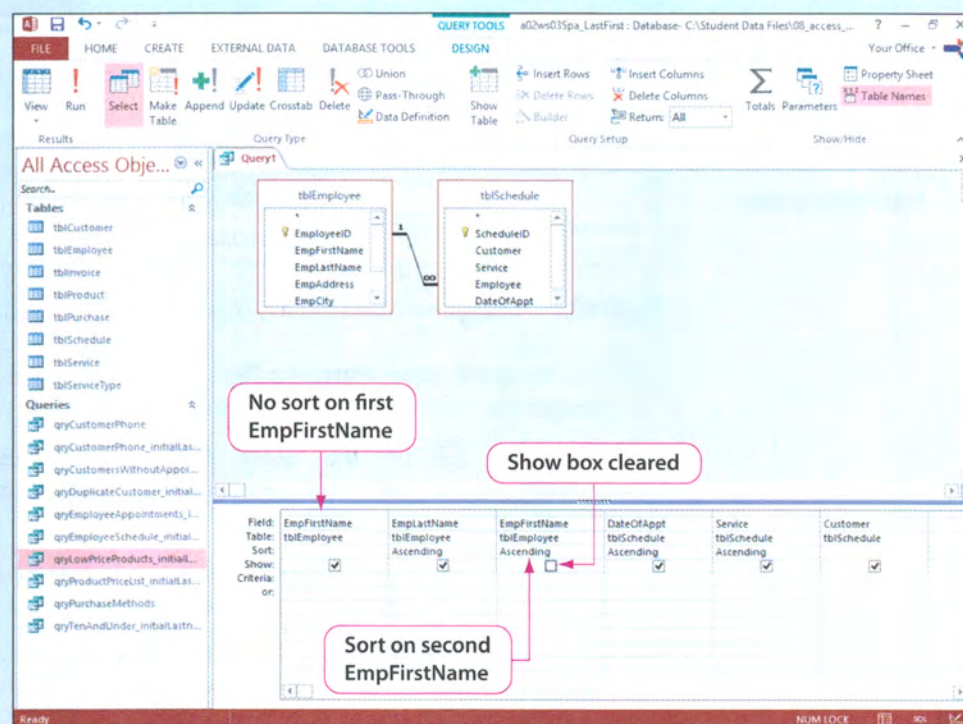


Figure 18 Sort options selected and EmpFirstName Show check box cleared

- Click **Run** to run the query. The results should show 53 records sorted by employee last name, first name, date, and service. Notice that the main sort is by last name but Alex Weaver comes before Joseph Weaver.
- Click **Save** on the Quick Access Toolbar, name the query **qryEmployeeSort_initialLastname** using your first initial and last name, and then click **OK, Close** the query.

Using Is Null Criteria

You practiced entering a criteria value to get all records that meet the criteria. You can also select any records that have no value in a field using the Is Null criteria. Null is the absence of any value and is different from blank or zero.

For this exercise, one of the spa workers has created a purchase record without specifying that the order was placed in person. You will show the manager how to locate a record that is missing a value. You will also show her how to change the value in the query and have it changed in the table.

A03.18



To Use Is Null Criteria

- Click the **CREATE** tab, and then in the Queries group, click **Query Design**. Double-click **tblPurchase**, and **tblCustomer** to add the tables to the query window. Click **Close** to close the Show Table dialog box.
- In the following order, double-click **PurchaseType** and **PurchaseDate** from **tblPurchase**, and **CustFirstName** and **CustLastName** from **tblCustomer** to add them to the query design grid.
- Click in the **Criteria** row for the **PurchaseType** field, and then type **Is Null**.
- Click **Run** to run the query. The results show one record that was the purchase by Omar Hinton on 1/18/2015. That is the one that the employee forgot to enter.

Null Purchase Type

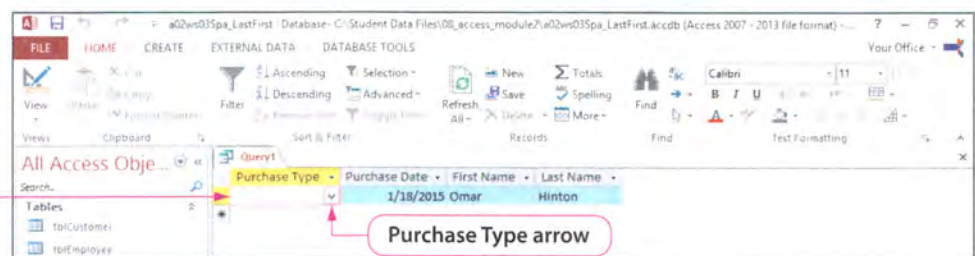


Figure 19 Change null value in query results

- Click the arrow under **Purchase Type**, and then change the value to **In Person**. This changes the result in the underlying **tblPurchase** to be In Person.
- Click **Save**  on the Quick Access Toolbar, under **Query Name** type **qryNullPurchaseType_initialLastname** using your first initial and last name, and then click **OK**. **Close**  the query.
- Double-click **tblPurchase** to open the table. Notice that Hinton's purchase (PurchaseID = 25) is now indicated as being In Person. **Close**  the table.
- Double-click **qryNullPurchaseType_initialLastname** to run it. Notice that no records are found since Hinton's record was corrected. **Close**  the query.

Using the AND Logical Operator

When you create a query, you can select criteria for one field or for multiple fields. If you use multiple criteria, then you must also use **logical operators** to combine these criteria. Logical operators are operators that allow you to combine two or more criteria, as shown in Table 4. For example, if you want a record selected when both criteria are met, then you would use the AND logical operator, but if you want a record selected if only one of the criteria is met, then you would use the OR logical operator. For an even more advanced query, you can combine the AND and the OR logical operators.

Operator	Description
AND	Returns records that meet both criteria
OR	Returns records that meet one or more criteria
NOT	Returns records that do not meet the criteria

Table 4 Logical operators

When you want to specify multiple criteria, and all criteria must be true for a record to be included in the results, then the AND logical operator is used, and the criteria must be in the same Criteria row in the query design grid. Access will look at the first field in the query design grid for criteria and continue moving from left to right looking for criteria. When criteria are in the same row, all criteria must match for the record to be included in the query results. For this project, you want to help the manager narrow down a sales strategy. She is trying to determine which customers place phone orders for products over \$10.

A03.19



To Use the AND Logical Operator

- Click the **CREATE** tab, and then in the Queries group, click **Query Design**. Double-click **tblProduct**, **tblPurchase**, and **tblCustomer** to add the tables to the query window. Click **Close** to close the Show Table dialog box.
- In the following order, double-click **PurchaseType** from **tblPurchase**, **ProductDescription** and **Price** from **tblProduct**, and **CustFirstName** and **CustLastName** from **tblCustomer** to add them to the query design grid.
- Click in the **Criteria** row for the **PurchaseType** field, type **Phone**, and then for the **Price** field type **>10**.
- Click in the **Sort** row for the **ProductDescription** field, and then select **Ascending**.

SIDE NOTE

Looks Do Not Matter

How the tables are laid out in the query window does not affect the results. You can move the tables by dragging them to a new location.

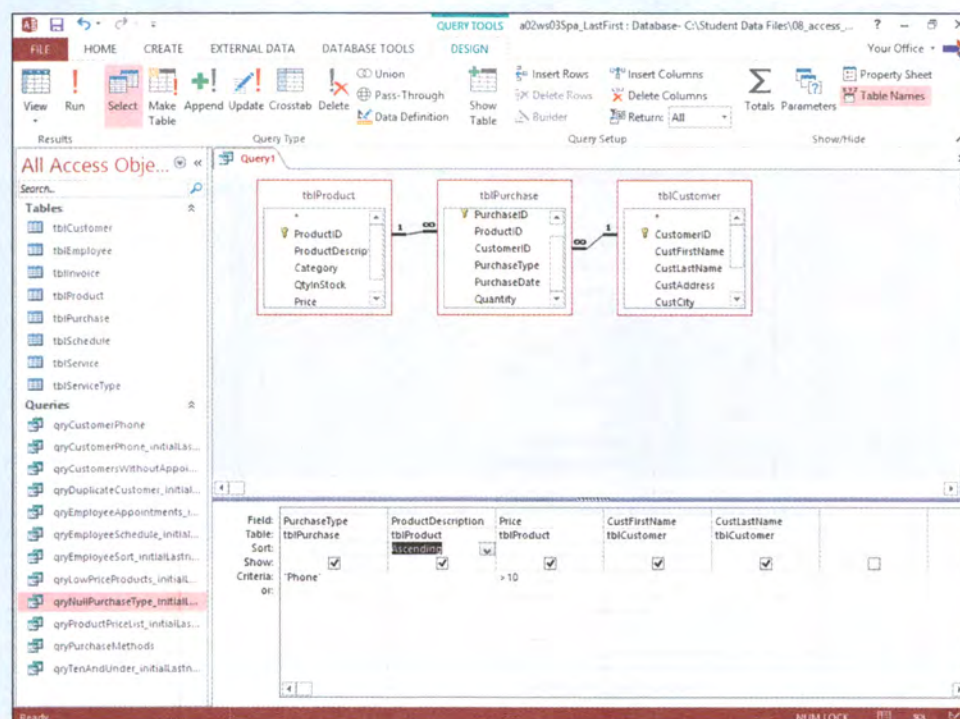


Figure 20 Criteria added for PurchaseType and Price fields

- e. Click **Run** to run the query. The results show five records, with Phone as the purchase type and a price greater than \$10. The results are sorted by ProductDescription.
- f. Click **Save**  on the Quick Access Toolbar, under Query Name type **qryPhoneAndTen_initialLastname** using your first initial and last name, and then click **OK**. Close  the query.

Using the OR Logical Operator

When you want to specify criteria in multiple fields, and at least one of the criteria must be true for a record to be included in the results, then the OR logical operator is used, and the criteria must be in different Criteria rows in the query design grid. Access will look at the first field in the first Criteria row for criteria and continue moving from left to right. Then it will start at the left again on the next criteria row that is labeled “or”. For this exercise, you want to help the manager find all customers who make purchases either by phone or online.

A03.20



To Use the OR Logical Operator

- a. Click the **CREATE** tab, and then in the Queries group, click **Query Design**. Double-click **tblProduct**, **tblPurchase**, and **tblCustomer** to add the tables to the query. Click **Close** to close the Show Table dialog box.
- b. Double-click **PurchaseType** from **tblPurchase**, double-click **ProductDescription** from **tblProduct**, and then double-click **CustFirstName** and **CustLastName** from **tblCustomer** in that order to add them to the query design grid.
- c. Click in the **Criteria** row for the PurchaseType field, type **Phone**. In the **or** row just below the Criteria line in the PurchaseType field, type **Online**.
- d. Click in the **Sort** row, and then select **Ascending** for the **PurchaseType** and **ProductDescription** fields.

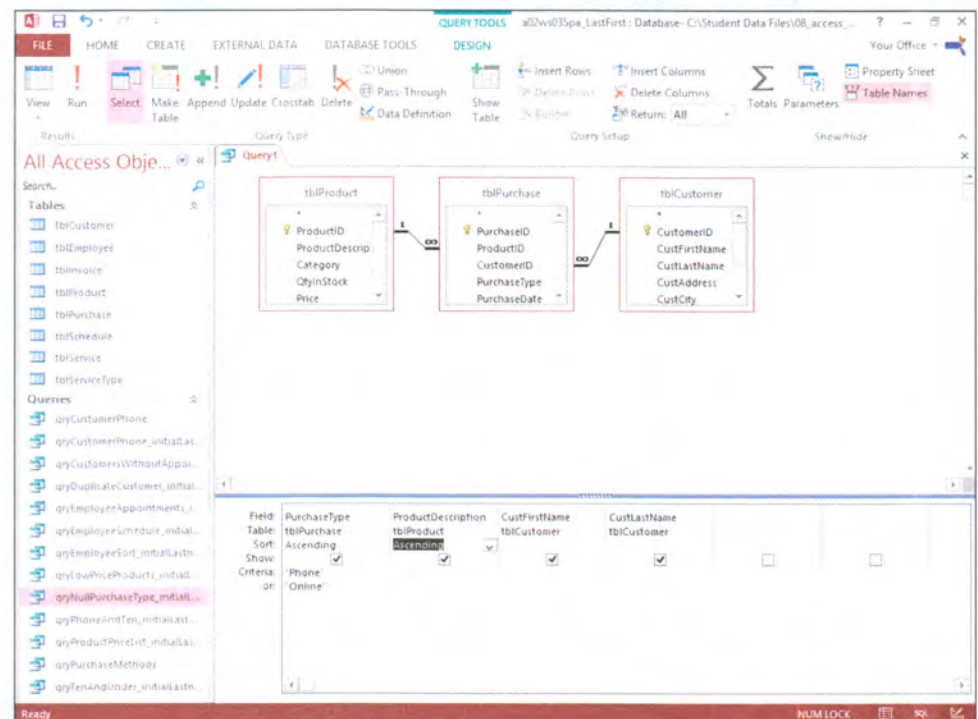


Figure 21 Or criteria for PurchaseType

- e. In the Results group, click **Run** to run the query. The results should show 12 records, all with Phone or Online as the purchase type sorted by purchase type and product description.
- f. Click **Save**  on the Quick Access Toolbar, name the query **qryPhoneOrOnline_initialLastName** using your first initial and last name, and then click **OK. Close**  the query.

Combining the AND and OR Logical Operators

There may be times when you want to use two logical operators, AND and OR, at the same time. Depending on the desired results, you may have to use one or both Criteria rows. If you use both Criteria rows for criteria for two fields, then Access treats it like two AND logical operators with one OR logical operator.

For this project, the manager wants you to find all phone purchase types for products over \$20 as well as all online purchase types for products over \$15. Phone and greater than 20 are one AND criteria. Online and greater than \$15 are the other AND criteria. You want all purchases that are one OR the other of the two AND combinations. Access moves left to right on the first criteria so it will treat “Phone” and >20 as AND criteria and then move to the next row, which it will consider OR criteria. To see how this works, you will step through the query one criteria at a time.

A03.21



To Combine the AND and the OR Logical Operator

- a. Click the **CREATE** tab, and then in the Queries group, click **Query Design**, and then double-click **tblProduct**, **tblPurchase**, and **tblCustomer** to add the tables to the query. Click **Close** to close the Show Table dialog box.
- b. Double-click **PurchaseType** from **tblPurchase**, double-click **ProductDescription** and **Price** from **tblProduct**, and then double-click **CustFirstName** and **CustLastName** from **tblCustomer** in that order to add them to the query design grid.
- c. Click in the **Sort** row, and then select **Ascending** for the **PurchaseType** and **Price** fields.
- d. Click in the **Criteria** row for the **PurchaseType** field, and then type **Phone**. Click **Run** to run the query.
Notice that five orders are shown. Why do you see these orders? Access has found all records that are Phone orders.
- e. Switch to **Design** view. In the same Criteria row for the **Price** field, type **>20**. Click **Run** to run the query.
Notice that two orders are shown. Why do you see these orders? They are both phone orders and both have prices of over \$20. Access has found all records that are Phone AND >20.
- f. Switch to **Design** view. In the **or** row below the Criteria row, type **Online** for the **PurchaseType** field. Click **Run** to run the query.
Notice that nine orders are shown. Why do you see those orders? You still see the two phone orders with prices of over \$20. You also see all online orders. Access has found all records that are Phone AND >20 OR orders that are Online.
- g. Switch to **Design** view. In the same **or** row as Online, type **>15** for the **Price** field.

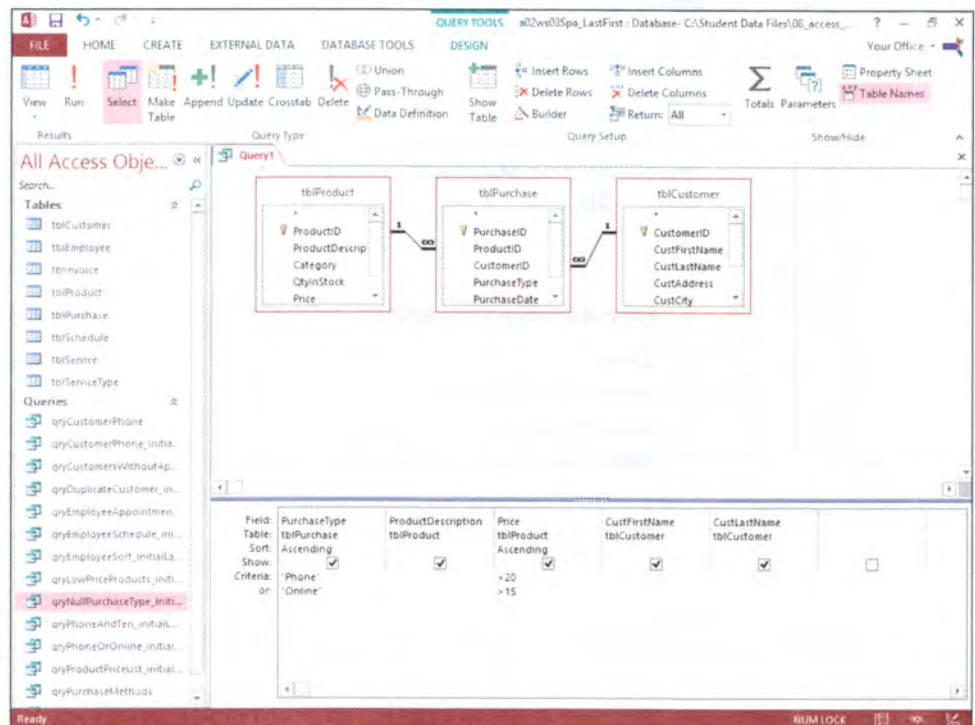


Figure 22 Two criteria rows added for PurchaseType and Price

h. Click **Run** to run the query.

Notice that six orders are shown. Why these six orders? You still see the two phone orders with prices of over \$20. You also see four online orders with prices of over \$15. Access has found all records that are Phone AND >20 OR orders that are Online AND >15.

Access moved left to right on the first criteria so it will treat "Phone" and >20 as AND criteria and then move to the next row, where it will consider "Online" and >15 as OR criteria.

i. Click **Save** on the Quick Access Toolbar, name the query **qryPhoneAndOnline_initialLastname** using your first initial and last name, and then click **OK**. **Close** the query.

Combining Multiple AND and OR Logical Operators

You cannot always use two rows for the OR criteria when you combine both logical operators. In cases like this, the word "or" can be used for two criteria used in the same field and the same Criteria row. For this project, the manager of the spa wants you to find all phone and online purchase types for products over \$10. If you put the purchase type criteria on two rows and the price of >10 in one row, your results will show all records with phone purchase types over \$10 or Online purchase types of any amount. Remember, Access moved left to right on the first criteria so it will treat "Phone" and >10 as AND criteria and then move to the next row, which it will consider OR criteria.

A03.22



To Combine Multiple AND and OR Logical Operators

- Click the **CREATE** tab, and then in the Queries group, click **Query Design**. Double-click **tblProduct**, **tblPurchase**, and **tblCustomer** to add the tables to the query. Click **Close** to close the Show Table dialog box.
- In the following order, double-click **PurchaseType** from **tblPurchase**, **ProductDescription** and **Price** from **tblProduct**, and **CustFirstName** and **CustLastName** from **tblCustomer** to add them to the query design grid.
- Click in the **Criteria** row for the **PurchaseType** field, type **Phone**, and then in the **Criteria** row for the **Price** field, type **>10**. In the **or** row for the **PurchaseType** field, type **Online**.
- Click in the **Sort** row, and then select **Ascending** for the **PurchaseType** and **Price** fields.

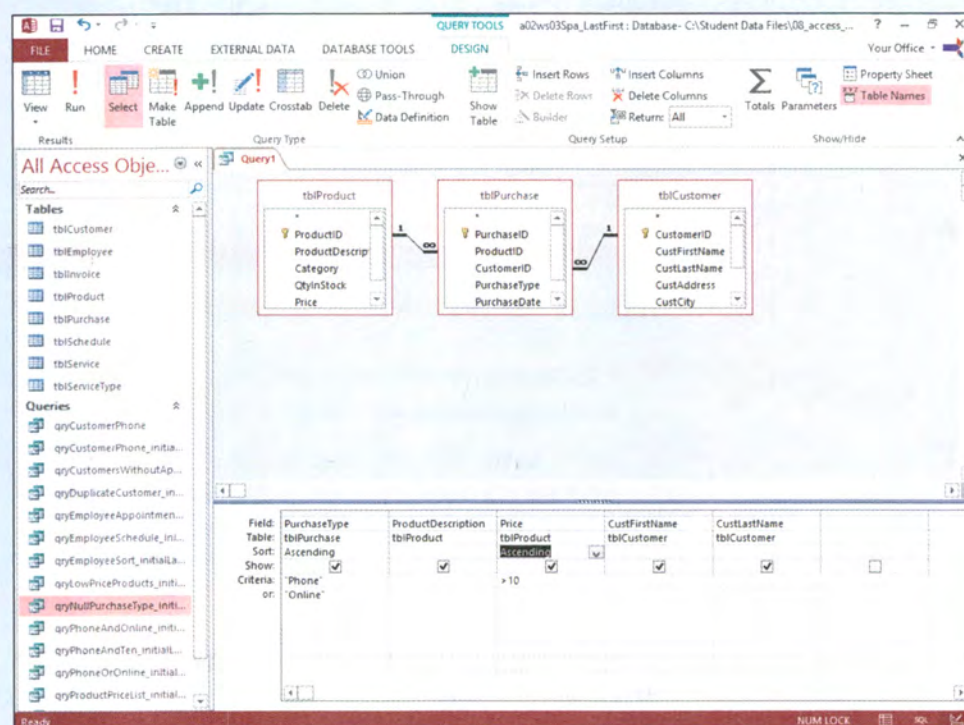


Figure 23 AND and OR criteria added to the query design grid

- Click **Run** to run the query.
Notice the results are all Phone purchase types with prices over \$10 or all Online purchase types, regardless of the price. The manager wants to see Phone or Online purchase types over \$10, so this is not correct.
- Switch to **Design** view. In the **or** row for the **PurchaseType** field, delete "Online." Click in the **Criteria** row for the **PurchaseType** field, and then change the criteria to **Phone or Online**.

SIDE NOTE

Access Puts in Quotes

You can leave the quotation marks around "Phone" or remove them. Access will add them for Short Text fields.

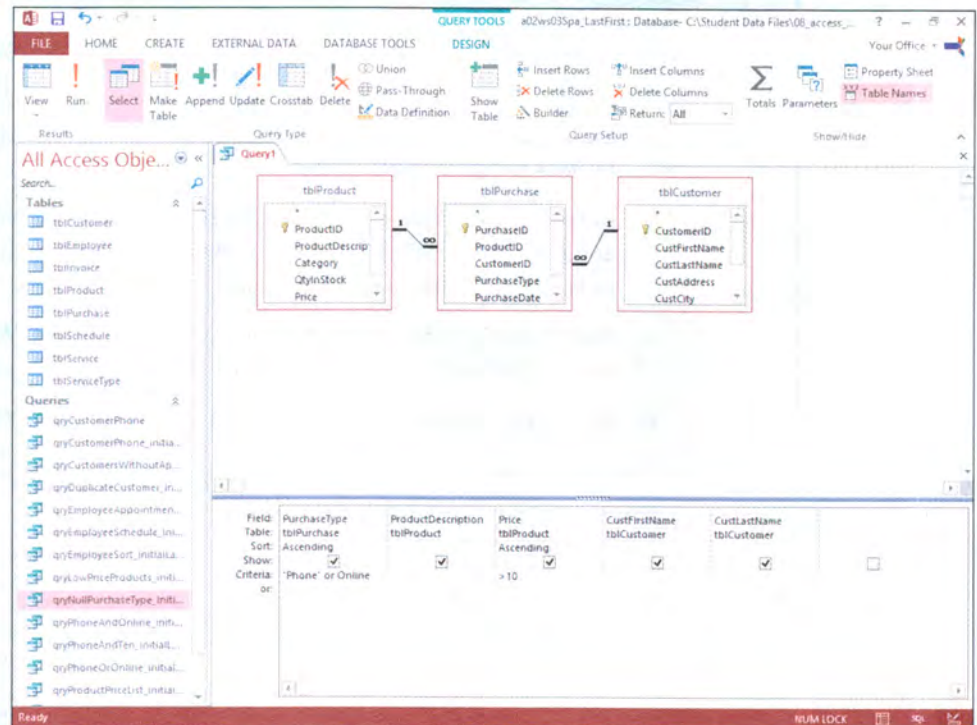


Figure 24 OR criteria in one row with AND criteria

- g.** Click **Run** to run the query again. The results should now show the 10 Phone or Online purchase types that are over \$10.
- h.** Click **Save**  on the Quick Access Toolbar, under Query Name type **qryPhoneOrOnlineOverTen_initialLastname** using your first initial and last name, and then click **OK**. Close  the query.

Combining Operators and Multiple Criteria

The more criteria added to your query means the more difficult it will be to see if you have the correct results. With multiple criteria, it is good practice to add one criteria, run the query to make sure you are getting the correct results, and then continue adding criteria one at a time.

For this project, the spa manager would like to see all of her high-end services listed by price and then service type, and she would like to break down the criteria as follows: Hands & Feet or Body Massage services \$50 or more, Facial or Microdermabrasion services over \$55, Beauty or Waxing services over \$45, and all Botanical Hair & Scalp Therapy services.

A03.23



To Combine Operators and Multiple Criteria

- a. Click the **CREATE** tab, and then in the Queries group, click **Query Design**, and double-click **tblService** to add the table to the query window. Click **Close** to close the Show Table dialog box.
- b. In the following order, double-click **Fee**, **Type**, and **ServiceName** to add the fields to the query design grid.
- c. Click in the **Criteria** row for the Fee field, type **>55**, and then in the **Criteria** row for the Type field type **Facial or Microdermabrasion**.
- d. Click in the **Sort** row, and then select **Ascending** for the **Fee**, **Type**, and **ServiceName** fields.
- e. Click **Run** to run the query. The results should show six records with Facial or Microdermabrasion for the Type field, and all values in the Fee field should be greater than \$55.
- f. Switch to **Design** view. In the **or** row for the Fee field, type **>=50**, and for the **or** row for the Type field type **"Hands & Feet" or Body Massage**. Click **Run** to run the query again.

The query results should show 19 records with types Facial or Microdermabrasion that have fees greater than \$55, and records with types Hands & Feet or Body Massage that have fees greater than or equal to \$50.

Troubleshooting

If you only get 16 records in the results, you did not put the quotation marks around "Hands & Feet". Access will add those quotation marks for you. In this case, Access evaluates the ampersand character (&) as separating two values, so it will put the quotation marks around the word "Hands" and around the word "Feet" so it will look like "Hands" & "Feet". This is different than having the quotations around the whole phrase, which is what you want it to look like. In this case you should put the quotation marks around the phrase in order for it to appear as "Hands & Feet".

- g. Switch to **Design** view. Click in the **second or** row for the Fee field, type **>45**, and then in the **Criteria** row for the Type field, type **Beauty or Waxing**. Click **Run** to run the query again.

The results should show 23 records with types Facial or Microdermabrasion that have fees greater than \$55, and records with types Hands & Feet or Body Massage that have fees greater than or equal to \$50, and records with types Beauty or Waxing that have fees greater than \$45.

- h. Switch to **Design** view. Click in the **third or** row for the Type field, and then type **"Botanical Hair & Scalp Therapy"**.

SIDE NOTE

Wider Columns

You can widen the columns in the query design grid by double-clicking the right border of the column selector bar.

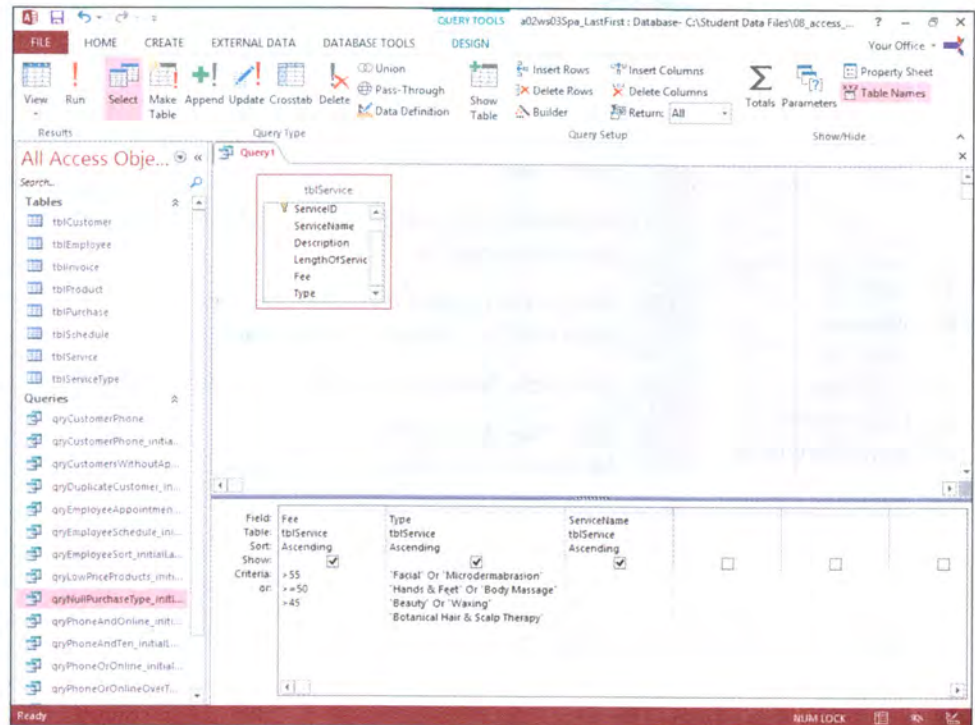


Figure 25 All criteria added to query design grid

- i. Click **Run** to run the query again.

The results should show 25 records with types Facial or Microdermabrasion that have fees greater than \$55, records with types Hands & Feet or Body Massage that have fees greater than or equal to \$50, records with types Beauty or Waxing that have fees greater than \$45, and all Botanical Hair & Scalp Therapy types.

Troubleshooting

If you still see 23 records, check to see that you put the quotation marks around "Botanical Hair & Scalp Therapy" and that you spelled the type correctly.

- j. Click **Save**  on the Quick Access Toolbar, name the query **qryHighEndServices_initialLastname** using your first initial and last name, and then click **OK**. **Close**  the query.

Using Special Operators and Date Criteria

Special operators, as shown in Table 5, are used to compare text values using wildcards (LIKE), to determine whether values are between a range of values (BETWEEN), or in a set of values (IN).

Operator	Description
LIKE	Matches text values by using wildcards. These are the same wildcards that are shown in Table 1.
BETWEEN	Determines if a number or date is within a range.
IN	Determines if a value is found within a set of values.

Table 5 Special operators

For this project, the manager of the spa would like you to find all services scheduled for February 2015, along with the customer who is scheduled for those services. The Between special operator will return results that include and fall between the criteria you enter. If you recall, when working with dates as criteria, a # in front of and at the end of each date are required to identify the numbers as dates and not a string of text. You will use the Between special operator.

A03.24



To Use the Between Special Operator with a Date Criteria

- Click the **CREATE** tab, and then in the Queries group, click **Query Design**. Double-click **tblSchedule** and **tblCustomer** to add the tables to the query. Click **Close** to close the Show Table dialog box.
- Double-click **DateOfAppt**, **Service**, and **Employee**, from **tblSchedule**, and then double-click **CustFirstName** and **CustLastName** from **tblCustomer** in that order to add them to the query design grid.
- Click in the **Sort** row, and then select **Ascending** for the **DateOfAppt**, **Service**, and **Employee** fields.
- Click in the **Criteria** row for the **DateOfAppt** field, and then type **Between 2/1/15 and 2/29/15**.
- Click **Run** to run the query.

Notice that the results do not show services in February. They show services in January. Access is misinterpreting your query criteria.

- Switch to **Design** view to check the criteria. Move your pointer to the **border** between **DateOfAppt** and **Service** until it becomes . Double-click to see the full criteria.

Notice that since there is no leap day in 2015, Access interpreted the 2/29/15 as 2/29/2012, the last leap day that occurred, and the /15 as a division. This is not what you wanted. This example shows why it is so important to check your results to see if they make sense.

SIDE NOTE

Formatting Criteria

Access will add pound signs around dates and quotation marks around text. However, if the criteria are ambiguous, you should put them in.

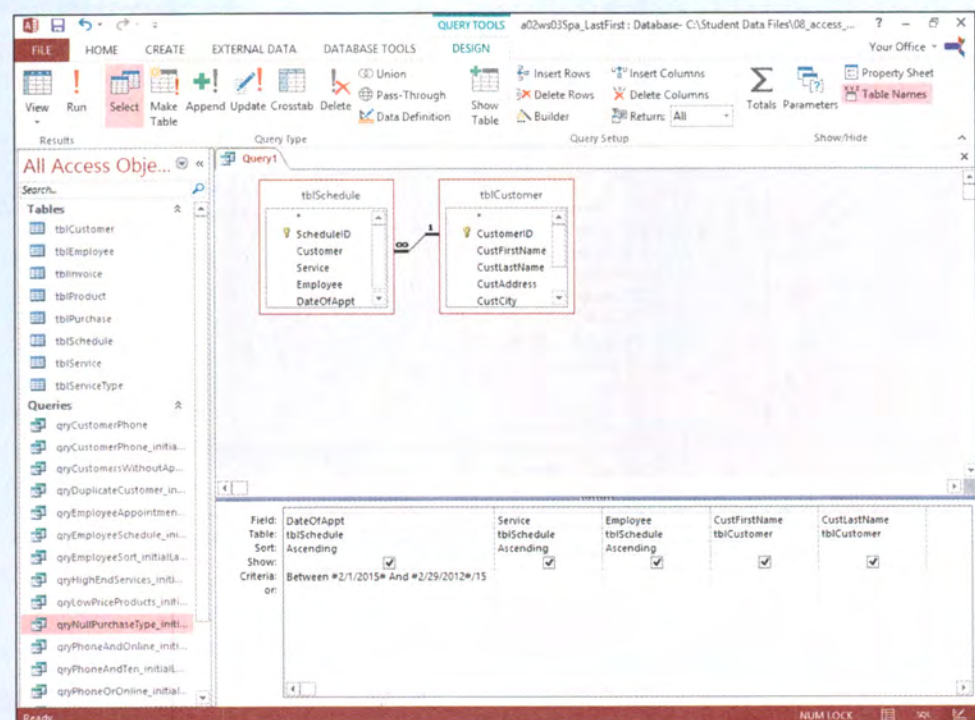


Figure 26 Misinterpreted criteria for DateOfAppt

- g. Change the criteria to **Between 2/1/15 and 2/28/15**. Click **Run** to run the query. This time the results are as expected and show 47 appointments in February.
- h. Click **Save**  on the Quick Access Toolbar, under Query Name type **qryFebruaryServices_initialLastname** using your first initial and last name, and then click **OK**. **Close**  the query.

Combining Special Operators and Logical Operators

Special operators can be combined with logical operators. As your criteria get more complex, you need to carefully check how Access interprets your criteria and your results.

For this project, the manager of the spa would like you to find all services scheduled for months other than February 2015, along with the customer who is scheduled for that service. You will use the LIKE special operator and combine it with the NOT logical operator. This query is very similar to the one you just created so you will open that query and modify it.

A03.25



To Use Combine Logical and Special Operators

- a. Right-click **qryFebruaryServices_initialLastname**, and then select **Copy**. Right-click the **Navigation Pane**, and then select **Paste**. In the Query Name box type **qryNotFebruaryServices_initialLastname**. Click **OK**.
- b. Double-click **qryNotFebruaryServices_initialLastname** to open it.
- c. Switch to **Design** view. Click in the **Criteria** row for the DateOfAppt field, and then replace the current criteria with **Like 2/*/2015**. Remember that the asterisk (*) is a wildcard that will select all dates that have a month of 2 and a year of 2015.
- d. Click **Run** to run the query. Notice that the results show 47 February service appointments.
- e. Switch to **Design** view. Type **Not** before the current criteria so it reads **Not Like "2/*/2015"**.

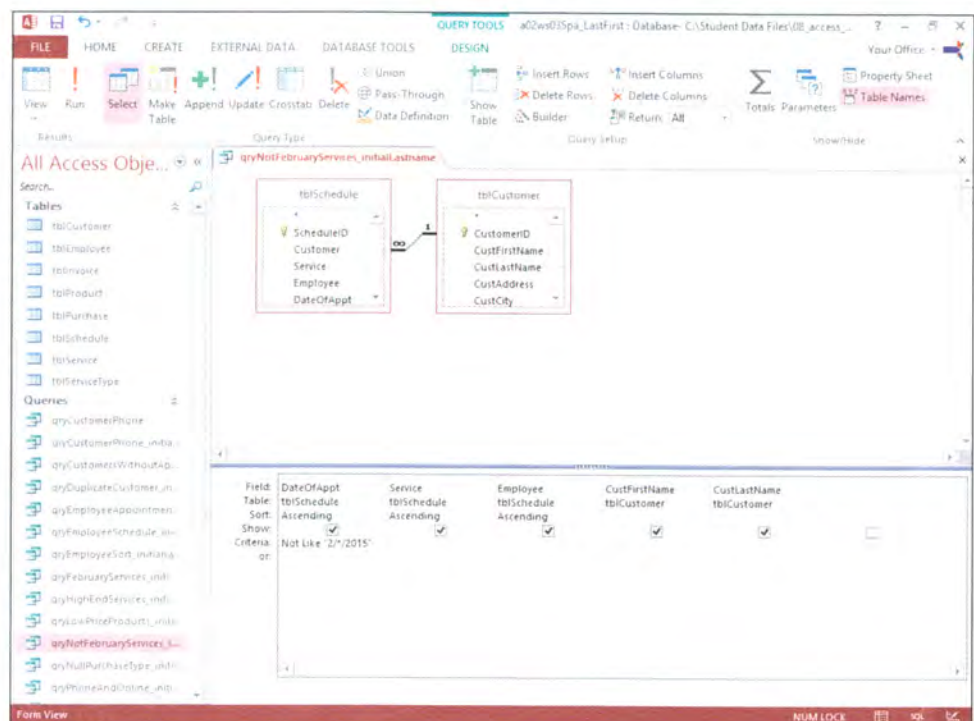


Figure 27 Combined Not and Like operators

- f. Click **Run** to run the query. Notice that the results now show the six service appointments not in February.
- g. **Save**  and **close**  your query.

Create Aggregate Functions

Aggregate functions perform arithmetic operations, such as calculating averages and totals, on records displayed in a table or query. An aggregate function can be used in Datasheet view by adding a total row to a table, or it can be used in a query on records that meet certain criteria.

QUICK REFERENCE

Commonly Used Aggregate Functions

There are a number of different aggregate functions that can be used depending on the type of calculation you want to perform.

1. **Sum**—Calculates the total value for selected records
2. **Average**—Calculates the average value for selected records
3. **Count**—Displays the number of records retrieved
4. **Minimum**—Displays the smallest value from the selected records
5. **Maximum**—Displays the largest value from the selected records

Adding a Total Row

If you need to see a quick snapshot of statistics for a table or query, you can use the **total row**. The total row is a special row that appears at the end of a datasheet that enables you to show aggregate functions for one or more fields. For this project, you will help the manager quickly find a total for all unpaid invoices listed in the invoices table and a count of the number of invoices in the table. The invoice table has a Yes/No field, so you will show her how to define criteria for Yes/No.

A03.26



To Add a Total Row to a Query That Uses Yes/No Criteria

- a. Double-click **tblInvoice** to open it. Notice that the Paid field is a check box. Switch to **Design** view and see that the Data Type is Yes/No. Click the **Data Type** and see that the Format is Yes/No. **Close**  the table.
- b. Click the **CREATE** tab, and then in the Queries group, click **Query Design**. Double-click **tblInvoice** and **tblCustomer** to add the tables to the query. Click **Close** to close the Show Table dialog box.
- c. Double-click **InvoiceDate**, **InvoiceTotal**, and **Paid** from **tblInvoice**, and then double-click **CustFirstName** and **CustLastName** from **tblCustomer** in that order to add them to the query design grid.
- d. Click in the **Sort** row, and then select **Ascending** for **InvoiceDate**.
- e. Click in the **Criteria** row for the **Paid** field, and then type **No**.
- f. Click **Run** to run the query. The six unpaid invoices are shown.

SIDE NOTE

Removing Totals

To remove the total row, on the Home tab, click Totals.

- g. In the Records group, click **Totals** so that the Total row shows.
- h. Click in the **Total row** under the InvoiceTotal field, click the arrow, and then select **Sum**. Click in the **Total row** under the First Name field, click the arrow, and then select **Count**.

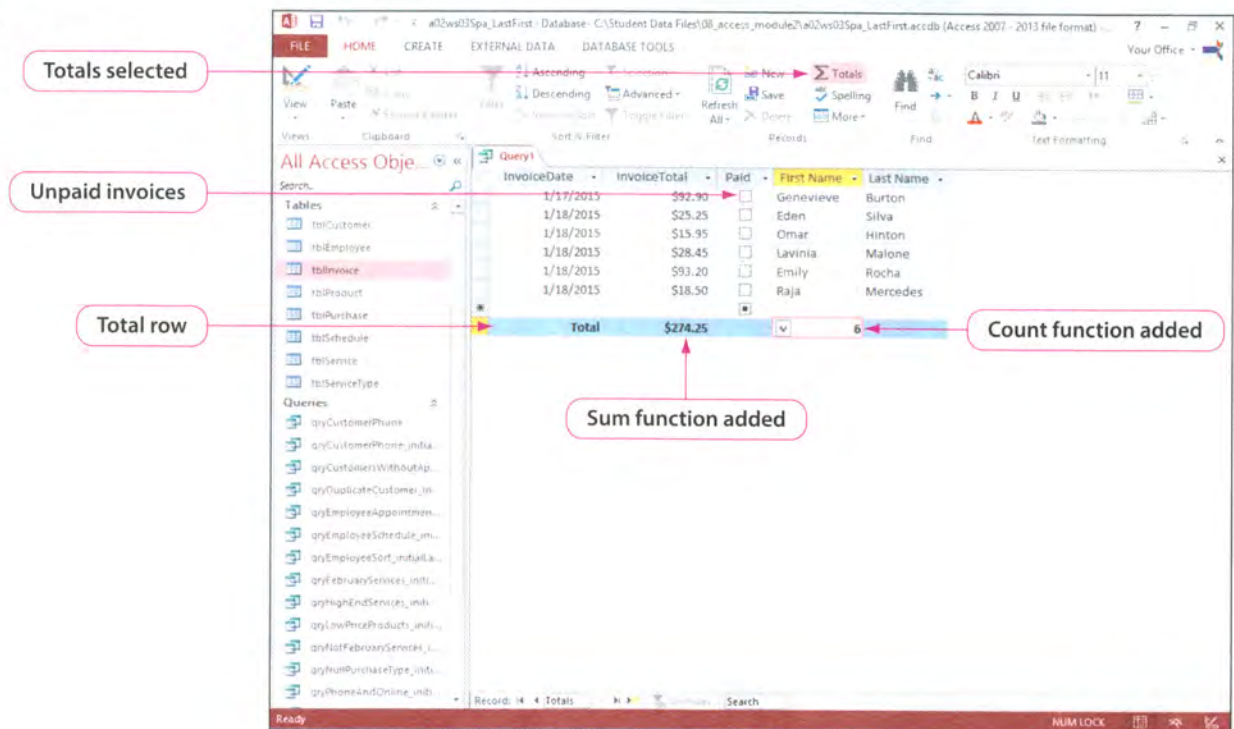


Figure 28 Sum and Count of Unpaid Invoices added to the Total row

- i. Click **Save** on the Quick Access Toolbar, under **Query Name** type **qryUnpaidInvoices_initialLastname** using your first initial and last name, and then click **OK**. **Close** the query.

Using Aggregate Functions in a Query

Aggregate functions can be used in queries to perform calculations on selected fields and records. One advantage to using aggregate functions in queries, rather than just a total row, is that you can group criteria and then calculate the aggregate functions for a group of records. By default, the query design grid does not have a place to enter aggregate functions, so the total row must be added from the Query Tools Design tab. Each column or field can calculate only one aggregate function, so to calculate multiple functions on the same field, the field must be added to the grid multiple times.

For this project, you have been asked to provide a statistical summary of the spa's product prices. The manager would like to see how many products are offered, what the average product price is, and the minimum and maximum product prices.

A03.27



To Use Aggregate Functions in a Query

- Click the **CREATE** tab, and then in the Queries group, click **Query Design**. Double-click **tblProduct** to add the table to the query. Click **Close** to close the Show Table dialog box.
- Double-click **Price** four times to add the field four times to the query design grid.
- In the Show/Hide group, click **Totals** to add a total row to the query design grid.
- In the first Price column, click in the **Total** row, click the arrow, and then select **Count**. In the second Price column, click in the **Total** row, click the arrow, and then select **Avg**. Repeat for the next two **Price** columns selecting **Min** for the third column and **Max** for the last column.

SIDE NOTE

Pull Down Arrow

Alternatively, you can click the right side of the Total row and the pull down menu appears.

Total row added to query design grid

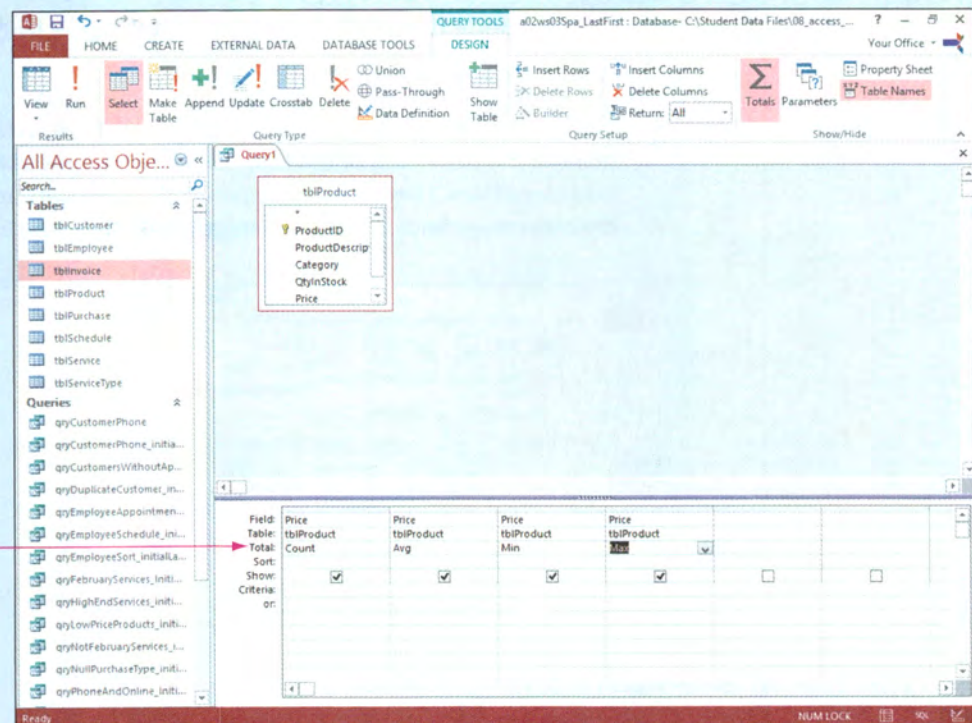


Figure 29 Aggregate functions selected for each column

- Click **Run** to run the query. Because this is an aggregate query and you are calculating one statistic per column, there will only be one record in the results.

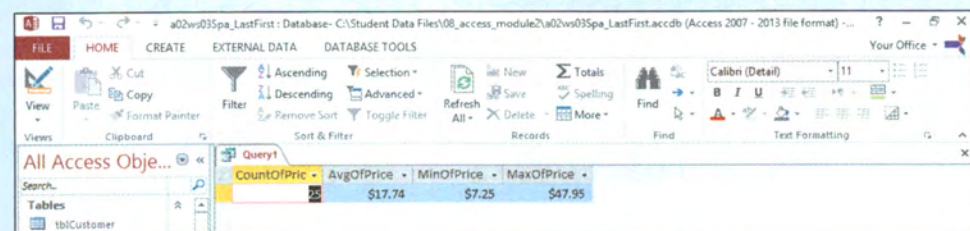


Figure 30 Aggregate query results

Changing Field Names

Field names in aggregate queries are a composite of the selected aggregate function and the table field name. For example, the Count function for Price is named CountOfPrice as shown in Figure 30. This is not particularly descriptive in what it actually shows is the number of products that have a price. The other functions are more descriptively named but still could have more useful names.

The field names assigned in an aggregate query can easily be changed either before or after the query is run. However, you must keep the original field name in the query design grid so Access knows what field to perform the calculation on. For this project, you will change the names of the fields in the aggregate query you just created.

A03.28



To Change the Field Names in an Aggregate Query

- Switch to **Design** view.
- Click in the **Field** row of the first column, and then press **Home** to move the insertion point to the beginning of the field name. Type **Count of Products:.** Do not delete the field name **Price**. The colon identifies the title as separate from the field name. Repeat for the other three fields and type **Average Price:.**, **Minimum Price:.**, and **Maximum Price:.**

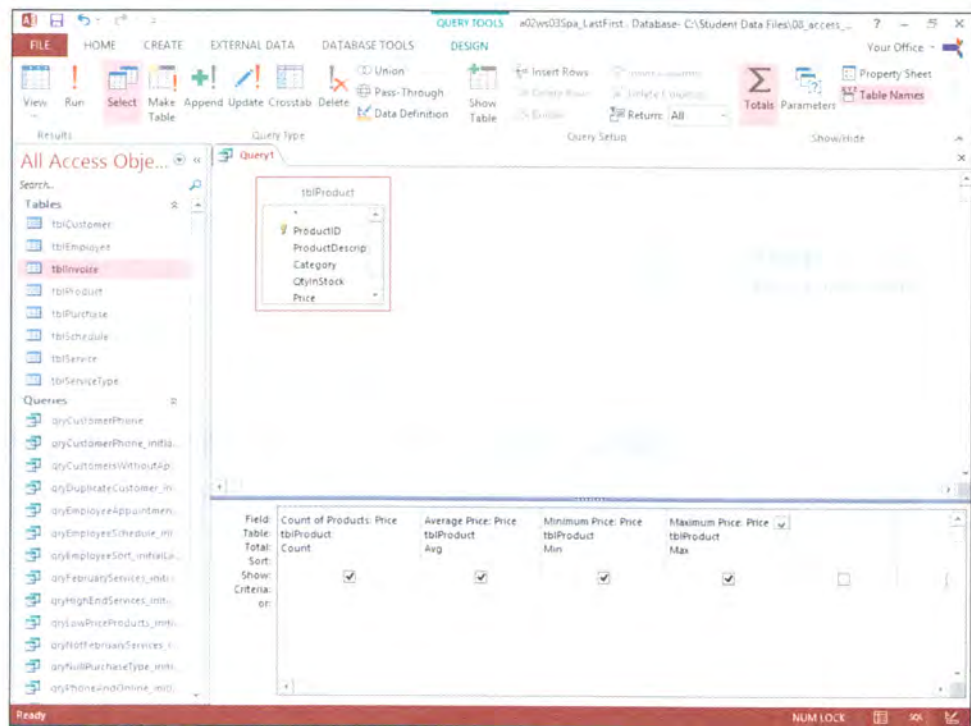


Figure 31 Field titles changed

- Click **Run** to run the query. Use the **AutoFit** feature on the columns to see the complete column names.
- Click **Save**  on the Quick Access Toolbar, under Query name type **qryProductStatistics_initialLastname** using your first initial and last name, and then click **OK**. Close  the query.

Creating Calculations for Groups of Records

Not only can you find statistical information on selected records using aggregate functions in a query, or for all records using the total row, you can also calculate statistics for groups of records. Creating a group to calculate statistics works the same way as an aggregate query but must include the field to group by. The additional field will not have a statistic selected for the total row, but instead it will have the default Group By entered in the total row.

For this exercise, you will help the spa manager find the same product price statistics you calculated above but this time grouped by product category.

A03.29



To Create a Group Calculation

- Click the **CREATE** tab, and then in the Queries group, click **Query Design**, and then double-click **tblProduct** to add the table to the query. Click **Close** to close the Show Table dialog box.
- Double-click **Category** to add it to the query design grid, and then double-click **Price** four times to add the field four times to the query design grid.
- On the DESIGN tab, in the Show/Hide group, click **Totals** to add a total row to the query design grid.
- In the first Price column, click in the **Total** row, click the **arrow**, and then select **Count**. In the second Price column, click in the **Total** row, click the **arrow**, and then select **Avg**. Repeat for the next two **Price** columns selecting **Min** for the third column and **Max** for the last column. Notice that the Category Total row displays Group By so the statistics will be grouped by each category type.
- Click **Run** to run the query. Notice that there are five total lines, one for each category of product.
- Switch to **Design** view.
- Change the titles for the Price fields to the following: **Number of Products**, **Average Price**, **Minimum Price**, and **Maximum Price** remembering to put a colon between the name and the Price field name. **Run** the query again. Use the **AutoFit** feature on the columns to best fit the data.

Category	Number of Products	Average Price	Minimum Price	Maximum Price
Bath	5	\$18.35	\$15.95	\$19.95
Body	7	\$17.61	\$10.50	\$22.50
Face	4	\$29.09	\$8.50	\$47.95
Foot	2	\$10.98	\$9.00	\$12.95
House Brand	7	\$12.89	\$7.25	\$19.95

Figure 32 Query results with field titles changed

- Click **Save** on the Quick Access Toolbar, under Query Name type **qryPriceStatisticsByCategory_initialLastname** using your first initial and last name, and then click **OK**. **Close** the query.

Troubleshooting an Aggregate Query

Caution should be used when using aggregate functions. Forgetting to add a function in the total row can cause a large number of records to be retrieved from the database, or a combination of records that do not make any sense. You must carefully select which field should have the Group By operator in the total row; many times only one field will use Group By. Combining search criteria and aggregate functions in a single query can make the query complex. It also makes troubleshooting more difficult if the query does not work. When in doubt, set all your criteria in one query and then use the aggregate functions in another query based on the query with the criteria. This way, you can first verify that your criteria worked and then concentrate on the aggregate function results.

For this exercise, the manager tried to create an aggregate query to calculate the total number of items and average number of items purchased by different methods—phone, online, and in person. The results made no sense, and she has asked you to help her figure out why.

A03.30



To Troubleshoot an Aggregate Query

- Double-click **qryPurchaseMethods** to open the query. Notice the results in the second and third columns are exactly the same, when the intent was to have one column contain a total and the other column contain an average.
- Switch to **Design** view. Look at the second column, **Quantity**, and notice the Total row shows the Group By operator instead of a function. Change this to **Sum**.
- Rename the second and third column field titles to **Total Quantity** and **Average Quantity**, remembering to put a colon between the name and the Quantity field name.
- Click **Run** to run the query. Use the **AutoFit** feature on the columns to best fit the data.
- Click the **FILE** tab, select **Save As**, click **Save Object As**, and then click **Save As**. Under Save 'qryPurchaseMethods' to: type **qryPurchaseMethods_initialLastname**, using your first initial and last name, and then click **OK**.

Formatting a Calculated Field

An aggregate query may give you the correct results, but the formatting may not be what you expected. The fields used in a query that come from a table use the formatting defined in the table design. However, calculated query fields must be formatted in the query design grid using the Field properties sheet. The **Property Sheet** contains a list of properties for fields in which you can make precise changes to each property associated with the field.

For this project, the manager does not want to see decimal places for the Average Quantity column, so you will show her how to change the formatting of that field.

A03.31



To Change the Formatting of a Calculated Field

- Switch to **Design** view.
- Click the **Average Quantity: Quantity** column. On the DESIGN tab, in the Show/Hide group, click **Property Sheet**.
- In the Property Sheet pane, on the General tab, click the **Format** box, click the **arrow**, and then select **Fixed**. Click the **Decimal Places** box, and then type **0**.

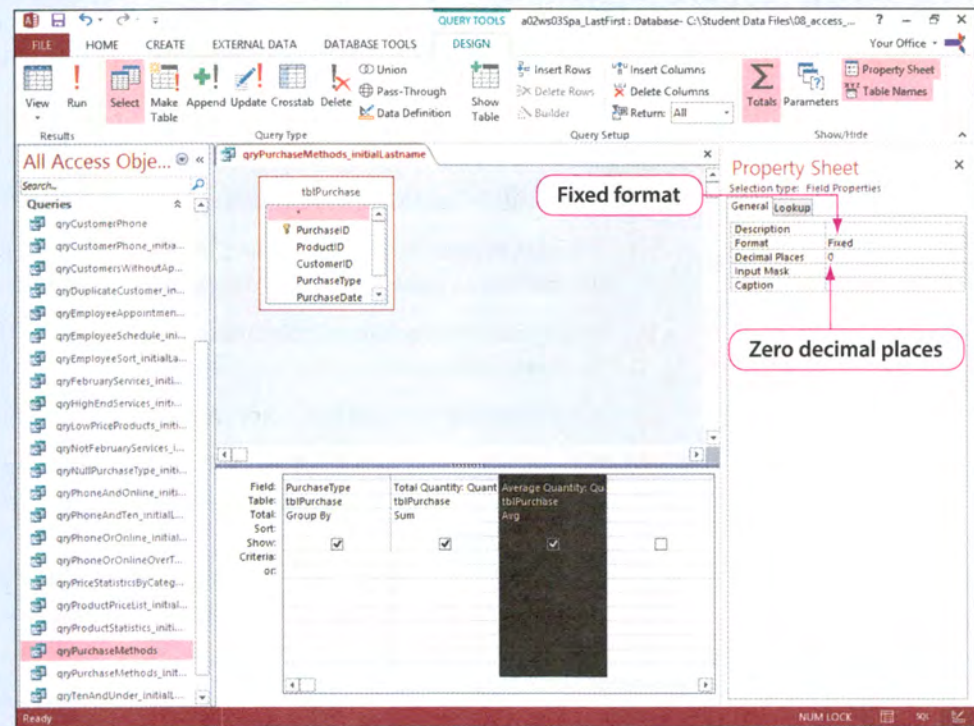


Figure 33 Property sheet open with changes

- Close** the Property Sheet pane, and then **run** the query again. The results should be formatted with no decimal places.
- Save** and **close** the query.



CONSIDER THIS

How Many Decimal Places?

Would having many decimal places for an average field give you a more accurate average? Why would you choose to show no decimal places on an average quantity field?

Create Calculated Fields

In addition to statistical calculations using aggregate functions, you can also perform an arithmetic calculation within a row of a query to create a new field. The result of the calculated field is displayed each time you run the query. However, this new field is not part of any other table.

A calculated field can be added to a query using the fields in the query or even fields in another table or query in the database. The calculation can use a combination of numbers and field values, which allows you flexibility in how you perform the calculation. For example, you can multiply a product price stored in the table by a sales tax rate that you enter into the calculation.

Building a Calculated Field Using Expression Builder

Expression Builder is a tool in Access that can help you format your calculated fields correctly. The Builder provides a list of expression elements, operators, and built-in functions. The capabilities of Expression Builder range from simple to complex.

For this exercise, you will help the spa manager create a query to show what the value of her inventory is using the Quantity in Stock and Price fields for each product.

A03.32



To Add a Calculated Field Using Expression Builder

- a. Click the **CREATE** tab, and then in the Queries group, click **Query Design**, and then double-click **tblProduct** to add the table to the query. Click **Close** to close the Show Table dialog box.
- b. Double-click **ProductDescription**, **Category**, **QtyInStock**, and **Price** to add the fields to the query design grid.
- c. Click in the **Sort** row, and then select **Ascending** for the **ProductDescription** field.
- d. Click **Save**  on the Quick Access Toolbar, under **Query Name**, type **qryProductInventory_initialLastName** using your first initial and last name, and then click **OK**.
- e. Click in the **Field** row in the fifth column, in the Query Setup group, click **Builder**. The Expression Builder dialog box opens, which is where you will build your formula for the calculation.
- f. Under Expression Categories, double-click **QtyInStock** to add the field to the expression box, type ***** for multiplication, and then under Expression Categories double-click **Price**. Move the insertion point to the beginning of the expression, and then type **Total Inventory:.**

SIDE NOTE

Expression Box

When you use multiple tables in Expression Builder, the table name is put in front of the field name with an exclamation mark.

Troubleshooting

When you click Expression Builder to create a calculated field, and you do not see your field names listed in the Expression Categories box in the middle of the dialog box, it may be that the query has not been saved yet. If the query is not saved, then the field names will not appear and you will have to type them in the Expression Builder manually instead of clicking them to select them. It is good practice to save your query first, and then open the Expression Builder to create a calculated field.

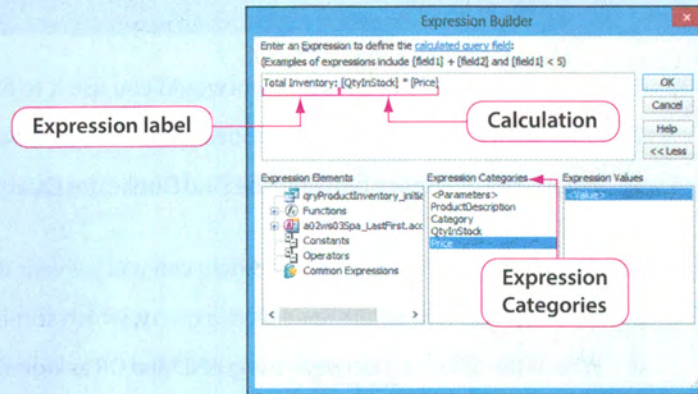


Figure 34 Expression Builder

- g. Click **OK** to save the expression and add it to the query design grid. Use the **AutoFit** feature on all columns.

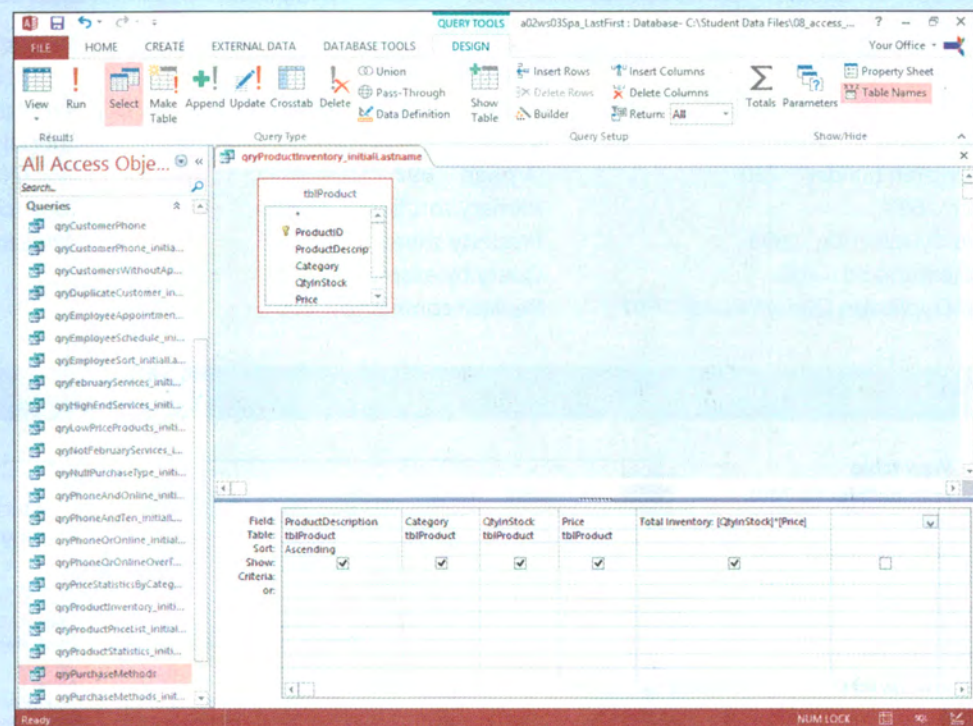


Figure 35 Design grid with calculated expression added

- h. Click **Run** to run the query. Use the **AutoFit** feature on the Total Inventory column to best fit the data. The results should show 25 records with a new column titled **Total Inventory** that multiplies the QtyInStock and the Price fields.
- i. Close ☒ the query, and then click **Yes** when prompted to save changes. **Close** Access.

Concept Check

1. What is a wildcard character? How would you use it to find a record? p. 692–693
2. Does modifying the datasheet appearance change the data in your database? p. 695
3. What is the difference between the Find Duplicates Query Wizard and the Find Unmatched Query Wizard? p. 696–698
4. What is the multiplier effect, and how can you prevent it from happening? p. 702, 705
5. If you sort on two different fields in a query, which sort is done first? p. 707
6. What is the difference between using AND and OR as logical operators in a query? p. 712–714
7. What is an aggregate query? Why would you add the same field multiple times to an aggregate query? p. 723–724
8. How does a calculated field differ from an aggregate function? p. 729–730

Key Terms

Aggregate function 723	Find Unmatched Query Wizard 698	Secondary sort field 707
AutoFit 695	Join lines 702	Sort field 706
Comparison operator 708	Logical operator 712	Sorting 706
Crosstab query 696	Multiplier effect 702	Special operator 720
Expression Builder 730	Orphan 697	Text filter 694
Filter 693	Primary sort field 707	Total row 723
Filter by selection 693	Property sheet 728	Wildcard character 690
Find command 690	Query by example 699	
Find Duplicates Query Wizard 697	Replace command 690	

Visual Summary

View table relationships (p. 703)

Select specific records using a selection filter (p. 694)

Find and replace records (p. 691)

Find and replace records in the datasheet (p. 690)

Remove a table from a query (p. 705)

Find unmatched records (p. 698)

Create a query from multiple tables (p. 704)

Find duplicate customer information (p. 697)

Run query wizards (p. 697)

Sort query results (p. 706)

Sort a query by more than one field (p. 707)

Find records in the datasheet (p. 690)

Customer ID	First Name	Last Name	Address	City	State	Phone
CU0-1	Raja	Mercedes	P.O. Box 875, 708 Suspensidse Street	Casper	ND	(701) 555
CU0-2	Emily	Rocha	2485 Fusce Street	Martinsburg	MN	(320) 555
CU0-3	Erica	Muer	636-7188 Sed Street	Murray	CT	(203) 555
CU0-4	Hamish	Dunn	Ap #206-7268 Amet Street	West Warwick	MI	(734) 555
CU0-5	Brenden	Rhodes	P.O. Box 772, 7168 A Road	Saipan	UT	(385) 555
CU0-6	Mercedes	Joseph	P.O. Box 735, 3036 Amet Street	Port Jervis	FL	(239) 555
CU0-7	Lois	Kinney	Ap #992-9224 Donec Street	West Lafayette	MT	(406) 555
CU0-8	Blaze	Buchanan	Ap #337-8497 Et Street	Clarksburg	UT	(385) 555
			P.O. Box 443, 1587 Donec Road	Derby	NC	(828) 555
			p #526-549 In Street	Bradbury	IN	(317) 555
			p #740-6878 Enim Street	Miami Beach	PA	(484) 555
			p #873-8407 In Street	Isle of Palms	NM	(505) 555
			80-2610 Eros Avenue	Spokane	AZ	(480) 555
			p #340-8569 Sed Road	Kona	CO	(303) 555
			P.O. Box 819, 9224 Euismod Road	Meridian	HI	(808) 555
CU0-16	Silas	Bond	4558 Sapien Avenue	Rye	PA	(484) 555
			P.O. Box 146, 8510 Ipsum Street	Darlington	ME	(207) 555
			P.O. Box 832, 3751 Donec Avenue	Gary	IN	(219) 555
			Ap #294-7647 Posuere Avenue	Suffolk	WI	(715) 555
			5880 Quam Street	Canton	MN	(320) 555
			512-5388 Dictum Avenue	Chicago Heights	AK	(479) 555
			8089 Nec Avenue	Orangeburg	MN	(320) 555
			4139 Ornare Avenue	Anchorage	IA	(319) 555
CU0-24	Marvin	Underwood	P.O. Box 819, 9224 Euismod Road	Meridian	HI	(808) 555
CU0-25	Troy				VA	(571) 555
CU0-26	First				NM	(505) 555

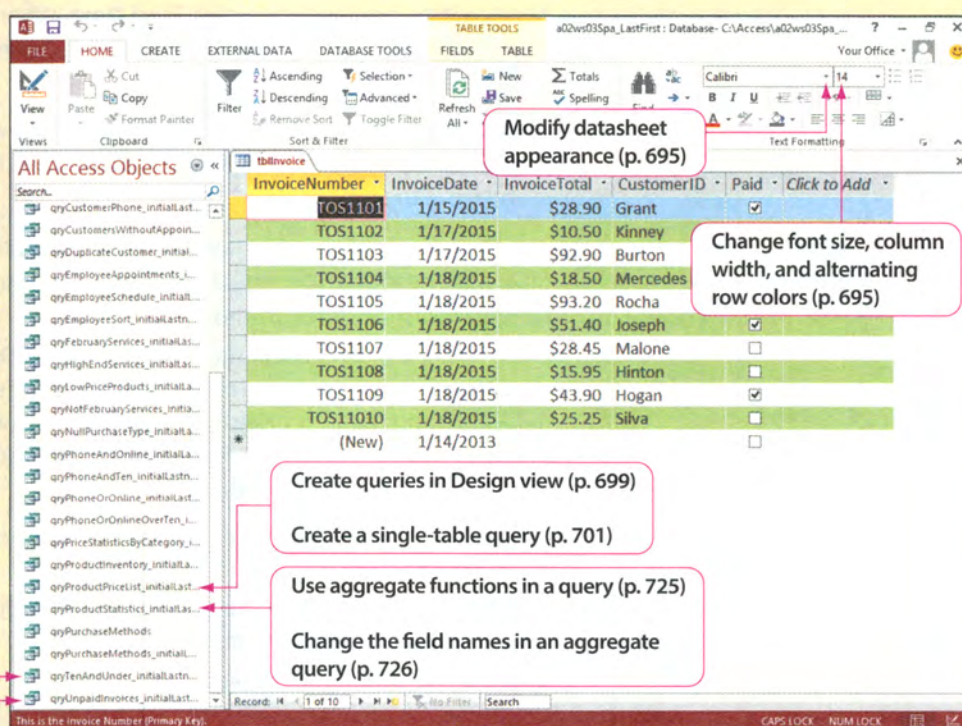
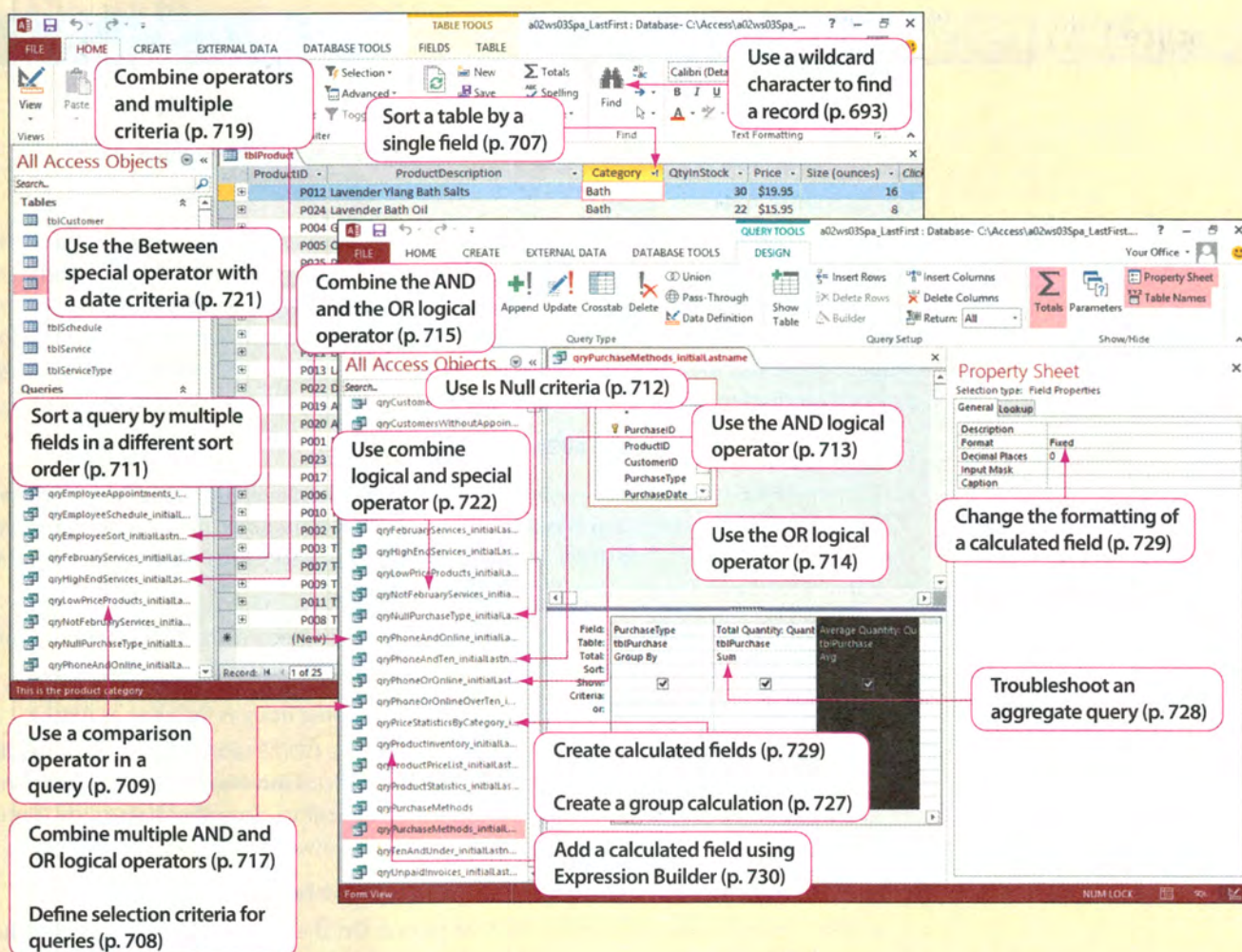


Figure 36 Turquoise Oasis Spa Data Management Final

Student data file needed:

 a02ws03Spa2.accdb

You will save your file as:

 a02ws03Spa2_LastFirst.accdb


Sales & Marketing

Turquoise Oasis Spa

The resort is considering hosting a large convention and is trying to sign a multiple-year contract with an out-of-town group. The spa is being asked to provide information about the services, products, and packages it offers. All the information can be found in the database, but it needs to come together in a coherent fashion. You have been asked to answer a number of questions about the spa and provide information to help answer those questions. You will also look for discrepancies or mistakes in the data, and correct them as necessary.

- a. Start **Access**, and then open **a02ws03Spa2**.
- b. Click the **FILE** tab, and then select **Save As**. Make sure **Save Database As** and **Access Database** are selected. Click **Save As**. In the Save As dialog box, navigate to where you are saving your files, and then type **a02ws03Spa2_LastFirst**, using your first and last name. Click **Save**. If necessary, click **Enable Content**.
- c. Double-click **tblCustomer** to open the table. Add a new record with your first name and last name, your address, your city, your state, your phone, and your e-mail address.
- d. Use the **Find** command to find spa customers who come from as far away as Alaska.
 - Click in the **State** column for the first record. On the **HOME** tab, in the Find group, click **Find**. Type **AK** in the Find What box, and then click **Find Next** until Access finishes searching the table. Click **OK**, and then click **Cancel** to close the dialog box. Notice that the Alaska address selected is really a city in Hawaii.
- e. Use the Replace command to replace **AK** with **HI** in the table.
 - Click in the **State** column for the first record. On the **HOME** tab, in the Find group, click **Find**. Click the **Replace** tab, and type **AK** in the Find What box. Type **HI** in the Replace With box, and then click **Find Next**. When Customer ID CU0-21 is selected, click **Replace**. Click **Find Next** to check for any more similar errors. Click **OK**, and then click **Cancel** to close the dialog box.
- f. Click the **arrow** on the **State** field column, point to **Text Filters**, select **Begins With**, type **H** in the State begins with box, and then click **OK**. Verify there are three records selected. Save and close the table.
- g. Create a query to find which products are purchased by more than one customer.
 - Click the **CREATE** tab, and then in the Queries group, click **Query Wizard**. Click **Find Duplicates Query Wizard**, and then click **OK**.
 - Click **Table: tblPurchase**, and then click **Next**. Double-click **ProductID**, and then click **Next**. Click the **All Fields** button to add all the fields to the Additional query fields box, and then click **Next**. Under "What do you want to name your query?" type **qryDuplicateProducts_initialLastname** using your first initial and last name, and then click **Finish**. Close the query.
- h. Create a query to find out which employees currently do not have any customer appointments at the spa.
 - Click the **CREATE** tab, and then in the Queries group, click **Query Wizard**. Click **Find Unmatched Query Wizard**, and then click **OK**.
 - Click **Table: tblEmployee**, and then click **Next**. Select **Table: tblSchedule**, and then click **Next**. Verify that Matching fields shows **EmployeeID <=> Employee**, and then click **Next**. Click the **All Fields** button to add all the fields to the Selected fields column, and then click **Next**.

- Name the query **qryEmployeesWithoutAppointments_initialLastname**, using your first initial and last name, and then click **Finish**.
 - Switch to **Design** view. Click the **Sort** row for the EmpLastName field, click the **sort** arrow, and then click **Ascending** to sort the query in ascending order by Last Name. On the DESIGN tab, in the Results group, click **Run** to run the query. Close the query, and then click **Yes** when prompted to save the changes.
- i. Create a query to list any customers who are not from New Mexico who have purchased bath products.
- Click the **CREATE** tab, and then in the Queries group, click **Query Design**. Double-click **tblCustomer**, **tblPurchase**, and **tblProduct** to add the tables to the query window. Click **Close** to close the Show Table dialog box.
 - In the following order, from **tblCustomer** double-click **CustLastName**, **CustFirstName**, **CustState**; from **tblPurchase** double-click **PurchaseDate**; from **tblProduct**, double-click **ProductDescription**; and from **tblPurchase**, double-click **Quantity** to add the fields to the query design grid. Click the **Sort** row for the CustLastName and CustFirstName fields, and then select **Ascending**.
 - In the **Criteria** row for **CustState**, type **Not NM**. In the same Criteria row for **ProductDescription**, type **Like *Bath***.
 - On the DESIGN tab, in the Results group, click **Run** to run the query.
 - Click **Save** on the Quick Access Toolbar, name the query **qryBathProductsNotNM_initialLastname** using your first initial and last name, and then close the query.
- j. Create a query to list the spa's services by Type, Name, LengthOfService, and Fee.
- On the **CREATE** tab, in the Queries group, click **Query Design**. Double-click **tblService** and **tblServiceType** to add the tables to the query window. Click **Close** to close the Show Table dialog box.
 - In the following order, from **tblServiceType** double-click **Type**, and from **tblService** double-click **ServiceName**, **LengthOfService**, and **Fee** to add the fields to the query design grid. Click the **Sort** row for the Type field, select **Ascending**, and then for the Fee field, select **Descending**. On the DESIGN tab, in the Results group, click **Run** to run the query.
 - Use the **AutoFit** feature on all columns. Click **Save** on the Quick Access Toolbar, name the query **qryServicesAndFees_initialLastname** using your first initial and last name, and then close the query.
- k. Create a query to find how much each customer spent on their product purchase, including 8% sales tax, but only if the purchase was a quantity greater than 1.
- Click the **CREATE** tab, and then in the Queries group, click **Query Design**. Add **tblProduct**, **tblPurchase**, and **tblCustomer** to the query window. Click **Close** to close the Show Table dialog box. From **tblProduct**, double-click **ProductDescription** and **Price**; from **tblPurchase**, double-click **Quantity**; and from **tblCustomer**, double-click **CustFirstName** and **CustLastName** in that order to add the fields to the query design grid.
 - Click in the **Criteria** row for Quantity, and then type **>1**. Click **Save** on the Quick Access Toolbar, name the query **qryTotalPurchase_initialLastname** using your first initial and last name, and then click **OK**.
 - In the sixth column, click in the **Field** row, and then on the DESIGN tab, in the Query Setup group, click **Builder**. Double-click **Price** to add it to the expression, type *****, double-click **Quantity** to add it to the expression, type *****, and then type **1.08**. Click at the beginning of the expression, type **Total Purchase with tax;**, and then click **OK**.
 - Click the **Sort** row for the Quantity field, click the **arrow**, and then click **Ascending**. In the Results group, click **Run** to run the query.
 - Switch to **Design** view. Click the **Total Purchase with tax** field, on the DESIGN tab, in the Show/Hide group, click **Property Sheet**. On the Property Sheet's General tab, click the **Format** arrow, and then select **Currency**. Click the **Decimal Places**

arrow, and then select **2**. Close the Property Sheet, and then on the DESIGN tab, in the Results group, click **Run** to run the query. The Total Purchase with tax field should be formatted with currency and two decimal places.

- Use the **AutoFit** feature on all the columns.
 - Close the query, and then click **Yes** when prompted to save the changes.
- l.** Create an aggregate query to find the average, minimum, and maximum fee for each type of service the spa offers.
- Click the **CREATE** tab, and then in the Queries group, click **Query Design**. Add **tblService** to the query window. Click **Close** to close the Show Table dialog box. Double-click **Type** one time, and then double-click **Fee** three times in that order to add the fields to the query design grid. In the Show/Hide group, click **Totals** to add the Total row to the query design grid.
 - Click in the **Total** row, for the first Fee column, click the **arrow**, and then click **Avg**. For the second Fee column select **Min**, and for the third Fee column select **Max**. Click in the **Sort** row in the Type field, click the **arrow**, and then select **Ascending**. In the Results group, click **Run** to run the query.
 - Switch to **Design** view. Change the names of the three Fee columns to **Average Fee**, **Minimum Fee**, and **Maximum Fee** in that order, remembering to put a colon before the Fee field name. In the **Results** group, click **Run** to run the query.
 - Use the **AutoFit** feature on all the columns.
 - Click **Save** on the Quick Access Toolbar, name the query **qryFeeStatistics_initialLastname** using your first initial and last name, and then click **OK**. Close the query.
- m.** Close Access. Submit your file as directed by your instructor.

Problem Solve 1

MyITLab[®]
Grader
Homework 1



Production &
Operations

Student data file needed:

 a02ws03Baseball.accdb

You will save your file as:

 a02ws03Baseball_LastFirst.accdb

Baseball Academy

Matt Davis is a retired baseball player who runs the Baseball Academy, an indoor baseball facility for middle school, high school, and college players. He offers lessons as well as practice times for individuals and teams. Due to his growing clientele and increased record keeping needs, Matt wants all his records in a database. While he has already set up a database, he now needs to take the database to the next level of performance by improving his ability to get specific data from the database. He has hired you to create the queries he will need to get this information.

- a.** Start **Access**, and then open **a02ws03Baseball**. Click the **FILE** tab, and save the file as an **Access Database** in the location where you store your files with the name **a02ws03Baseball_LastFirst** using your first and last name. If necessary, enable the content.
- b.** Open **tblMember**, and then add a new record with your **first name**, **last name**, **address**, **city**, **state**, zip code of **87594**, and **phone**. Create a filter to show only those members who have a zip code of **87594**. Save and close the table.
- c.** Modify **tblPayments** so the font type is **Arial** and the font size is **14**. Adjust the column widths appropriately. Save and close the table.
- d.** Create a Find Duplicates Query that will show members who have the same address. Show all the fields in the query results. Name the query **qryDupAddresses_initialLastname** and then close the query.

- e. Create an Unmatched Query that will return the last name, first name, address, city, state, zip code, and phone of anyone who is listed as a member in **tblMember** but has not made a payment matching on MemberID. Name the query **qryNonPayment_initialLastname**. Sort by last name and first name, and then save and close the query.
- f. Create a query that will return the **member last name, first name, amount, and payment date**. Sort the query in ascending order first by last name then by first name. Name the query **qryPayments_initialLastname**.
 - Add a total row to show the sum of total payments made. Save and close the query.
- g. Create a query that returns all the employees that have **Instructor** in their position. Include employee **first name, last name, and position**. Sort them by salary—highest to lowest but do not show the salary in the result. Name the query **qryInstructors_initialLastname**. Save and close the query.
- h. Create a query to calculate employee salaries with a 3% raise. Include the employee's **last name, first name, and salary**. Name the query **qryRaises_initialLastname**.
 - The new calculated field is salary * 1.03 and should be called **SalaryWithRaise**. Format the new field as **Currency** with **Auto** decimal places, and then sort the results by SalaryWithRaise from highest salary to lowest.
 - Adjust the column widths as necessary. Include total payroll before and after the raises at the bottom of the datasheet. Save and close the query.
- i. Create a query that returns the sum, average, minimum, and maximum of all the employee salaries. Name the fields **Total Salary, Average Salary, Minimum Salary, and Maximum Salary**. Adjust the column widths to fit. Name the query **qrySalaryStats_initialLastname**. Save and close the query.
- j. Create a query that includes the member's **last name, first name, scheduled date, and fee** for any lesson between June 1 and June 30, 2015, which is greater than or equal to \$250. Sort by last name and first name. Name the query **qryBigJuneFees_initialLastname**. Save and close the query.
- k. Save and close the database. Submit your file as directed by your instructor.

Perform 1: Perform in Your Career

Student data file needed:



a02ws03Roadhouse.accdb

You will save your file as:



a02ws03Roadhouse_LastFirst.accdb



Production &
Operations

Beverage Database at The Roadhouse Bar and Grill

You are the bar manager at The Roadhouse Bar and Grill, a local restaurant that specializes in home-cooked meals for breakfast, lunch, and dinner. You have developed a database for managing the inventory of beverage items.

You will expand the database by creating queries to help you manage the database. You have loaded a few sample transactions to help you develop these queries. For each query, choose which fields you need and which sort order makes sense.

- a. Start **Access**, open **a02ws03Roadhouse**, and then save it as **a02ws03Roadhouse_LastFirst**.
- b. Open **tblSuppliers**, and then change the name of the first supplier to your full name.
- c. Open each table and familiarize yourself with the fields. Open the relationships window and note how the tables are related.
- d. Change **tblSales** to have a larger font and alternating row colors.

- e. Create a query that shows sales of beverages from suppliers in Maryland. Show the **Supplier Name** and **State**, the **Sales Date**, and beverage fields that make sense. Sort by fields that make sense. Save the query as [qryMarylandSupplierSales_initialLastname](#).
- f. Create a query to see if there are any Suppliers that are not supplying you with any beverages. Hint: this is a Find Unmatched Query. Save the query as [qrySuppliersWithoutBeverages_initialLastname](#).
- g. Create a query that shows beverages that have soda in their name, their size, the container type, and the suppliers that supply them. Sort by fields that make sense. Save the query as [qrySodaSuppliers_initialLastname](#).
- h. Create a query that shows all juices that were sold in February 2015. Sort by fields that make sense. Save the query as [qryFebruaryJuiceSales_initialLastname](#).
- i. Create a query that shows all root beer or cola sold in a bottle with the sale date. Sort by fields that make sense. Save the query as [qryBottleSales_initialLastname](#).
- j. Create an aggregate query that shows the average price, minimum price, and maximum price for each beverage serving. Hint: Group by beverage. Sort by fields that make sense. Save the query as [qryBeveragePriceStatistics_initialLastname](#).
- k. Create a query that calculates for each beverage the number of servings per container—container size divided by serving size. Sort by fields that make sense. Save the query as [qryBeverageServings_initialLastname](#).
- l. Create another query that you would find useful in your job.
- m. Submit your file as directed by your instructor.



Additional
Cases

Additional Workshop Cases are available on the companion website and in the instructor resources.

Microsoft Office Access 2013

Module 2

Accessing, Maintaining, and Presenting Information

WORKSHOP 4 | ACCESS INFORMATION FROM AN ACCESS DATABASE

OBJECTIVES

1. Navigate in datasheets and forms p. 740
2. Update table records using forms p. 748
3. Create a form using the Form Wizard p. 751
4. Modify a form's design p. 756
5. Create a report using the Report Wizard p. 762
6. Customize a report p. 770
7. Save a report as a PDF file p. 777

Prepare Case

Turquoise Oasis Spa's New Database

The Turquoise Oasis Spa has a database with customer, employee, product, and service information for easier scheduling and access. An intern created the database, and the manager and staff members are struggling to use the database to its full-est capacity. You have recently been hired to work in the office of the spa and you have knowledge of Access, so the manager has asked for your help in maintaining the records and creating forms and reports to help better use the data in the database.



Production & Operations



Zadorozhnyi Viktor / Shutterstock

REAL WORLD SUCCESS



"After I started using Access for entering my data and running reports, my supervisor asked if I could set up a database for my coworker to use for her job. She didn't know Access so I created forms for her data entry. She just enters today's data and runs her daily reports."

- Elaine, marketing analyst and alumnus

Student data files needed for this workshop:



a02ws04Spa.accdb



a02ws04Spa.thmx



a02ws04Spa.jpg

You will save your files as:



a02ws04Spa_LastFirst.accdb



a02ws04SpaEmployeeSchedule_LastFirst.pdf

Creating Customized Forms

Recall that forms are the objects in Access that are used to enter, edit, or view records in a table. Data can be entered, edited, or viewed directly in the table or in a form. Each option offers advantages and disadvantages.

In Datasheet view, data may be updated directly in the table where it is stored. When updating data in a table, you will be in Datasheet view. Datasheet view shows all the fields and records at one time, which provides all the information you need to update your data, unlike in a form or query, where some of the fields or records may not be in view. This section starts by describing how to navigate in datasheets and forms, continues to editing data in a table, and then finishes by discussing how to edit data in a form.

Navigate in Datasheets and Forms

As you may recall, you can navigate from record to record or field to field in a database using the Navigation bar, or in Navigation mode by using **Tab**, **Enter**, **Home**, **End**, **↑**, **↓**, **←**, and **→**. **Navigation mode** allows you to move from record to record and field to field using keystrokes. To update data in a table, you must be in Edit mode. **Edit mode** allows you to edit, or change, the contents of a field. To switch between Navigation mode and Edit mode, press **F2**.

If you can see the blinking insertion point in a field, you are in Edit mode. When the text of a field is selected and highlighted, you are in Navigation mode.

QUICK REFERENCE		Keystrokes Used in Navigation Mode and Edit Mode
Keystroke	Navigation Mode	Edit Mode
→ and ←	Move from field to field	Move from character to character
↑ and ↓	Move from record to record	Switch to Navigation mode and move from record to record
Home	Moves to the first field in the record	Moves to the first character in the field
End	Moves to the last field in the record	Moves to the last character in the field
Tab and Enter	Move one field at a time	Switch to Navigation mode and move from field to field
Ctrl + Home	Moves to the first field of the first record	Moves to the first character in the field, same as Home
Ctrl + End	Moves to the last field of the last record	Moves to the last character in the field, same as End

Opening the Starting File

The spa collects data about customers, employees, products, and services and uses them for scheduling. You will open the spa database to get started.

A04.00



To Open the a02ws04Spa Database

- Start **Access**, and then open the student data file **a02ws04Spa**.
- On the **FILE** tab, save the file as an **Access Database** in the location designated by your instructor with the name **a02ws04Spa_LastFirst** using your first and last name. If necessary, enable the content.

Editing a Table in Datasheet View

Datasheet view shows all the records and fields at one time, which is one advantage to using it to update your records. Another advantage is the ability to see all the records in the table, which gives you a perspective on the data you are entering. For this exercise, the staff has received a note from a customer who has changed his phone number. You will show the spa staff how to change that customer's record in the Customer table.

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SIDE NOTE

Prefix for Key

When you click CustomerID, the "CU0" disappears. The key is defined as numeric but has a prefix identifying the table it is key to.

A04.01



To Edit a Record in a Table in Datasheet View

- In the Navigation Pane, double-click **tblCustomer** to open the table.
- Locate the customer with the Customer ID **CU0-12** and the last name **Hinton**.
- Click in the **CustomerID** field, and then press **[Tab]**. You are now in Navigation mode, and the First Name field should be highlighted.

Customer ID	First Name	Last Name	Address	City	State	Phone
CU0-1	Raja	Mercedes	P.O. Box 875, 708 Suspenside Street	Casper	ND	(701) 555-8
CU0-2	Emily	Berg	2485 Fusce Street	Martinsburg	MN	(320) 555-4
CU0-3	Erica	Rocha	636-7188 Sed Street	Murray	CT	(203) 555-3
CU0-4	Hamish	Dunn	Ap #206-7268 Amet Street	West Warwick	MI	(734) 555-2
CU0-5	Brenden	Rhodes	P.O. Box 772, 7168 A Road	Saipan	UT	(385) 555-4
CU0-6	Mercedes	Joseph	P.O. Box 735, 3096 Amet Street	Port Jervis	FL	(239) 555-4
CU0-7	Lois	Kinney	Ap #992-9224 Donec Street	West Lafayette	MT	(406) 555-7
CU0-8	Blaze	Buchanan	Ap #337-8497 Et Street	Clarksburg	UT	(385) 555-0
CU0-9	Guy	Bowers	P.O. Box 443, 1587 Donec Road	Derby	NC	(828) 555-3
CU0-10	Fallon	Tanner	Ap #526-549 In Street	Bradbury	IN	(317) 555-6
CU0-11	Lavinia	Malone	Ap #740-6878 Enim Street	Miami Beach	PA	(484) 555-6
CU0-12	Dinar	Hinton	Ap #873-8407 In Street	Isle of Palms	NM	(905) 555-9
CU0-13	Haviva	Hogan	480-2610 Eros Avenue	Spokane	AZ	(480) 555-3
CU0-14	Nero	Perkins	Ap #340-8569 Sed Road	Kona	CO	(303) 555-4
CU0-15	Genevieve	Burton	P.O. Box 819, 9224 Euismod Road	Meridian	HI	(808) 555-8
CU0-16	Silas	Bond	4558 Sapient Avenue	Rye	PA	(484) 555-4
CU0-17	Jonah	Hogan	P.O. Box 146, 8510 Ipsum Street	Darlington	ME	(207) 555-3
CU0-18	Harper	Henderson	P.O. Box 832, 3751 Donec Avenue	Gary	IN	(219) 555-2
CU0-19	Otto	Blake	Ap #294-7647 Posuere Avenue	Suffolk	WI	(715) 555-4
CU0-20	Eden	Silva	5880 Quam Street	Canton	MN	(320) 555-4
CU0-21	Samson	Travis	512-5388 Dictum Avenue	Honolulu	AK	(479) 555-7
CU0-22	Raja	Cleveland	8089 Nec Avenue	Orangeburg	MN	(320) 555-0
CU0-23	Kibo	Grant	4139 Ornare Avenue	Anchorage	IA	(319) 555-3
CU0-24	Marvin	Underwood	P.O. Box 819, 9224 Euismod Road	Meridian	HI	(808) 555-8
CU0-25	Troy	Meadows	P.O. Box 369, 6183 Cursus Road	Las Vegas	VA	(571) 555-6
(New)						

Figure 1 Table in navigation mode

- d. Continue pressing **Tab** until the **Phone** field is highlighted. Press **F2** to switch from Navigation mode to Edit mode. Notice the insertion point is at the beginning of the Phone field and the first character is highlighted. Type **5055552923** to enter the new phone number. Because the field is already formatted as a phone number, it is not necessary to enter parentheses or dashes.
- e. Press **Tab** to switch to Navigation mode and move to the next field.
- f. **Close** **X** the table.



CONSIDER THIS

Why Put a Prefix Before a Primary Key?

CustomerID, the primary key for tblCustomer, is defined as AutoNumber but formatted to have the prefix "CU0-" (0 is a zero) before the number field. Similarly, EmployeeID, the key for tblEmployee, is formatted to have "EMP-" as a prefix before the number field. What is the advantage of putting a prefix before the primary key to a table? Are there disadvantages? Why were these two prefixes chosen?

Navigating Forms and Subforms

A form is an object in Access that you can use to enter, edit, or view records in a table. A simple form allows you to see records one at a time rather than as a group in Datasheet view.

REAL WORLD ADVICE

Data Overload!

You may be asked to create a database for someone else that is not familiar with how a database works or even how the computer works. Your role is to make their job as easy as possible so they can get their work done with as few errors as possible.

Looking at a database table with hundreds or thousands of records in Datasheet view can be very intimidating to some people. Trying to keep track of the record or field you are in can be more difficult as the table grows larger and larger. Often seeing one record at a time in a form can eliminate data entry errors and allow the user to focus on the information for that particular record.

You navigate records in a form the same way you navigate a table, using buttons on the Navigation bar to move from record to record.

QUICK REFERENCE		Navigation Buttons on the Navigation Bar
Button	Description	What it does
	First record	Moves to the first record in the table
	Last record	Moves to the last record in the table
	Previous record	Moves to the record just before the current record
	Next record	Moves to the record just after the current record
	New (blank) record	Moves to a new row to enter a new record

When you create a form from two tables that have a one-to-many relationship, the first table selected becomes the **main form** and the second table you select becomes the **subform**. A form with a subform allows you to see one record at a time from the main form and multiple records in Datasheet view from the other related table. Because you only see one record at a time or one record and a datasheet, navigation tools become important when you are working with forms as you cannot see all the records at one time.

Navigating a Main Form

Within each record, you can use a combination of **Tab**, **Home**, **Enter**, and **End**, as well as , , , , to move from field to field as shown in the Quick Reference Box.

QUICK REFERENCE		Navigating Forms
Navigating a main form		
Keystroke	What it does	
Tab	Moves from field to field within a record; at the last field in a record, it moves you to the first field in the next record.	
Home	Moves to the first field of the current record.	
Ctrl + Home	Moves to the first field of the first record of the table.	
End	Moves to the last field of the current record.	
Ctrl + End	Moves to the last field of the last record of the table.	
 ,  ,  , 	Move up or down a field of the current record.	

(Continued)

Navigating a form with a subform

Keystroke	What it does
	Moves from field to field within a main record. At the last field in a record, it moves to the first field in the subform. At the last record in the subform, it moves to the first field in the next record of the main form.
	From the main form, moves to the first field of the current record. From the subform, moves to the first field of the current record in the subform.
 + 	From the main form, moves to the first field of the first record. From the subform, moves to the first field of the first record in the subform.
	From the main form, moves to the last field of the current record in the subform. From the subform, moves to the last field of the current record in the subform.
 + 	From the main form, moves to the last field of the last record of the subform. From the subform, moves to the last field of the current record of the subform.
 ,  ,  , 	Move up or down a field in the current record in either the form or subform.

For this exercise, you will show the spa staff how to navigate the form `frmEmployee`, which is a list of all employees, one record at a time.

A04.02

To Navigate a Single-Table Form

- On the Navigation Pane, double-click **frmEmployee** to open the form.
- Click **Last record**  to go to the last record of the table.
- Click **First record**  to return to the first record in the table.
- Click **Next record**  to go to the next record in the table.
- Click **Previous record**  to go back to the previous record in the table.
- Click **Close**  the form.

Navigating a Form with a Subform

When navigating forms with a subform, the Navigation bar buttons at the bottom of the main window are used to navigate the records in the main form, and a second Navigation bar at the bottom of the subform datasheet is used to navigate the records in the subform.

The same navigation keystrokes are used; however, they work a little differently when a subform is included.

For this exercise, you will show the spa staff members how to navigate the form `frmCustomerPurchases`, which shows one customer at a time with all their recent product purchases.

A04.03



To Navigate a Multiple-Table Form with a Subform

- a. On the Navigation Pane, double-click `frmCustomerPurchases` to open the form.

Notice that the form has two parts. At the top is the main form that shows information about the customer. The lower part is the subform that shows all the purchases made by the customer. There are also two navigation bars, one for the main form and one for the subform.

The screenshot shows the Microsoft Access interface with the 'Customer Purchases' form open. The form is divided into two sections: a main form at the top for customer details and a subform at the bottom for purchase history. The subform is in Datasheet view, displaying two records. The navigation bars for both the main form and the subform are visible at the bottom of their respective sections. Red boxes and arrows highlight the 'Last record' buttons on both navigation bars. The status bar at the bottom of the window indicates 'This is the Customer's First Name'.

Purchase Date	Purchase Type	ProductDescription	Price	Quantity
1/18/2015	In Person	New Mexico Mud Mask	\$8.50	3
1/18/2015	In Person	Turquoise Oasis Foot Care Cream	\$10.00	1

Main form Last Record button on the Navigation bar

Subform Last Record button on the Navigation bar

Figure 2 Form with a subform in Datasheet view

- b. Click **Last record** on the subform Navigation bar to highlight the last record in the subform.
- c. Click **Last record** on the main form Navigation bar to go to the last record in the table.
- d. Click **Previous record** repeatedly to go to record 20 with the customer name Eden Silva.
- e. Click **Next record** in the subform to go to the next record in the subform.
- f. Click **Close** the form.

Navigating a Split Form

A split form is a form created from one table, but it has a Form view and a Datasheet view in the same window. You can view one record at a time at the top of the window, and see the whole table in Datasheet view at the bottom of the window. This kind of form is helpful when you want to work with one record at a time and still see the big picture in the main table. In a split form, there are buttons on the Navigation bar to move only from record to record, and each record shown at the top is the record highlighted in the datasheet at the same time. You cannot highlight a different record in the form part and the datasheet part at the same time.

For this exercise, you will show the spa staff how to navigate the form `frmMasterSchedule`, which shows the schedule as a form and a datasheet in the same window.

A04.04



To Navigate a Split Form

- On the Navigation Pane, double-click **frmMasterSchedule** to open the form.
- Click **Last record** on the Navigation bar to highlight the last record in both the form and the datasheet.
- Click the **record selector** in the datasheet with **Schedule ID S046**. The record will be highlighted in the datasheet and also be shown at the top in Form view.

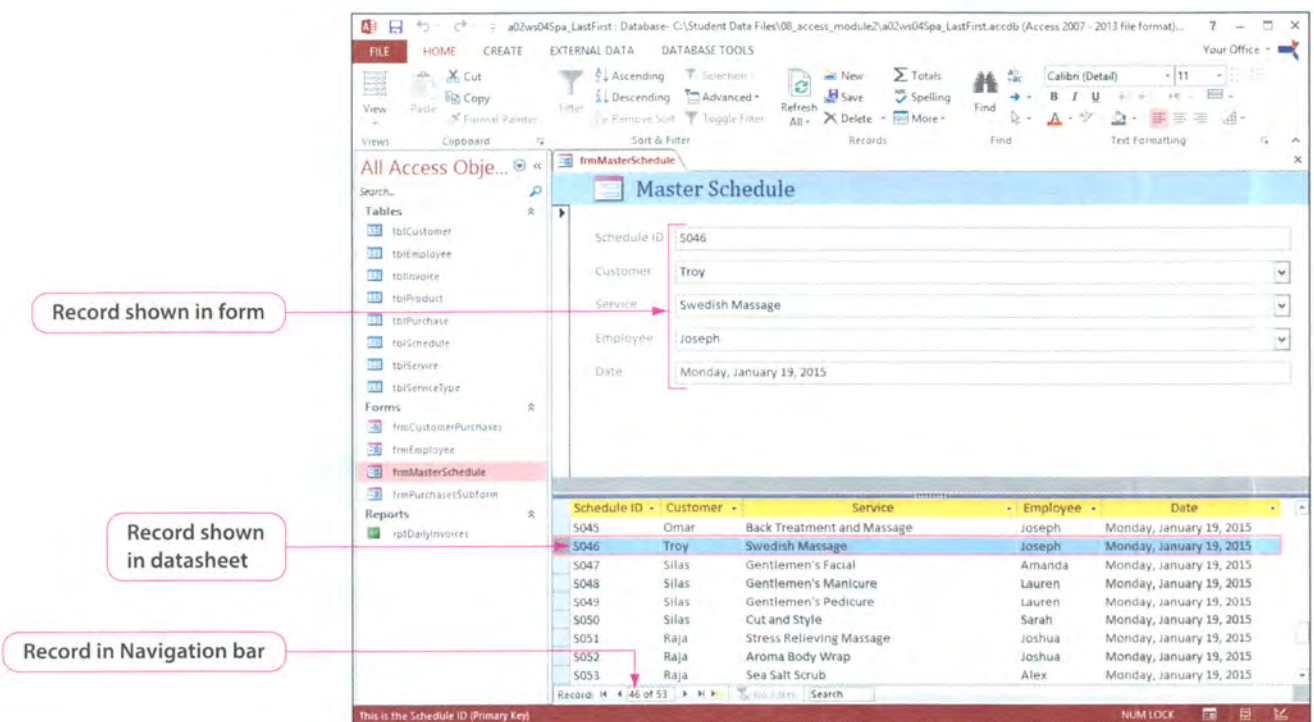


Figure 3 Navigating a split form

- Close the form.

REAL WORLD ADVICE

Using Tabs

People have become accustomed to using tabs in browsers, and they tend to have many tabs open at one time. In fact, it makes work more efficient because you do not have to keep opening and closing those windows. Unfortunately, Access does not work the same way. Every time you open an object in Access it opens in a new window with a tab. Those tabs, however, do not work the same way as tabs in your browser. While websites can be updated when they are open in a tab on your desktop, Access objects cannot be updated when they are open. It is therefore a good idea to close an object when you are done working with it, and then reopen it again later when you need it.

Using the Find Command in a Form

Finding data in a form is similar to finding data in a datasheet—you use the Find command. Because you only see one record at a time with a form, using Find can be a quick way to find a record with a specific value in a field and prevents you from having to scroll through all the records in the table one at a time in Form view.

When you are looking for a specific value in a field, you are looking for an exact match. For this exercise, a staff member has asked you to search the employee table to find any employees who may live in Las Vegas so they can try to set up a carpool with them. You will show the staff member how to use a form to look for that information.

A04.05



To Use the Find Command in a Form

- On the Navigation Pane, double-click **frmEmployee** to open the form. Press **[Tab]** to move to the **City** field in the first record.
- On the HOME tab, in the Find group, click **Find** to open the Find and Replace dialog box.
- In the **Find What** box, type **Las Vegas**. Verify that the Look In text box is Current field, and then click **Find Next**.

Move the Find and Replace dialog box to see all the fields for the current record. The first record with Las Vegas as a value in the City field will be shown.

Troubleshooting

If you get the message that the search item was not found, make sure that you spelled "Las Vegas" correctly.

Las Vegas entered in box

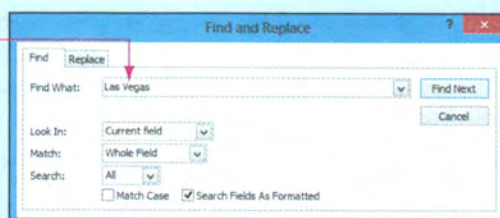


Figure 4 Find and Replace dialog box

- Continue to click **Find Next** until Access gives you the message "Microsoft Access finished searching the records. The search item was not found." Click **OK**, and then click **Cancel** to close the Find and Replace dialog box.

Update Table Records Using Forms

Just as you can update data in a datasheet, you can also update data in a form. Remember, a form is just another way to view the data in the table, so when you see a record, you are seeing the record that is actually stored in the table. Nothing is actually stored in the form.

To make changes to data in a form, you must be viewing the form in Form view. You can also add a record to a table using the form. Using the Navigation bar, you can go directly to a new record.

QUICK REFERENCE

Updating Tables

Data can be edited in tables, queries, or forms. There are advantages and disadvantages to each method. The table below will help you decide the most appropriate place to edit data.

Method	Advantages	Disadvantages	Typical Situation to Use
Tables	All the records and fields are visible in the datasheet.	The number of records and/or fields in the datasheet can be overwhelming.	A user familiar with Access needs to add a record quickly to a smaller table.
Queries	There may be fewer records and/or fields in the datasheet making the data more manageable. A form can be based on a query rather than a table.	Not being able to see all the records and/or fields, you may inadvertently change related data in the fields you can see. Not all queries are editable, such as aggregate queries.	A user familiar with Access needs to see and modify appointments booked for a particular day.
Forms	Being able to view one record at a time can make the data seem more manageable.	Not all fields may be included in a form. If fields are missing, some data may mistakenly be left out of a record. Provides view of only one record at a time.	A user unfamiliar with Access needs to add data to a large table with many records.

Adding Records

When you add a record to a form, you are actually adding the record to the table it will be stored in. The form will open in Form view, which is the view that allows you to edit the data. Just like in a datasheet, new records are added at the end of the table, which means you must go to a blank record to enter new data. For this exercise, you will use the frmEmployee form to add your name to the list of employees in the tblEmployee table.

A04.06



To Add a New Record in a Form

- a. On the Navigation bar, click **New (blank) record** .

New (blank)
record button

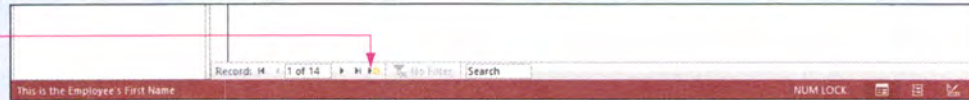


Figure 5 frmEmployee Navigation bar

- b. Type your first name, last name, address, city, state, and phone in the new record. **Close**  the form.
- c. On the Navigation Pane, double-click **tblEmployee** to open the table, and then click **Last record**  to see that your record was added. **Close**  the table.

Editing Records

When you edit a record in a form, you are actually editing the record in the table it is stored in. Changes to data are saved automatically but can be undone while the table or form is open by using the Undo button  or by pressing **[ESC]** just after the change is made while still in Edit mode.

For this exercise, you are asked to update the **tblEmployee** table with recent changes. Mary Murphy has recently changed her phone number, but it has not been changed in the table yet. You will show the staff how to find her record using a form and update her phone number.

A04.07



To Edit Records Using a Form

- a. On the Navigation Pane, double-click **frmEmployee** to open the form. Press **[Tab]** to move to the **Last Name** field. On the HOME tab, in the Find group, click **Find** and then in the **Find What** box, type **Murphy**. Click **Find Next**.
- b. When the record for Mary Murphy is displayed, click **Cancel** to close the Find and Replace dialog box, and then press **[Tab]** to move to the **Phone** field. Change Mary's phone number to **5055551289**.
- c. **Close**  the form.

Deleting Records

Records can be deleted from a single table without additional steps if the table is not part of a relationship. If the table is part of a relationship, referential integrity has been enforced, and the cascade delete option has not been chosen, a record cannot be deleted if there are related records in another table until those records have also been deleted. For example, if you want to delete a customer from **tblCustomer**, and that customer has appointments in **tblSchedule**, then the appointments for the customer have to be deleted from the **tblSchedule** before the customer can be deleted from the **tblCustomer**. This prevents leaving a customer scheduled in one table without the corresponding customer information in another table.

For this exercise, the spa manager would like you to remove Peter Klein from tblEmployee because he has taken a new job and is leaving the spa. You explain to her that if he has any appointments scheduled in tblSchedule that those will have to be removed first. She tells you that rather than removing those records she would like to give those appointments to Alex instead. By changing the name to Alex, those appointments will no longer be linked to Peter, and Peter will be able to be deleted from tblEmployee.



CONSIDER THIS

Delete with Caution

Deleting records in a table is permanent. Once you confirm a deletion, you cannot use the Undo button. This is very different than programs like Excel or Word. Can you think of ways you could safeguard your data from accidental deletion?

A04.08



To Delete a Record with a Form

- On the Navigation Pane, double-click **frmEmployee** to open the form. In the **Find** group, click **Find**, and then in the Find What box type **Peter**. Click **Find Next**, and then click **Cancel** to close the Find and Replace dialog box.
- On the **HOME** tab, in the **Records** group, click the **Delete** arrow, and then click **Delete Record**. Access displays a message saying, "The record cannot be deleted or changed because table 'tblSchedule' included related records." Click **OK**.

Troubleshooting

If Access blanks out the First Name field, you chose **Delete** rather than **Delete Record**. Press **[Esc]** to undo the deletion, and then choose **Delete Record**.

- On the Navigation Pane, double-click **tblSchedule** to open the table. Press **[Tab]** to move to the **Employee** field for the first record. Click the arrow next to **Peter**, and then click **Alex**.

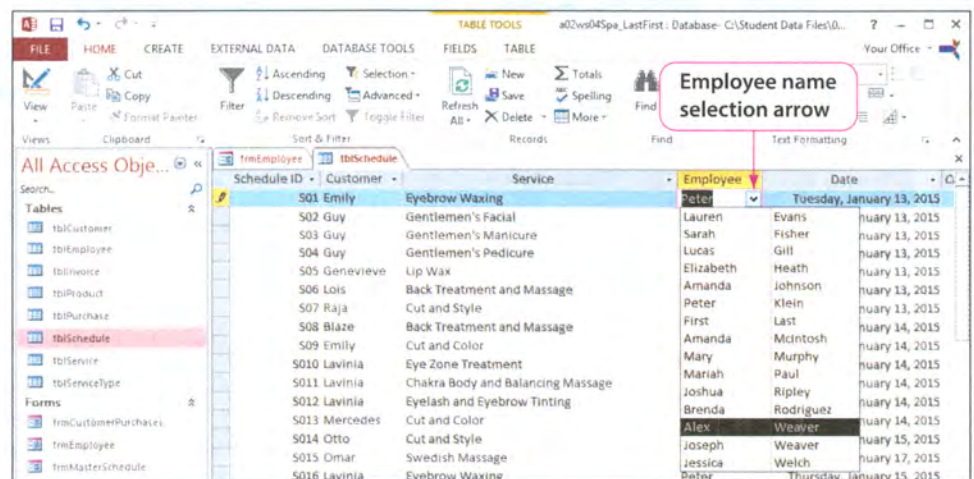


Figure 6 Replacing employee name using the selection arrow

- d. On the HOME tab, in the Find group, click **Find**, and then in the **Find What** box, type **Peter**. Click **Find Next**. Click the **arrow** next to the name, and then click **Alex**. Click **Find Next**, and then repeat for all three records that have **Peter** listed as the Employee. Click **Cancel** to close the Find and Replace box.
- e. Click **Close**  the table. On the form, make sure the record showing is for **Peter**. On the HOME tab, in the Records group, click the **Delete** arrow, and then select **Delete Record**. Click **Yes** to confirm the deletion.
- f. Click **Close**  the form.

Create a Form Using the Form Wizard

Recall that the Query Wizard walks you through the steps in order to create a query, asking you questions and using your answers to build a query that you can then make changes to if necessary. The Form Wizard works in a similar fashion, walking you through step-by-step to create a form from one or more tables in your database.

Unlike creating a simple form using the Form button on the Create tab, when you create a form using the wizard, it opens automatically in Form view ready for you to enter or edit your records. To make changes to the form, you have to switch to either Layout view or Design view.

Exploring Form Views

Form view is only for viewing and changing data, so to make any changes to the form you need to switch to either Layout view or Design view. Layout view allows you to make changes to the form while viewing the data at the same time. The effects of your changes can be viewed right away. Design view is a more advanced view that allows you to change the properties or structure of the form. Data is not shown while you are in Design view.

Both Layout view and Design view work with controls, as shown in Figure 7. A **control** is a part of a form or report that you use to enter, edit, or display data. There are three major kinds of controls: bound, unbound, and calculated. A **bound control** is a control whose data source is a field in the table such as the customer name. An **unbound control** is a control that does not have a source of data such as the title of the form. A **calculated control** is a control whose data source is a calculated expression that you create. Every field from the table is made up of two controls: a label and a text box. A **label control** may be the name of the field or some other text you manually enter and is an unbound control. A **text box control** represents the actual value of a field and is a bound control. When you add a text box to a form, the label is automatically added as well. However, a label can be added independently from a text box.

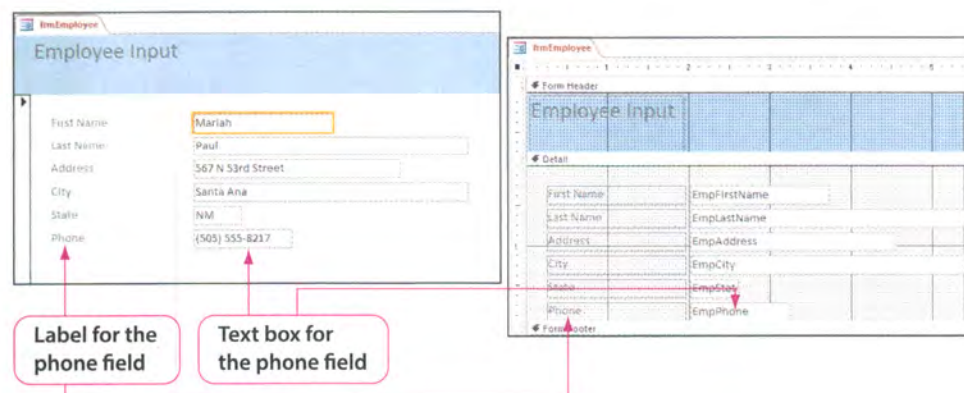


Figure 7 Text box and label controls in Layout view and Design view

For this exercise, the manager of the spa wants the staff to be able to enter and update customer information easily. She thinks it would be much easier to enter data in a form rather than in Datasheet view. You agree with her and offer to help set up the form.

A04.09



To Create a Single-Table Form in Design View

- Click the **CREATE** tab, and then in the Forms group, click **Form Wizard**. The Form Wizard dialog box opens.
- Click the **Table/Queries** arrow, and select **Table: tblCustomer**. Click the **All Fields** button to add all the available fields to the Selected Fields box, and then click **Next**.
- Verify that **Columnar** is selected as the form layout, and then click **Next**.
- Under **"What title do you want for your form?"** type **frmCustomerInput_initialLastname** using your first initial and last name. Verify that the **Open the form to view or enter information** option is selected, and then click **Finish**.

The form opens in Form view so you can immediately start adding or editing records. The form name is also displayed in the Navigation Pane under forms.

- Switch to **Design** view. Notice the Form Footer at the bottom of the form window. On the **DESIGN** tab, in the Controls group, click **Label** . Point to the Form Footer area, and then when your pointer changes to , drag your pointer to draw a label control about 2.5" wide in the top-left corner of the Form Footer section. In the new label, type **Created by initial Lastname** using your first initial and last name.

SIDE NOTE

Alternative Methods to Expand Footer

You can expand the footer and then add the label or you can add the label and the footer will automatically expand to fit what you add.

Troubleshooting

If the Field List pane opens, close it.

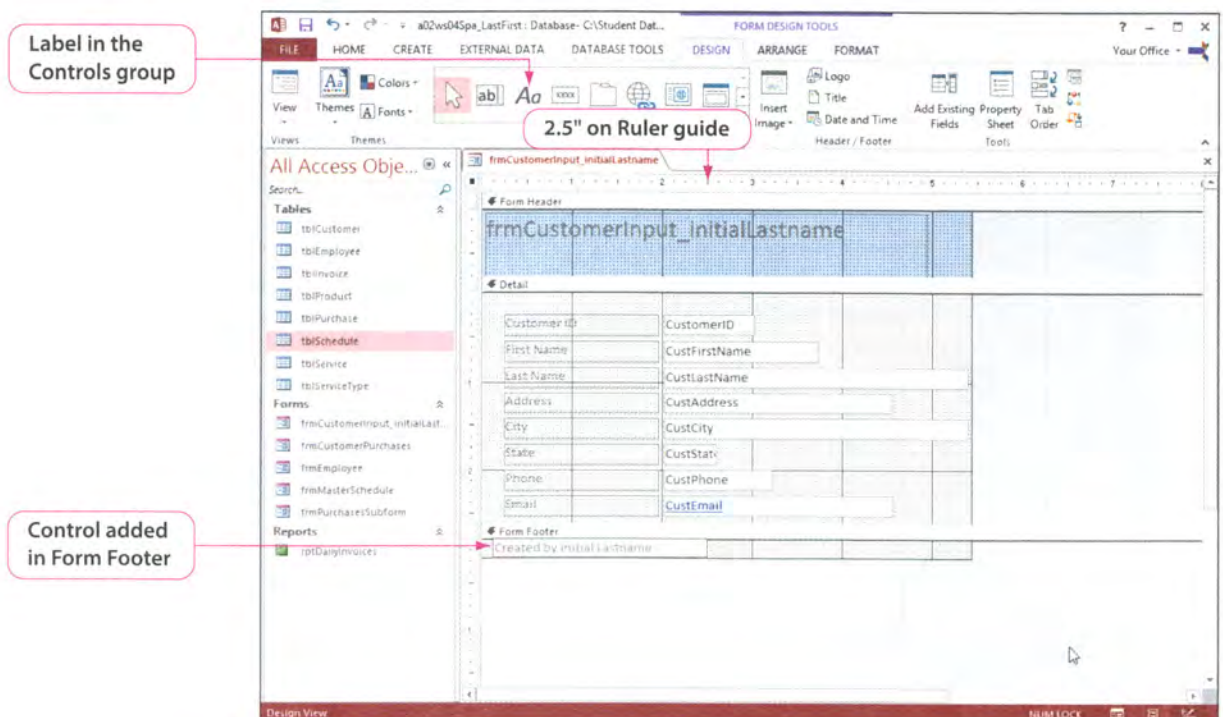


Figure 8 Form in Design view

- f. Switch to **Form** view. Verify that your label has been entered in the bottom-left corner of the form.

Label added in
Form Footer

Figure 9 Form with footer added

- g. Close  the form, and then click **Yes** to save the changes.

Creating Subforms (Multiple-Table Forms)

There may be times when you want to create a form using two tables. Before you can use two tables in a form, you must make sure there is a one-to-many relationship between the tables. Access will automatically use the common field between the tables to create the form.

The main form will display the first table one record at a time just like a single-table form. This is the “one” record in the one-to-many relationship. The subform will be displayed as a datasheet below the main form record. This will display the “many” records in the one-to-many relationship.

For this project, you will help the staff create another form that shows each customer in the main form and the customer’s scheduled appointments in the subform.

A04.10



To Create a Subform

- Click the **CREATE** tab, and then in the Forms group, click **Form Wizard**. The Form Wizard dialog box opens.
- Click the **Table/Queries** arrow, and then select **Table: tblCustomer**. Click the **All Fields** button  to add all the available fields to the Selected Fields list.
- Click the **Tables/Queries** arrow, and then select **Table: tblSchedule**. Click the **All Fields** button  to add all the available fields to the Selected Fields list, and then click **Next**.
- Verify that **tblCustomer** is selected and that **Form with subform(s)** is selected, and then click **Next**.

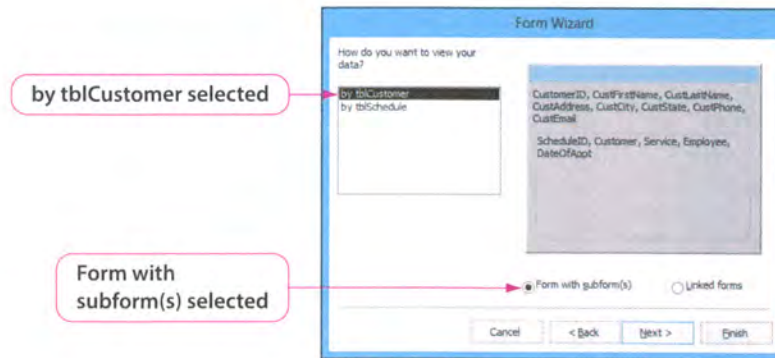


Figure 10 Form options are selected

- e. Verify that **Datasheet** is selected as the subform layout, and then click **Next**.
- f. Under **What titles do you want for your forms?** in the Form field, type **frmCustomerSchedule_initialLastname**, using your first initial and last name. In the Subform field, type **frmCustomerSubform_initialLastname**. Verify that the **Open the form to view or enter information** option is selected, and then click **Finish**.
The form opens in Form view so you can immediately start adding or editing records. The form and subform names are shown in the Navigation Pane.
- g. Switch to **Design** view. Scroll to the bottom of the form to see the Form Footer at the base of the main form. On the DESIGN tab, in the Controls group, click **Label** [Aa]. When your pointer changes to [Aa], drag your pointer to draw a label control about 2.5" wide in the top-left corner of the Form Footer section. In the new label, type **Created by initial Lastname** using your initial and last name.

Troubleshooting

If the Field List pane shows and blocks parts of the form you need to see, close the Field List pane.

Label added to Form Footer of main form

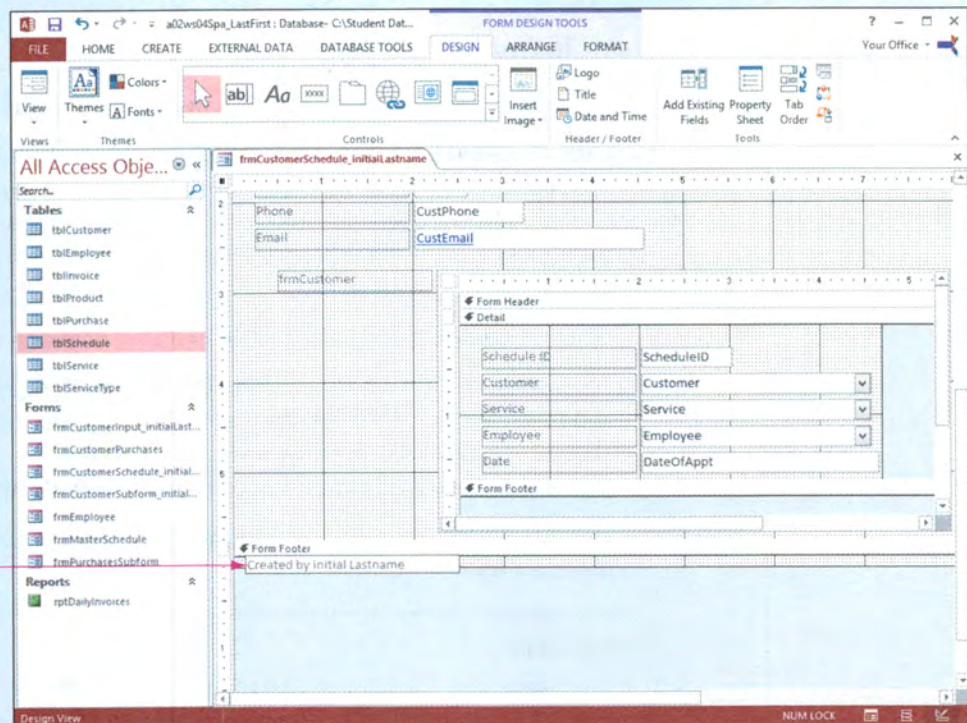


Figure 11 Add footer to main form

- h. Switch to **Form** view. Verify that your label has been entered in the bottom-left corner of the form.
- i. **Close** ☐ the form, and then click **Yes** to save the changes.



CONSIDER THIS | Include the Subform?

When two tables are in a one-to-many relationship and you use the Form button to create a form for the table on the "one" side of the relationship, the wizard automatically adds a subform for the table on the "many" side. If you create the form using Form Wizard, you can choose whether to include the subform. When would you want to include the subform? When would you not want to include the subform?

Creating a Split Form

A split form is created from one table and displays each record individually at the top of the window and then again as part of the whole table datasheet in the bottom of the window. This type of form gives you the advantage of seeing each record and the whole table in one place.

For this exercise, the manager would like to see each customer's record individually along with all the records from the customer table. You will show her how to create a split form from the customer table.



To Create a Split Form

- a. On the Navigation Pane, click **tblCustomer** one time to select the table, but do not open it.
- b. Click the **CREATE** tab, and then in the Forms group, click **More Forms**, and then select **Split Form**.

A window will open with the split form for the customer table. Notice that the top of the form shows a record individually and the bottom of the form shows the whole table as a datasheet.

- c. Switch to **Design** view. Notice that Design view shows only the top of the split form.
- d. On the DESIGN tab, in the Controls group, click **Label** , point to the Form Footer area, and then when your pointer changes to , drag your pointer to draw a label control about 2.5" wide in the top-left corner of the Form Footer section. In the new label, type **Created by initial Lastname** using your first initial and last name.
- e. Switch to **Form** view. Verify that your label has been entered in the bottom-left corner of the upper form.

Troubleshooting

If your label does not show, switch to Design view, and then switch back to Form view.

- f. Click **Save**  on the Quick Access Toolbar, under **Form Name** type **frmCustomerSplit_initialLastname** using your first initial and last name, and then click **OK. Close**  the form.

Modify a Form's Design

While creating a form using the wizard is quick and efficient, there may be times you will want to change how the form looks or add things to the form after you have created it. Formatting, like colors and fonts, can easily be changed. Controls can also be added to a form to include additional fields or labels with text. Pictures and other objects can also be added to a form to make the form more visually appealing.

Oftentimes, forms are customized to match company or group color themes, or other forms and reports already created by a user. Customizing forms can make them more personal and sometimes easier to use.

Colors, font types, and font sizes are just a few of the formatting changes you can make to an existing form.

Changing the Form Theme

By default, Access uses the Office theme when you create a form using the Form Wizard. Even though there is not a step in the wizard to select a different theme, you can change it once the form has been created. A **theme** is a built-in combination of colors and fonts. By default, a theme will be applied to all objects in a database: forms, reports, tables, and queries. However, you can select to apply a theme to only the object you are working with or to all matching objects. You can also select a theme to be the default theme instead of Office.

Because the form is displayed in Form view, once it is created, the first step is to switch to Layout view to make changes to the form itself. Changing the theme will not only change the colors of the form but also the font type and size and any border colors or object colors added to the form. Once a theme is applied to the form, the colors and fonts can be changed independently of the theme, so you can combine the colors of one theme and a font of another.

For this exercise, the manager of the spa would like to make the customer input form look more like the colors in the spa. The resort has a set of themes that she wants to apply to the selected form.

You will show her how to change the theme and the fonts for the form. The theme will be applied to all objects in the database. The font change will be applied to this form only.

A04.12



To Change the Theme of a Form

- On the Navigation Pane, double-click **frmCustomerInput_initialLastname** to open the form. Switch to **Layout** view.
- On the DESIGN tab, in the Themes group, click **Themes** to open the Themes gallery. Click **Browse for Themes**, navigate to where you stored your data files, click **a02ws04Spa**, and then click **Open**. This applies the spa theme to all objects.
- On the DESIGN tab, in the Themes group, click **Fonts**. Scroll down, right-click the Font theme **Corbel**, and then click **Apply Font Theme to This Object Only**.
- Double-click the **form title**, select the existing **text**, which by default is the name of the form, and then type **Customer Input**. Press **[Enter]**.

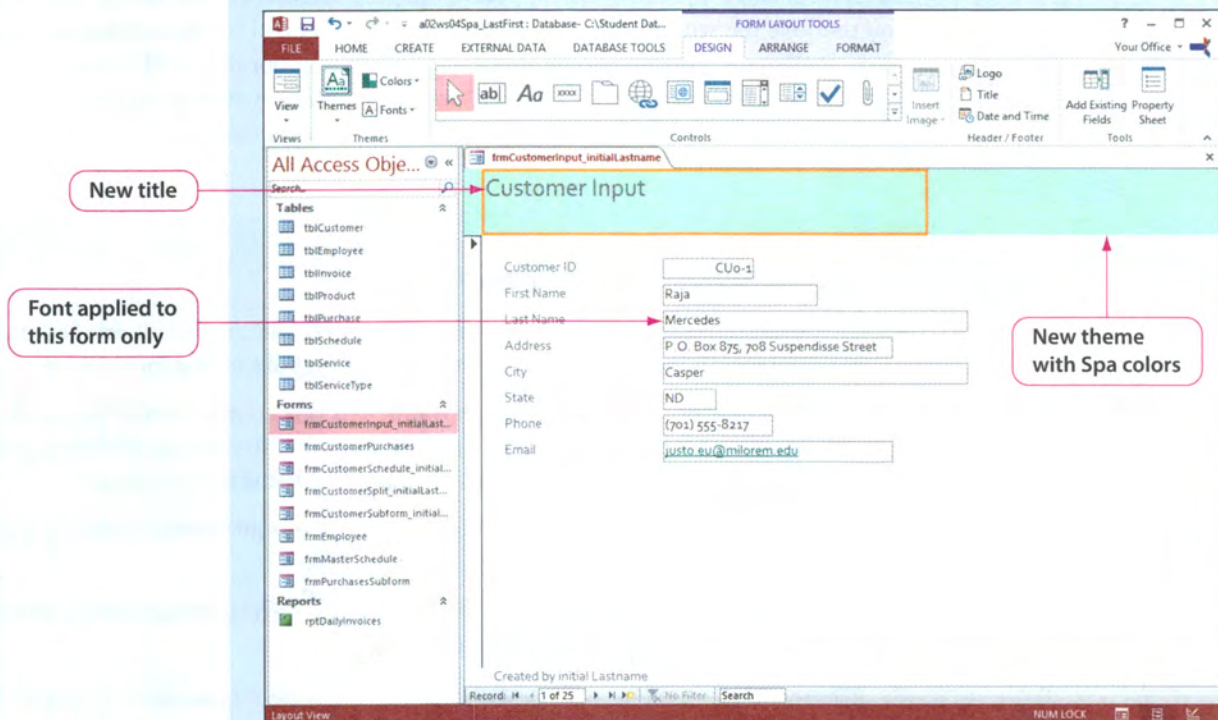


Figure 12 Form with theme, font, and title changed

- Click **Save** on the Quick Access Toolbar to save the form. Click **Close** the form.

By default, all themes are saved in the Document Themes folder (C:\Users\username\AppData\Roaming\Microsoft\Templates\Document Themes). If you save a custom theme in the default folder, it will appear as a custom theme in the Themes gallery. If you save the theme in a different folder, you can select Browse for Themes and look for the saved theme in your Documents folder. You can change where you save the theme, but if another person wants to use that theme for one of their documents, they may not be able to find it if it is saved somewhere other than the default folder. One purpose of saving themes is to have them available for a unified look among various documents, and because you may not be the person creating all the documents, you may want to save the theme somewhere that everyone can find it.

Resizing and Changing Controls

Controls can be resized to make the form more user friendly. When you create a form using the wizard, the order that you choose the fields in the wizard step is the order the fields are added to the form. Once the form is created, you may decide the fields should be in a different order. When you click a control in Layout view, an orange border appears around the control. When you select a subform control, an orange border appears around the control and a layout selector appears in the top-left corner. The **layout selector** allows you to move the whole table at one time. Once the control is selected you can move it or resize it. You can also change its appearance by adding borders or fill color.

For the following exercise, you will work with the spa staff to rearrange the controls on the Customer Schedule form to make it easier for data entry.

A04.13



To Resize and Change Controls on a Form

- a. On the Navigation Pane, double-click **frmCustomerSchedule_initialLastname** to open it. Notice that the spa theme was applied to this form but the new font was not.
- b. Switch to **Layout** view. Click the **Last Name** text box control, and an orange border appears around the control. Point to the **right border** of the control, and then drag it to the left so it lines up with the right border of the First Name text box above.
- c. Click the **Address** text box control, and then drag the **right border** to the right until it lines up with the right border of the City text box below.
- d. Double-click the **form title**, select the existing **text**, which by default is the name of the form, and then type **Customer Schedule**. Press **[Enter]**.
- e. Click the **frmCustomer** subform label, and then press **[Delete]** to delete it from the form.
- f. Use the AutoFit feature on each column of the subform to best fit the data. Use the scroll bar on the Navigation bar of the subform to scroll to the right to see all the fields. Drag the **left border** of the subform to the left so that all fields are visible without scrolling.
- g. In the main form, click the **Customer ID** label control, press and hold **[Shift]**, and then click the **CustomerID** text box control to select both controls.

SIDE NOTE

Selecting Controls

Each field has two controls—a label and a text box. The field name shows in the label, while the field value shows in the text box.

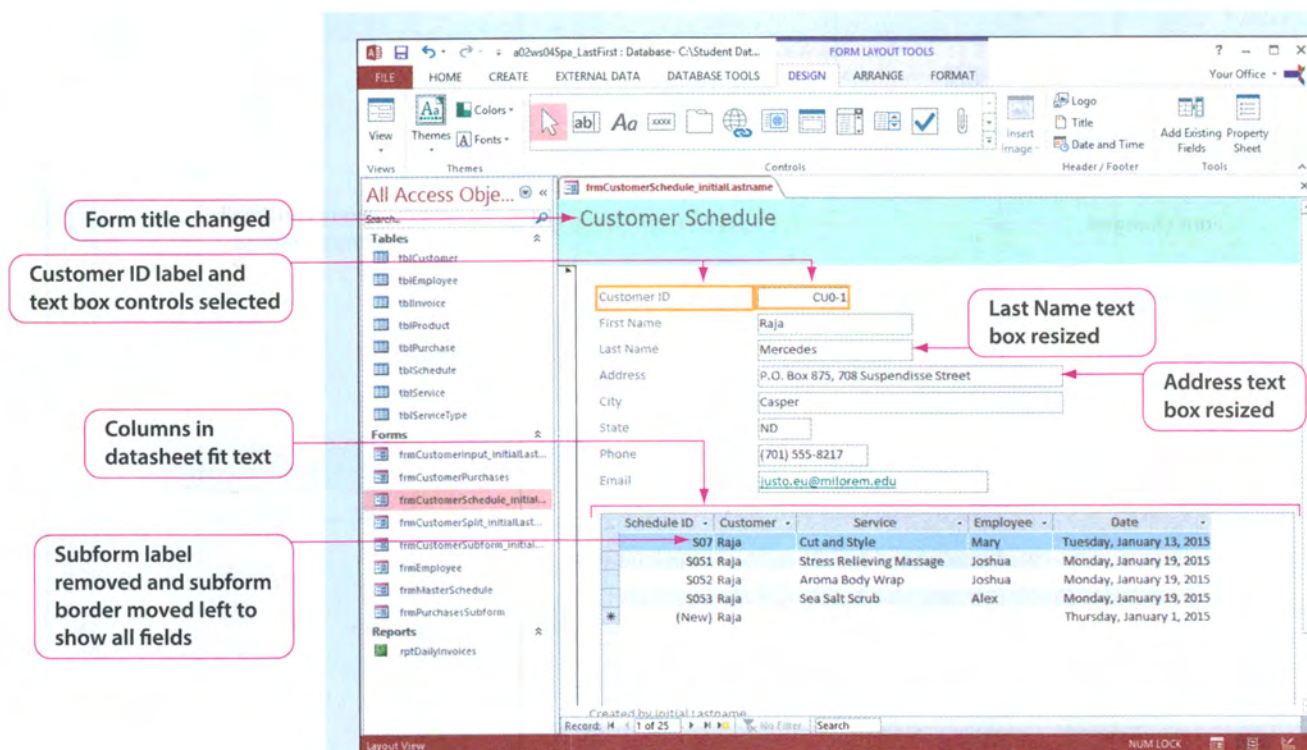


Figure 13 Select both label and name control to delete

- h. Press **Delete** to delete both controls from the form.
- i. Click the **Phone** label, hold down **Shift**, and then click the **Phone** text box, the **Email** label, and the **Email** text box controls.
- j. Point to any of the **selected controls**. When the pointer changes to , drag all four controls up and to the right until they are right next to the **First Name** and **Last Name** controls.

Troubleshooting

If when you release the pointer, the fields do not line up, repeat Step j, and then adjust the placement.

SIDE NOTE

Limited Visibility

If you cannot see the whole subform, use the scroll arrow on the right side of the window to scroll down the form.

- k. Click the **subform** datasheet to select it. Click the **Layout Selector**  and then drag it up and to the left so it is just under the **State** control.
- l. Click the **title** of the form to select it. On the **HOME** tab, in the Text Formatting group, click **Bold** **B**, click the **Font size** arrow  and then select **28**.
- m. Click the **First Name** text box control, hold down **Shift**, and then click the **Last Name** text box control. On the **HOME** tab, in the Text Formatting group, Click **Bold** **B**.

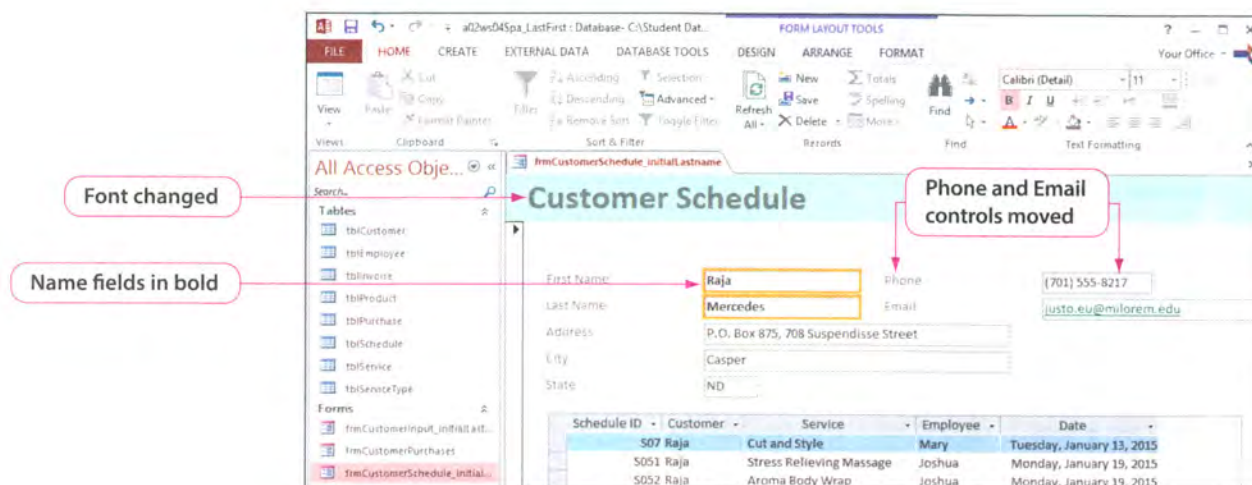


Figure 14 Formatted form and subform

- n. Click **Save**  on the Quick Access Toolbar to save the form.

Adding a Picture to the Form

Pictures can be added to forms to make them more appealing. When a picture is added to a form, then the same picture will appear for every record in the table. A different picture cannot be added for each record. A picture can be inserted in the header, footer, or the Detail area of the form where the record values are shown. For this exercise you will insert the spa's logo in the Detail area of the form to make it more personal for the spa.

A04.14



To Add a Picture on the Form

- Click in the **Detail area** of the form to select it. If a text box or label is selected, then the Insert Image button will not be available to use.
- On the DESIGN tab, in the Controls group, click **Insert Image**, and then click **Browse....**
- In the Insert Picture dialog box, navigate to where your student files are located, click **a02ws04Spa**, and then click **OK**. With the image control pointer , click in the **form detail** to insert the picture. Move your pointer to the **top-left corner** of the picture until it becomes a diagonal resize pointer . Drag the corner until the picture is small enough to fit under **Email** and above the subform.
- Click the **layout selector**  and move the picture under the **Email** text box. Use the diagonal resize pointer  to make the picture smaller until the picture fits between the **Email** text box and the subform.

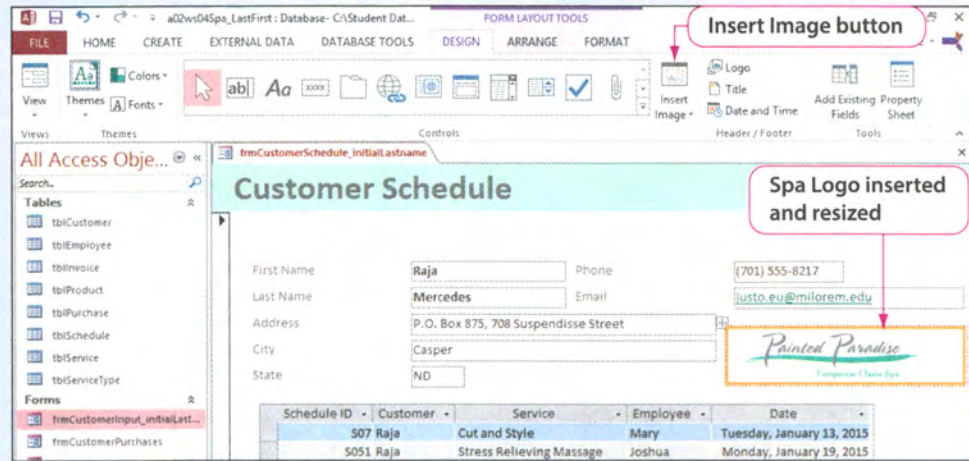


Figure 15 Logo inserted in form

- e. **Close**  the form, and then click **Yes** to save the changes.

Printing a Record from a Form

Not only can you see one record at a time using a form, but you can also print one record at a time. Printing a form can be useful if you need only one record's information, or if you want to use a form for other people to manually fill in the information.

For this project, the spa manager would like you to print a record for a particular customer from the customer form. You will show her how to preview the form first, select one record, and then send it to the printer.

A04.15



To Preview and Print a Record from a Form

- On the Navigation Pane, double-click **frmCustomerInput_initialLastname** to open it, and then switch to **Layout** view.
- Click the **Address** text box control, and then drag the **right border** to the right until it is lined up with the Last Name and City text box controls.
- Click the **FILE** tab, click **Print**, and then click **Print Preview**. Notice all the records will print in Form view.
- Click **Last Page**  on the Navigation bar to go to the last record. Notice in the Navigation bar that the number of pages for the printed report will be seven.
- On the PRINT PREVIEW tab, in the Close Preview group, click **Close Print Preview**.
- Using the Navigation bar, advance through the customer records to find the record for **Jonah Hogan**.
- Click the **FILE** tab, click **Print**, and then click **Print**. In the Print dialog box, in the Print Range section, click **Selected Record(s)**. Click **OK** to print the record if requested by your instructor.

When you view all the records in Print Preview, you cannot choose Selected Record(s) in the Print dialog box. To choose Selected Record(s) you must have one record showing in Form view when you click Print.

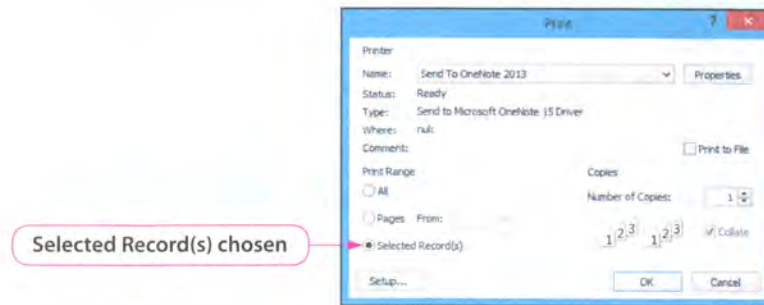


Figure 16 Print one record as a form

- h. Close  the form, and then click **Yes** to save the changes.

Creating Customized Reports

While a report and a form may look similar, a form is a method for data entry and a report is a formatted printout of that data. A report can be created from either a table or query. Reports may be based on multiple tables in a one-to-many relationship using a common field to match the records. The “one” record from the first table in the relationship will be shown first—similar to a main form, while the “many” records from the second table will be displayed as detailed records in the **subreport**—similar to a subform. In this section, you will create a report using the report wizard and then make changes to the report in design and layout views.

Create a Report Using the Report Wizard

The Report Wizard will walk you step by step through the process of building your report. You will choose the table or query to base the report on, and choose the fields to include in the report. You will have the option to group the data in your report. A **group** is a collection of records along with introductory and summary information about the records. Grouping allows you to separate related records for the purpose of creating a visual summary of the data. Groups can be created with data from individual tables or from multiple tables.

For example, a report grouped by the primary table containing customer records would show all the selected fields for a customer, and then would list that customer's individual appointments from the secondary table below the customer's record.

Within a report you can also sort using up to four fields in either ascending or descending order. Once a report is created using the wizard, it will open in Print Preview. Print Preview provides a view of the report representing how it will look when it is actually printed and provides you with printing options such as orientation, margins, and size. The current date and page numbers are added, and you can navigate the report in this view using the Navigation bar. To make any changes to the report, you can switch to Layout view.

Creating a Single-Table Report

A report can be created using one table or multiple tables. A single-table report is a report created from one table. Any or all of the fields can be selected, and the report can be created from a table or query.

For this project, the spa manager would like to have a report to help the staff with scheduling. The report will be a list of employee names and phone numbers so the staff can contact each other if necessary.

A04.16



To Create a Single-Table Report Using Report Wizard

- a. Click the **CREATE** tab, and then in the Reports group, click **Report Wizard**.
- b. Click the **Tables/Queries** arrow, and then select **tblEmployee**.
- c. Double-click **EmpFirstName**, **EmpLastName**, and **EmpPhone** from the Available Fields list. Click **Next**.
- d. You will not add any grouping levels to this report, so click **Next**.
- e. Click the **1 Sort** arrow, select **EmpLastName**, click the **2 Sort** arrow, select **EmpFirstName**, and then click **Next**.
- f. Verify that **Tabular** layout and **Portrait** orientation are selected, as well as **Adjust the field width so all fields fit on a page**. Click **Next**.
- g. Under **What title do you want for your report?**, type **rptEmployeeList_initialLastname** using your first initial and last name, and then click **Finish**.
- h. Switch to **Design** view. If necessary, close the Field List pane. On the REPORT DESIGN TOOLS DESIGN tab, in the Controls group, click **Label** , point to the **Report Footer** area, and then when your pointer changes to , drag your pointer to draw a label control about 2.5" wide in the top-left corner of the Report Footer section. In the new label, type **Created by initial Lastname** using your first initial and last name.

Troubleshooting

If the Label control is not visible, in the Controls group, click the More button to display the gallery, and then click Label.

- i. Switch to **Report** view. Verify that your label is fully shown in the bottom-left corner of the report.
- j. Switch to **Layout** view. Double-click the **form title**, select the existing text, type **Employee List** and then press .

In Layout view, you should also check that all the report column headers and data show fully. On this report they do, so there are no further changes necessary.

SIDE NOTE

Field Order

The order you add the fields in the Report Wizard is the order the fields will appear on the report.

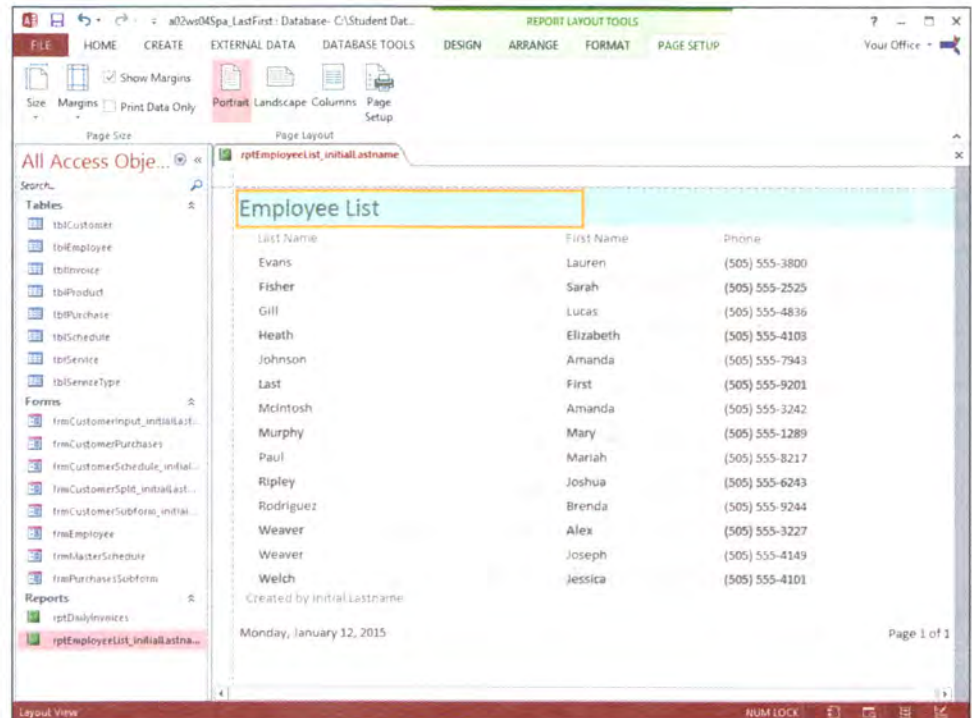


Figure 17 Completed Employee List report

k. Close  the report, and then click **Yes** to save the changes.

Creating a Multiple-Table Report

Similar to other objects created using more than one table, a multiple-table report must use tables that have a common field. The first table chosen for the report becomes the primary table, and the next and subsequent tables chosen become the secondary tables.

An employee has a one-to-many relationship with scheduled appointments. Each employee may have more than one appointment, and each appointment is with just one employee. Thus **tblEmployee** will be the primary table, and **tblSchedule** will be a secondary table.

In this exercise, the manager would like a report that will show each employee name and their upcoming appointments. This way the staff members can help coordinate their services for a guest who may be seeing more than one staff member in a day.

A04.17



To Create a Multiple-Table Report Using the Report Wizard

- Click the **CREATE** tab, and then in the Reports group, click **Report Wizard**.
- Click the **Tables/Queries** arrow, and then select **Table: tblEmployee**. Double-click **EmpFirstName** and **EmpLastName** in the Available Fields list.
- Click the **Tables/Queries** arrow, and then select **Table: tblSchedule**. Double-click **Service**, **DateOfAppt**, and **Customer** from the Available Fields list, and then click **Next**.
- Verify that **by tblEmployee** is highlighted to view the data by Employee, and then click **Next**.
Notice that Access defaults to viewing the data by primary table, **tblEmployee**.

- e. Double-click **DateOfAppt** to group by the date. Click **Grouping Options...**, click the **Grouping intervals** arrow, select **Normal**, and then click **OK**.

Access defaults to grouping dates by Month. Normal groups by date value.

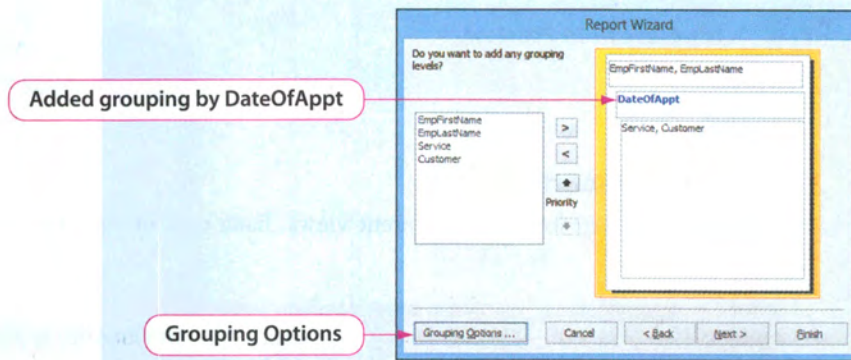


Figure 18 Report Wizard grouping step

- f. Click **Next**.
- g. Click the **1 Sort** arrow, select **Customer**, and then click **Next**.
- h. Verify that **Stepped** is selected under **Layout**, and then under **Orientation**, click **Landscape**. Verify that **Adjust the field width so all fields fit on a page** is checked. Click **Next**.
- i. Under **What title do you want for your report?**, type **rptEmployeeSchedule_initialLastname**, using your first initial and last name, and then click **Finish**. The report will open in **Print Preview**.

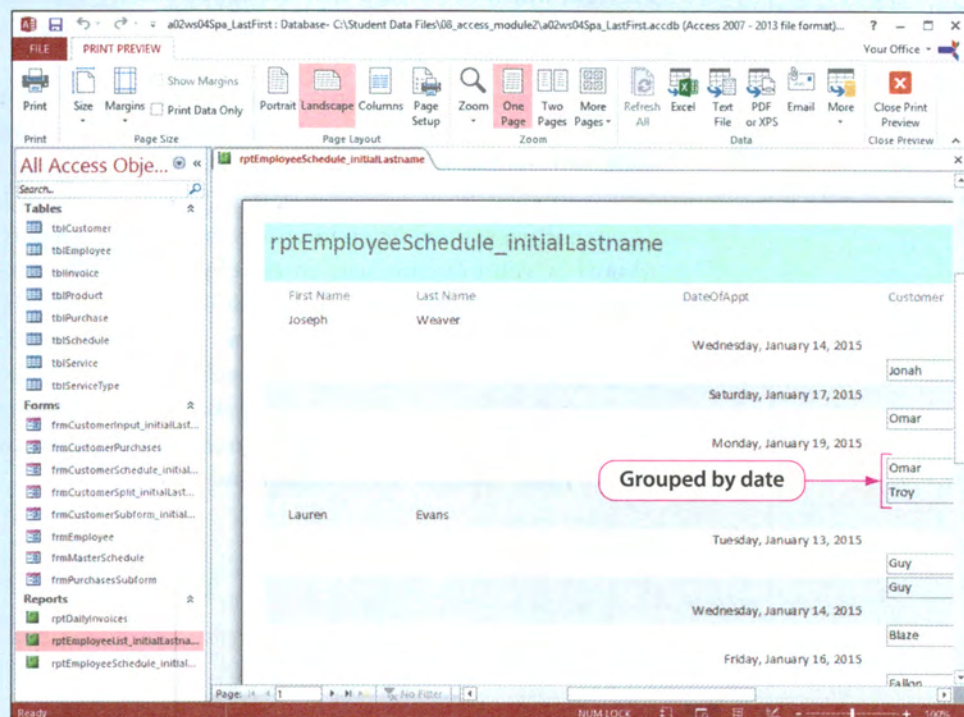


Figure 19 Report in Print Preview

Notice that the appointments are grouped by date. Your date column may not be wide enough to see the dates, but you will fix that in Layout view. Additionally, notice that in Print Preview view, at the bottom of each page of the report is today's date and the page number.

j. Click **Close Print Preview**.

Exploring Report Views

Recall that reports have four different views. Each type of view has its own features.

QUICK REFERENCE		Different View Options for a Report
View Name	What the View Is Used For	
Print Preview	Shows what the printed report will look like	
Layout view	Allows you to modify the report while seeing the data	
Report view	Allows you to filter data or copy parts of the report to the Clipboard	
Design view	Allows you to change more details of the report design or add other controls that are only available in Design view	

When the Report Wizard is done creating the report, it shows you the report in Print Preview, which is the view that shows you exactly what the report will look like when it is printed. Print Preview adds the current date and page numbers in the page footer at the bottom of each page.

Layout view allows you to change basic design features of the report while the report is displaying data so the changes you make are immediately visible. You can resize controls, add conditional formatting, and change or add titles and other objects to the report in Layout view. In this exercise, you will view a report in Layout view.

Report view provides an interactive view of your report. In Report view, you can filter records or you can copy data to the clipboard. There will be no page breaks shown in Report view so the number of pages at the bottom will show Page 1 of 1.

Design view offers more options for adding and editing controls on a report, as well as options not available in any of the other views.

In the following exercise, you will show the spa staff members what a report looks like in the different views and how to switch from one view to another. You will show them how to make changes in the Layout and Design views.

A04.18



To Explore Report Views

- a. Switch to **Layout** view.

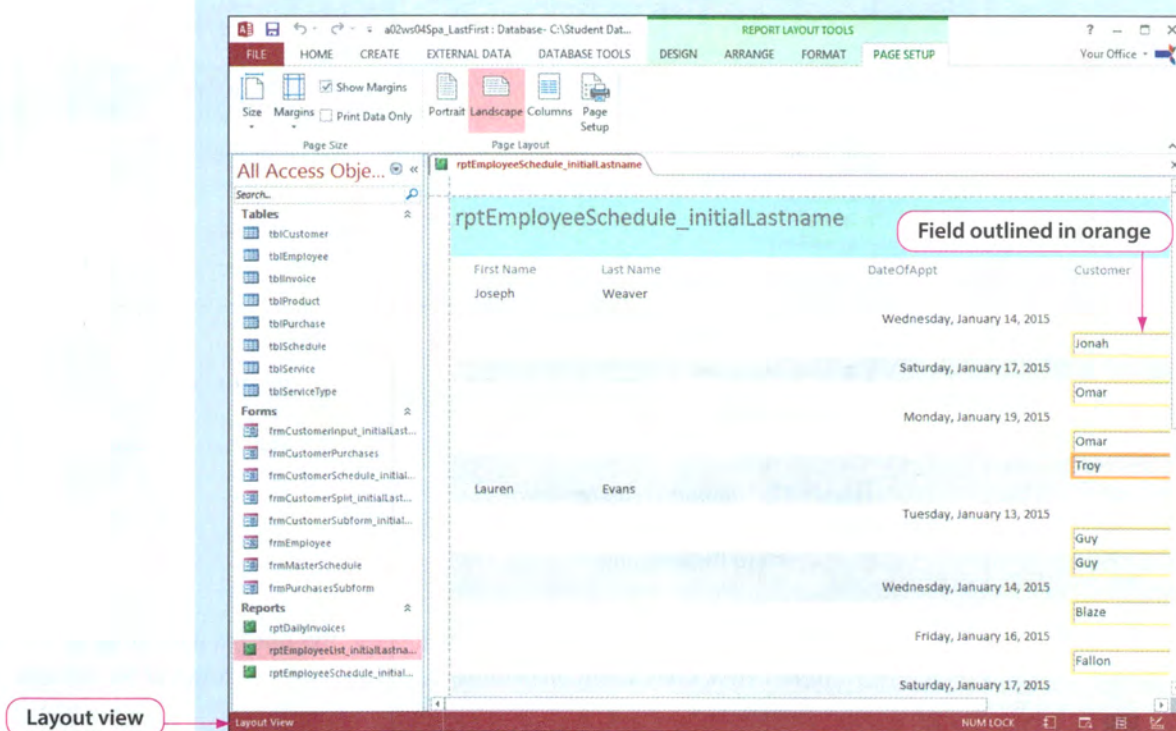


Figure 20 Report in Layout view

Notice the orange border around the first Customer field. Customer is the active field. You can make changes such as making a column wider in Layout view.

- b. If your dates are not visible, click the **DateOfAppt** column header, press and hold **(Shift)**, and then click the **DateOfAppt** text box. Use your pointer to drag the left border of the column to the left so that the date is fully shown.
- c. Scroll to the **bottom right** of the report.
- Notice there is the date and page number in the page footer, but the page number shows page 1 of 1. The actual number of pages will not be calculated until you switch to Print Preview.
- d. Switch to **Design** view. Data in Design view is not visible, only the controls in each section of the report are.
- e. On the **DESIGN** tab, in the Controls group, click **Label** , point to the Report Footer area, and then when your pointer changes to , drag your pointer to draw a label control about 2.5" wide in the top-left corner of the Report Footer section. In the new label, type **Created by initial Lastname** using your first initial and last name.

SIDE NOTE

Two Footers

Be sure to put your label in the Report Footer, not the Page Footer.

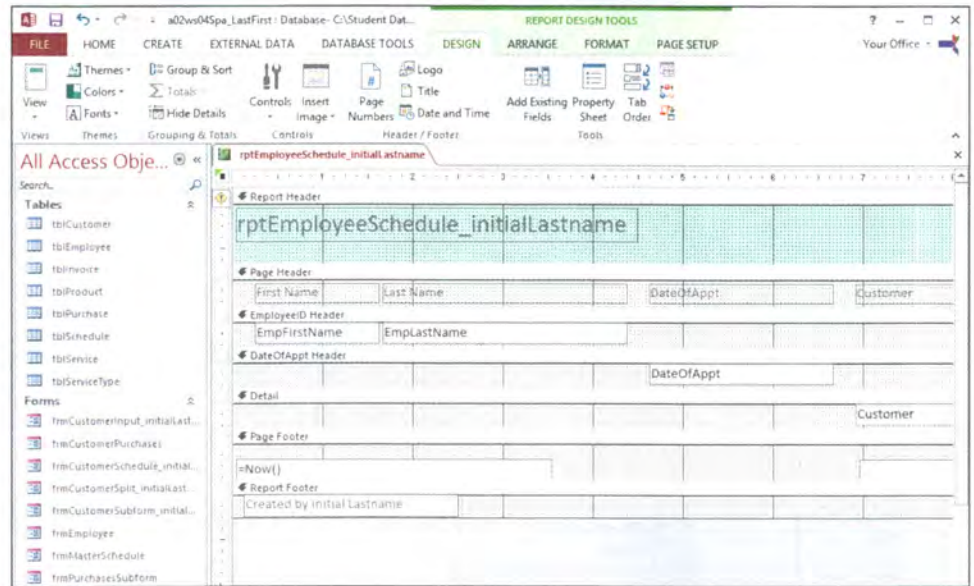


Figure 21 Report in Design view

- f. Switch to **Report** view.
- g. Scroll to the **bottom** of the report.
Verify that your label has been entered in the bottom-left corner of the report. In report view, there are no page breaks, so the number of pages at the bottom will show Page 1 of 1.
- h. **Save**  and **close**  your report.

Creating Totals Using the Report Wizard

When you report on numeric data, you have the option to ask Access to calculate sums, averages, minimums, and maximums of the numeric data. The **grand total** calculates the total for all records. **Subtotals** calculate totals for smaller groups of records. In this exercise, you will use the wizard to request these totals. Later, you will add totals to an already created report.

The spa manager asks you to create a report showing the invoices collected each day. You will show her how to provide a daily total as well as a grand total using the Report Wizard.

A04.19



To Create Report Totals Using the Report Wizard

- a. Click the **CREATE** tab, and then in the Reports group, click **Report Wizard**.
- b. Click the **Tables/Queries** arrow, and then select **Table: tblInvoice**. Double-click **InvoiceDate** and **InvoiceTotal** in the Available Fields list. Click **Next**.
- c. Double-click **InvoiceDate** to group by the date. Click **Grouping Options...**, click the **Grouping intervals** arrow, and select **Day**.
- d. Click **OK**, and then click **Next**.
- e. Click the **1 Sort** arrow, and then select **InvoiceDate**.

- f. Click **Summary Options...**, and then click the **Sum** check box.

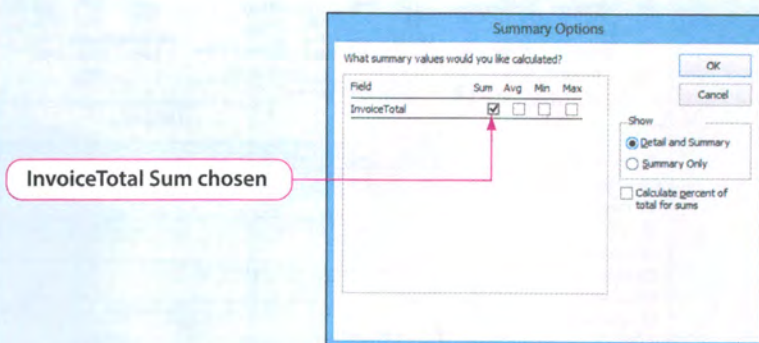


Figure 22 Report Summary Options

- g. Click **OK**, and then click **Next**. Verify that **Stepped** and **Portrait** are selected, and then click **Next**.
- h. Under **What title do you want for your report?**, type `rptInvoiceTotals_initialLastname`, using your first initial and last name, and then click **Finish**. The report will open in Print Preview. If necessary, scroll down to see the grand total.

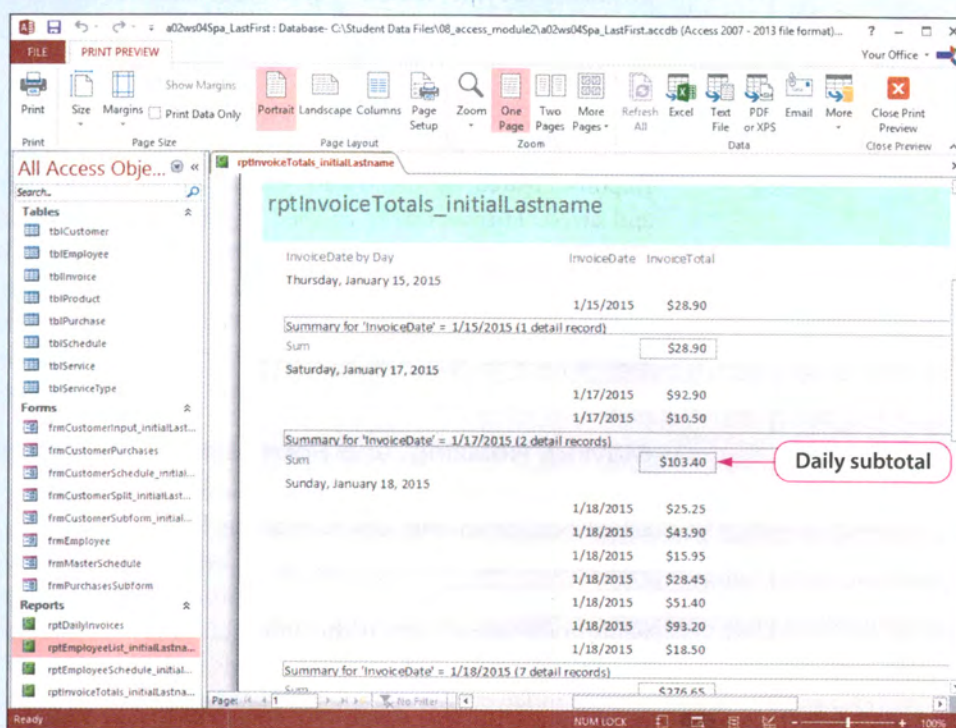


Figure 23 Report with daily subtotals and a grand total

Notice that there is a sum for each day and a grand total of all invoices for all days.

- i. Switch to **Design** view. There is a new footer for InvoiceDate where the sum for each day is shown. There is also a Report Footer where the GrandTotal is shown.
- j. On the **DESIGN** tab, in the Controls group, select **Label** `Aa`, move your pointer to the **Report Footer** just below the existing **Grand Total** label, and then when your pointer changes to `Aa` drag your pointer to draw a label control about 2.5" wide in the Report Footer section. In the new label, type `Created by initial Lastname` using your first initial and last name.

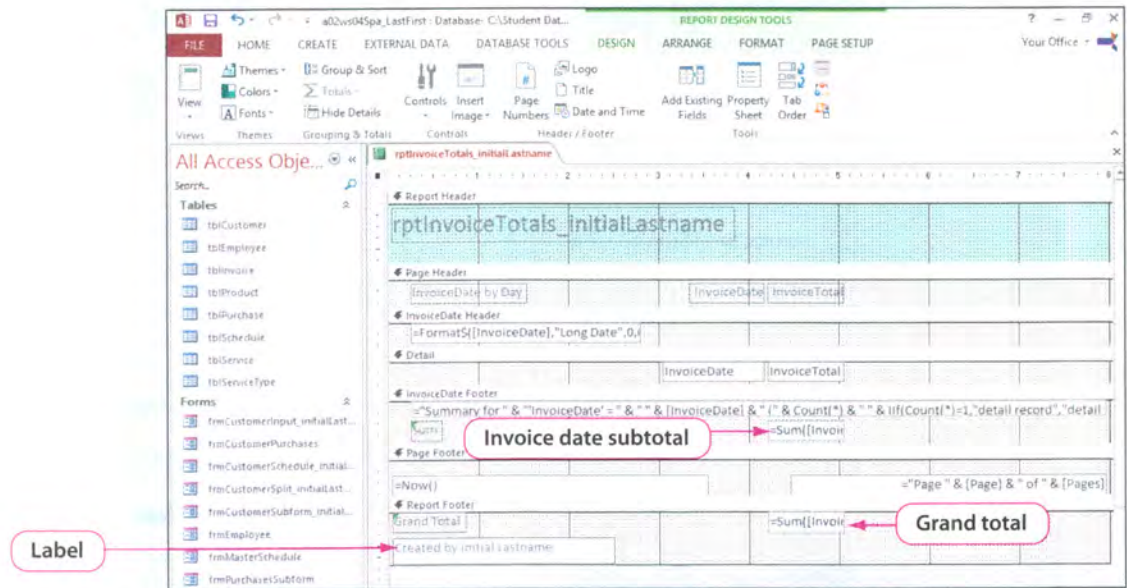


Figure 24 Design view of totals

k. Switch to **Print Preview** to check your label. **Save** and **close** your report.

Customize a Report

Reports created by the wizard can be easily customized after they have been created and saved. Themes can be applied to just the report or the whole database to change the colors, fonts, or both. Controls, bound and unbound, can be added or modified on the report to make room for more information or to rearrange the information already there.

To break a report into smaller sections, subtotals or groups may be added. Additional sorting options may also be applied or modified. Conditional formatting may also be applied in order to highlight fields that meet certain criteria.

Moving, Resizing, and Formatting Report Controls

Controls, as defined in the section on forms, are also used in reports. A control can be a text box, or another object that has been added to the form either by the wizard or manually in Layout or Design view. Controls can be moved or resized to make the report more readable. When you create a report using the wizard, the order that you choose the fields in the wizard step is the order the fields are added to the report. Once the report is created, you may decide that the fields should be in a different order. When you click a control in Layout view, an orange border appears around the control. Once the control is selected you can move it or resize it. You can also change its appearance by adding borders or fill color.

For this exercise, you will change the rptEmployeeSchedule schedule report to make it look more like what the manager expected. You will move the date, service, and customer name fields below the employee name, change the heading, and change the formatting to match the resort theme.

A04.20



To Move, Resize, and Format a Report Control

- On the Navigation Pane, right-click **rptEmployeeSchedule_initialLastname**, and then click **Layout View**.
- Click the **DateOfAppt** text box control to select it, and then drag the field to the left so it is just slightly indented under the employee first name.
- Click the **First Name** label control—the column header, press and hold **[Shift]**, click the **Last Name** and the **DateofAppt** label controls, and then press **[Delete]**.
- Click the **Customer** label control, press and hold **[Shift]**, and then click the **Customer** text box, the **Service** label, and the **Service** text box controls. Point to and click any field to drag all the controls to the left, just next to the date field.

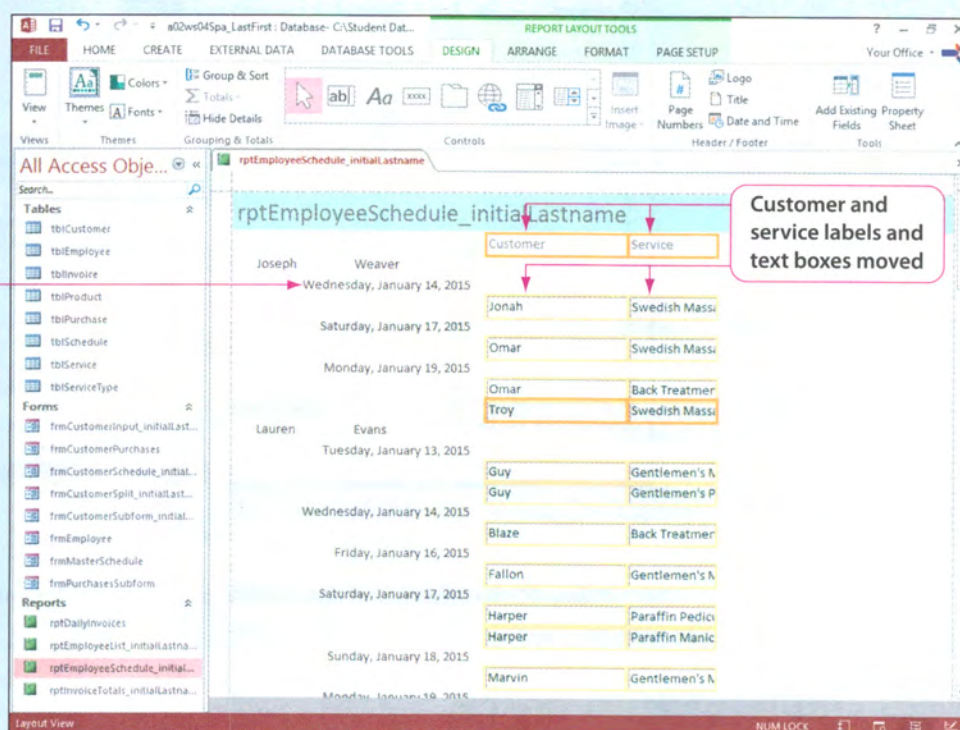


Figure 25 Fields moved

Troubleshooting

If you drag the controls too far to the left, reselect them, and then drag them back to the right.

- Click the **Service** text box control. Drag the **right border** of the box to the right to fit all the service description. Scroll down to check **Chakra Body and Balancing Massage** to make sure the description is fully shown. If not, drag the border to make the field wider.
- Scroll up, click the **Service** label control, and then press **[Delete]**.
- Click the **Service** text box control, press and hold **[Shift]**, and then click the **Customer** text box control. On the **FORMAT** tab, in the Control Formatting group, click **Shape Outline**, and then select **Transparent**.

- h. Click the employee's **First Name** text box control, press and hold **[Shift]**, and then click the **Last Name** text box control. On the **FORMAT** tab, in the **Control Formatting** group, click **Shape Fill**, and then select **Dark Teal Accent 2 Lighter 80%** in the second row of the sixth column under **Theme colors**. In the **Font** group, click **Bold** **[B]**.
- i. Double-click the **title**, select the **text**, type **Employee Schedule**, and then press **[Enter]**.

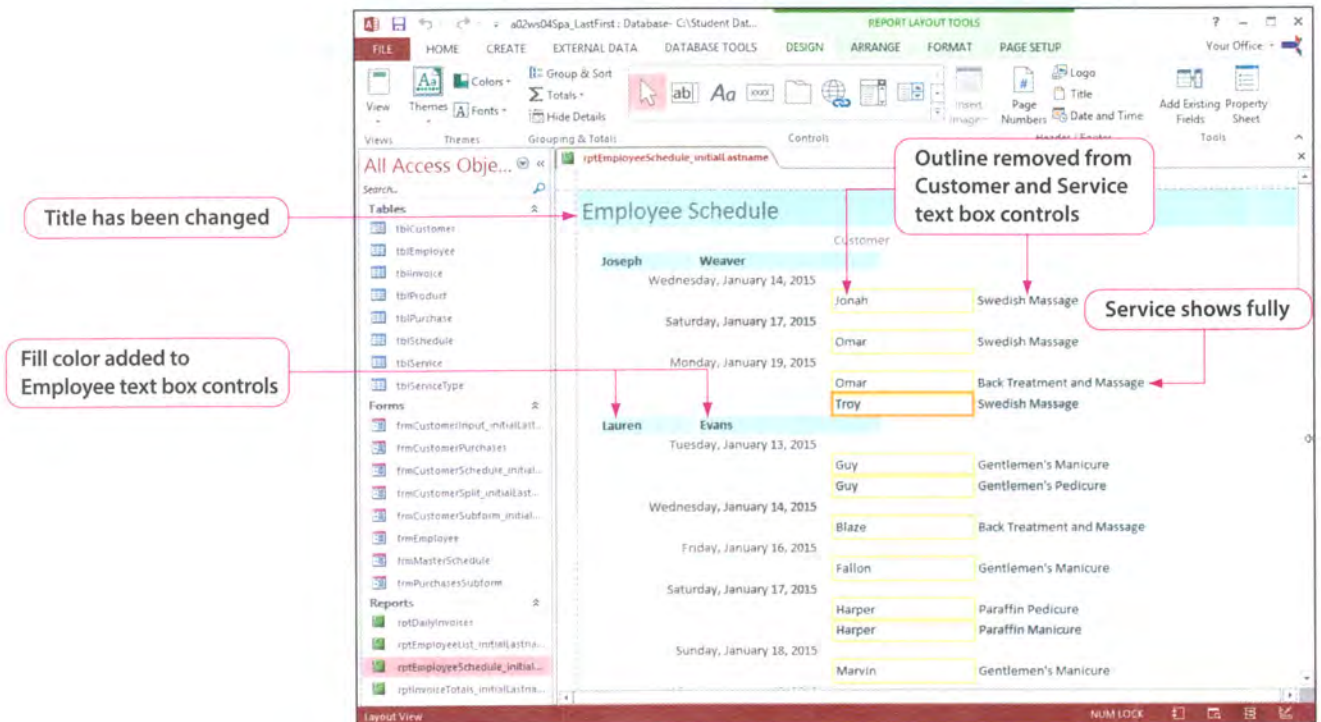


Figure 26 Formatted report in Layout view

- j. **Close** **[X]** the report, and then click **Yes** to save the changes.

Enhancing a Report with Conditional Formatting

In the previous section, you changed the colors and fonts of fields. You can also change the fonts and colors of fields only when certain conditions are met in the field. This is called **conditional formatting**. If a field value meets the conditions you specify, then the formatting will be applied. This is a useful tool to automatically highlight sales numbers on a report if they meet a certain threshold, or to highlight students' grades when they exceed a certain limit.

To apply conditional formatting, you must select the field value in the field to which you want the formatting applied. You can select a different font color and font effects for the formatting.

For this exercise, the spa manager would like you to create a report and apply conditional formatting to all services currently scheduled that are over \$100. These customers usually get some special treatments like complimentary coffee and tea, and the staff would like to be able to easily see which customers will get this service.

A04.21



To Apply Conditional Formatting to a Report Field

- Click the **CREATE** tab, and then in the Reports group, click **Report Wizard**.
- Click the **Tables/Queries** arrow, and then select **Table: tblSchedule**. Double-click **DateOfAppt**, **Customer**, and **Service** in the Available Fields list. Click the **Tables/Queries** arrow, and then select **Table: tblService**. On the Available Fields list, double-click **Fee**, and then click **Next**.
- Verify that **by tblSchedule** is highlighted, and then click **Next**. You will not add any grouping to this report, so click **Next**.
- Click the **1 Sort** arrow, click **DateofAppt**, and then click **Next**. Verify that **Tabular** is selected under Layout and **Portrait** is selected under Orientation. Verify that **Adjust the field width so all fields fit on a page** is checked. Click **Next**.
- Under **What title do you want for your report?**, type **rptHighFees_initialLastname** using your first initial and last name, and then click **Finish**. The report will open in Print Preview. Switch to **Layout** view. If necessary, **close** the Field List pane.
- Double-click the **title**, select the **text**, type **High Service Customers**, and then press **[Enter]**.
- Click in the **Fee** text box control, and then, on the **FORMAT** tab, in the Control Formatting group, click **Conditional Formatting**.
- In the Conditional Formatting Rules Manager dialog box, click **New Rule**. Verify that **Check values in the current record or use an expression** is highlighted. Find the three condition text boxes. The first should display **Field Value Is**. Click in the second condition box, and then select **greater than**. In the third condition text box, type **100**.

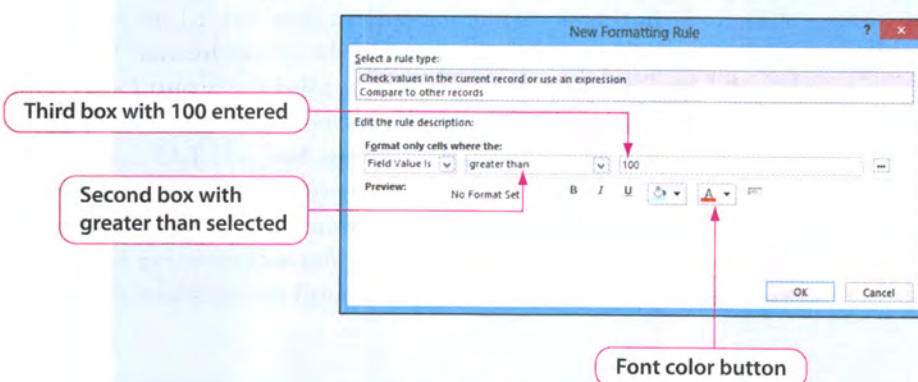


Figure 27 New Formatting Rule dialog box

- Below the condition text boxes, click **Bold** **[B]**, click the **Font color** arrow, and then click **Dark Red**. Click **OK**, verify that your rule states **Value > 100**, and then click **OK**.
All values greater than \$100 in the Fee field should be highlighted in dark red and bold.
- Switch to **Design** view. On the **REPORT DESIGN TOOLS DESIGN** tab, in the Controls group, select **Label** **[Aa]**, move your pointer to the **Report Footer**, and then when your pointer changes to **[+A]** drag your pointer to draw a label control about 2.5" wide in the top-left corner of the Report Footer section. In the new label, type **Created by initial Lastname** using your first initial and last name.
- Switch to **Report** view. Verify that your label has been entered in the bottom-left corner of the report.

The screenshot shows the Microsoft Access interface with a report titled "High Service Customers" in Layout View. The report displays a list of services with columns for Date, Customer, Service, and Fee. The Fee field is formatted with conditional text, and a callout box highlights the value \$129.00, indicating that the conditional text has been changed to dark red.

Date	Customer	Service	Fee
Tuesday, January 13, 2015	Guy	Gentlemen's Facial	\$129.00
Tuesday, January 13, 2015	Guy	Gentlemen's Manicure	\$30.00
Tuesday, January 13, 2015	Guy	Gentlemen's Pedicure	\$50.00
Tuesday, January 13, 2015	Genevieve	Lip Wax	\$16.00
Tuesday, January 13, 2015	Lois	Back Treatment and Massage	\$129.00
Tuesday, January 13, 2015	Raja	Cut and Style	\$75.00
Tuesday, January 13, 2015	Emily	Eyebrow Waxing	\$30.00

Figure 28 Report with conditional formatting applied

1. Close ☐ the report, and then click **Yes** to save the changes.

To delete a conditional formatting rule, click the **Format** tab in **Layout** view, click the field that has the conditional formatting applied, in the **Control Formatting** group, click **Conditional Formatting**, click the rule you wish to delete, and then click **Delete Rule**.

Applying Grouping and Sorting

The Report Wizard gives you the opportunity to sort and group records, but sometimes seeing the report changes your mind about what and how to group and sort. You can change the sorting and grouping options from either **Layout** or **Design** view. Groups are added to a section of the report called the **group header**. Calculations performed on a group in a report are added to a section called the **group footer**. A report may have one or more Group Headers, Group Footers, both, or neither.

In **Layout** view, you will use the **Group, Sort, and Total** pane to select the sort fields and grouping fields for a report. This is done after the report has been created by the Report Wizard.

For this exercise, the spa manager would like a report that shows appointment dates and services scheduled for those dates. You will show her how to create the report, and then you will make some changes to it until she likes how the information is presented.

A04.22



To Add Group and Sort Fields to a New Report

- Click the **CREATE** tab, and then in the **Reports** group, click **Report Wizard**.
- Click the **Tables/Queries** arrow, and then select **Table: tblSchedule**. Double-click **DateOfAppt**, **Service**, **Customer**, and **Employee** from the **Available Fields** list. Click **Next**.
- Click the **One Field Back** button to remove the **Service** grouping level. Click **DateOfAppt**, and then click the **One Field** button to add the date as a grouping level. Click **Grouping Options...**, click the **Grouping intervals** arrow, and then click **Normal**. Click **OK**, and then click **Next**.
- Click the **1 Sort** arrow, select **Service**, and then click **Next**.
- Verify **Stepped** layout and **Portrait** orientation are selected. Verify that **Adjust the field width so all fields fit on a page** is selected. Click **Next**.

- f. Under **What title do you want for your report?**, type `rptAppointments_initialLastname` using your first initial and last name, and then click **Finish**.
- g. Switch to **Design** view. On the DESIGN tab, in the Controls group, select **Label** , move your pointer to the **Report Footer**, and then when your pointer changes to  drag your pointer to draw a label control about 2.5" wide in the top-left corner of the Report Footer section. In the new label, type `Created by initial Lastname` using your first initial and last name.
- h. Switch to **Layout** view. Verify that your label has been entered in the bottom-left corner of the report.
- i. Click the **DateOfAppt** text box control, on the FORMAT tab, in the Font group, click **Align Text Left** . Drag the right border of the DateOfAppt text box to line up with the left border of the Service text box. All the date values should be visible.
- j. Click the **Service** text box control, and then drag the left border to the left to make the control wider so all the text can be displayed. Scroll down to the appointments scheduled on January 18, and then confirm that the **Microdermabrasion Treatment (6 sessions)** is showing.
- k. Double-click the **title**, select the **text**, and then type `Daily Appointments`. Press **Enter**.
- l. On the DESIGN tab, in the Grouping & Totals group, click **Group & Sort**, and then notice the Group, Sort, and Total pane that opens at the bottom of the report.
- m. Click the line that displays **Sort by Service**, and then click **Delete**  on the far right of the line. This will delete the sort that was added in the Report Wizard.
- n. Click **Add a group** in the Group, Sort, and Total pane, and then select **Employee**.
- o. Click the **Employee** text box control, and then drag it to the left until it is under the date. Click the **Employee** label control, press and hold **Shift**, click the **DateOfAppt** label control, and then press **Delete**.

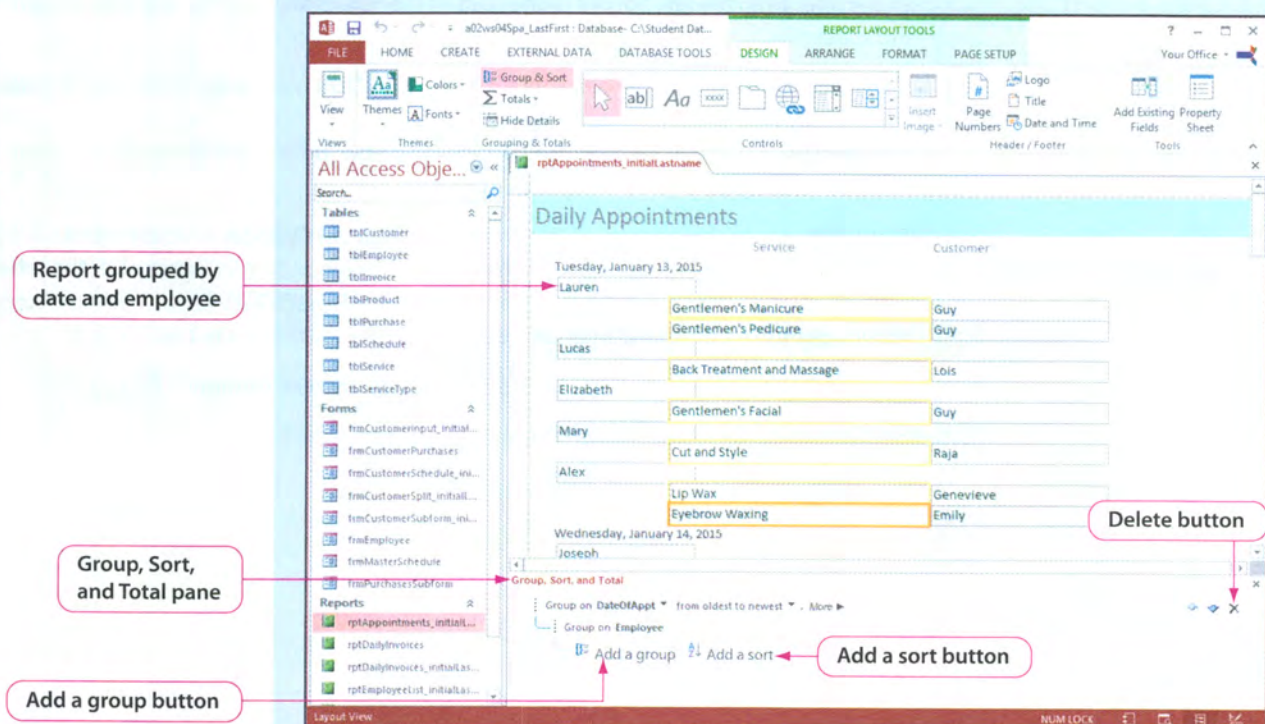


Figure 29 New grouping added to report

- p. **Close**  the Group, Sort, and Total pane being careful that you are clicking Close and not the Delete button. **Close**  the report, and then click **Yes** to save the changes.

Adding Subtotals

Earlier, you added subtotals when you created the report using the wizard. However, sometimes seeing the report makes you realize that subtotals would be useful. You can add them in Layout view, using the Group, Sort, and Total pane when you are selecting or modifying groups and sorts for the reports.

For this exercise, the spa manager would like to add subtotals to a report that shows all invoices grouped by date.

A04.23



To Add Subtotals to a Report

- a. In the Navigation Pane, right-click rptDailyInvoices, and then select **Copy**. Right-click in the **Navigation Pane**, and then select **Paste**. In the Paste As dialog box, in the **Report Name:** box, type rptDailyInvoices_initialLastname using your first initial and last name. Click **OK**.
- b. In the Navigation Pane, double-click rptDailyInvoices_initialLastname to open the report. Notice the report shows all invoices by day but has no totals.
- c. Switch to **Design** view. On the DESIGN tab, in the Controls group, click **Label** . Move your pointer to the **Report Footer**, and then when your pointer changes to drag your pointer to draw a label control about 2.5" wide in the top-left corner of the Report Footer section. In the new label control, type **Created by initial Lastname** using your first initial and last name.
- d. Switch to **Layout** view. Verify that your label has been entered in the bottom-left corner of the report.
- e. Scroll right, click the **Invoice Total** label control, press and hold **[Shift]**, click the **Invoice Total** text box control, and then drag the **right border** to the left so that it is to the right of the dotted line. Drag the **left border** to the right so the field is narrower but the column heading still shows.
- f. Click the **InvoiceTotal** text box control. On the DESIGN tab, in the Grouping & Totals group, click **Totals**, and then click **Sum**.

Subtotals for each InvoiceDate group will show under the InvoiceTotal details. A grand total will show at the bottom of the report.
- g. Right-click one of the subtotal controls, and then click **Set Caption**. A label control will be added next to each subtotal amount that says "InvoiceTotal Total". Double-click the **label** control, select the **text**, and then type **Invoice Subtotal**. Press **[Enter]**. Repeat the same steps to set a caption for the grand total control, and then change the text to **Invoice Total**.
- h. Double-click the **title**, select the **text**, and then type **Invoice Amounts**. Press **[Enter]**.

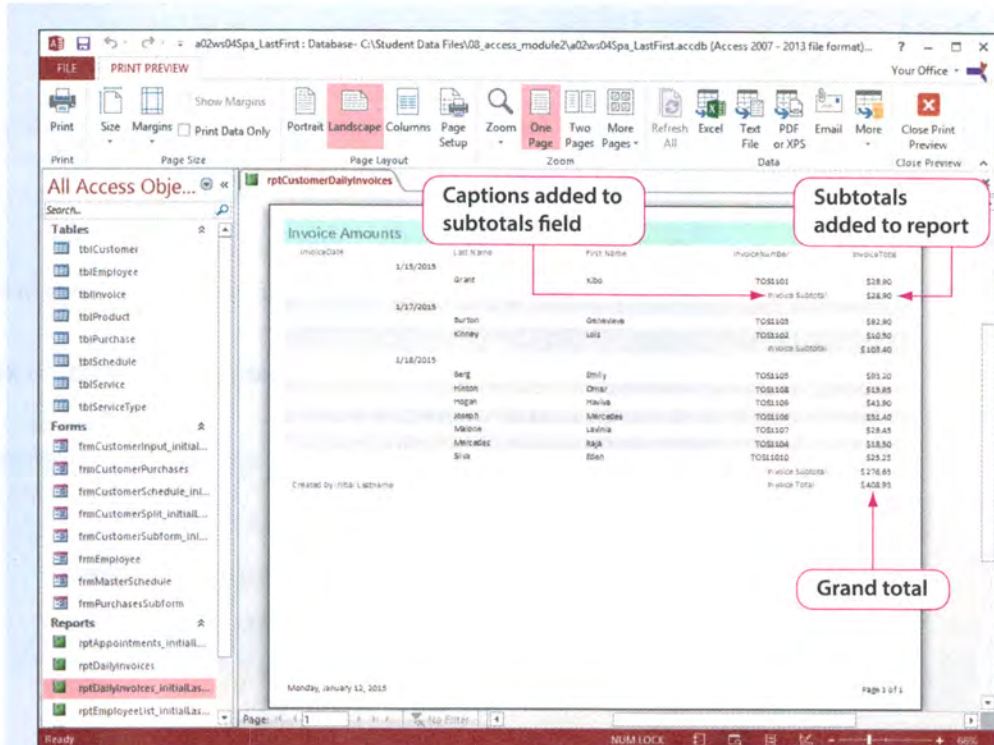


Figure 30 Report with subtotals added

i. **Close** ☐ the report, and then click **Yes** to save the changes.

Save a Report as a PDF File

Reports are formatted printable documents of your data, so the final result of a report will usually be a printout. If not printed, then the report may be shared with other people electronically. When you send a report to someone electronically, they have to have the same program in which the report was created in order to open the report. To avoid this problem, you can save a report as a PDF file, which can be read by Adobe Reader, a free program that you can download from the Internet, or by Word 2013.

To print a report, you use the Print dialog box on the File tab to select your printing options. Before you print, it is always a good idea to view the report in Print Preview to make sure it looks the way you want. Viewing the report in Layout view and Report view does not show you page breaks and other features of the report as it will look when actually printed. In Print Preview, you have many options to make design changes to your report before you send it to the printer. You can change the margins and orientation, and you can select how many pages, if not all, you want to print.

Creating a PDF File

If you need to distribute the report electronically, you also have the option to save the report as an Adobe PDF file. An **Adobe PDF file** is usually smaller than the original document, is easy to send through e-mail, and preserves the original document look and feel so you know exactly what it will look like when the recipient opens it. The correct terminology for saving a report as a PDF file format is to “publish” the report. When you are saving the report as a PDF you will see the option to Publish, not to Save or Print.

For this exercise, you will show the staff how to print and publish a PDF file of the employee schedule so it can easily be e-mailed to the staff each week.

A04.24



To Save a Report as a PDF File

- a. On the Navigation Pane, double-click **rptEmployeeSchedule_initialLastname** to open the report. Click the **FILE** tab, click **Print**, and then click **Print Preview**. Navigate through the pages to make sure the records fit on the pages correctly.
- b. On the PRINT PREVIEW tab, in the Print group, click **Print**.
- c. If your instructor instructs you to print, under Print Range, verify **All** is selected, and then click **OK**. Otherwise, click **Cancel**.
- d. On the PRINT PREVIEW tab, in the **Data** group, click **PDF or XPS**.
- e. In the **Publish as PDF or XPS** dialog box, navigate to the location where you are saving your files, and then in the **File name** box type **a02ws04SpaEmployeeSchedule_LastFirst** using your first and last name. Click **Publish**. The PDF file automatically opens. To close the file, drag down from the top bezel to the bottom.
- f. Drag from the left bezel to the right to return to **Access**.
- g. **Close** the Export - PDF window. **Close** ☐ the report, and then **close** ☐ Access.

Concept Check

1. What is the difference between Navigation and Edit modes? How can you tell you are in each mode? p. 740–742
2. When you add, change, or delete a record in a form, how does it affect the underlying table? Why? p. 748–749
3. What are controls? What is the difference between a label control and a text box control? Which is bound, and which is unbound? p. 751
4. What is a theme? What is the difference between applying a theme to an entire database and to a single object? p. 756–757
5. What view will you see when the Report Wizard is done creating a report? What is the difference between Report view, Layout view, Design view, and Print Preview when you are creating a report? Which view will show you the most accurate picture of what your printed report will look like? In which views do you see the data? p. 766
6. What is conditional formatting, and when would you use it? p. 772
7. What is a PDF file, and why would you want to save your report as a PDF? p. 777

Key Terms

Adobe PDF file 777
 Bound control 751
 Calculated control 751
 Conditional formatting 772
 Control 751
 Edit mode 740
 Grand total 768

Group 762
 Group footer 774
 Group header 774
 Label control 751
 Layout selector 758
 Main form 743
 Navigation mode 740

Split form 746
 Subform 743
 Subreport 762
 Subtotals 768
 Text box control 751
 Theme 756
 Unbound control 751

Visual Summary

The screenshot shows the Microsoft Access Report Layout Tools ribbon, which is divided into several tabs: FILE, HOME, CREATE, EXTERNAL DATA, DATABASE TOOLS, DESIGN, ARRANGE, FORMAT, and PAGE SETUP. The ribbon is currently in the DESIGN tab, showing options for controls, layout, and formatting. The background shows a report titled 'rptEmployeeSchedule_initial.asname' in Layout View, displaying a list of employees and their schedules. The report has a header section with the title 'All Access Objects' and a footer section with the text 'Created by initial Lastname' and 'Tuesday, January 20, 2015'.

Callouts from the left side of the screenshot:

- Save a report as a PDF file (p. 778)
- Save a report as a PDF file (p. 777)
- Add group and sort fields to a new report (p. 774)
- Add subtotals to a report (p. 776)
- Create a single-table report using Report Wizard (p. 763)
- Apply conditional formatting to a report field (p. 773)
- Create report totals using the Report Wizard (p. 768)

Callouts from the right side of the screenshot:

- Create a report using the Report Wizard (p. 762)
- Create a multiple-table report using the Report Wizard (p. 764)
- Move, resize, and format a report control (p. 771)
- Customize a report (p. 770)
- Explore report views (p. 767)

Preview and print a record from a form (p. 761)

Create a subform (p. 753)

Preview and print a record from a form (p. 761)

Create a form using the Form Wizard (p. 751)

Edit a record in a table in Datasheet view (p. 741)

Navigate a multiple-table form with a subform (p. 745)

Create a split form (p. 756)

Navigate a split form (p. 746)

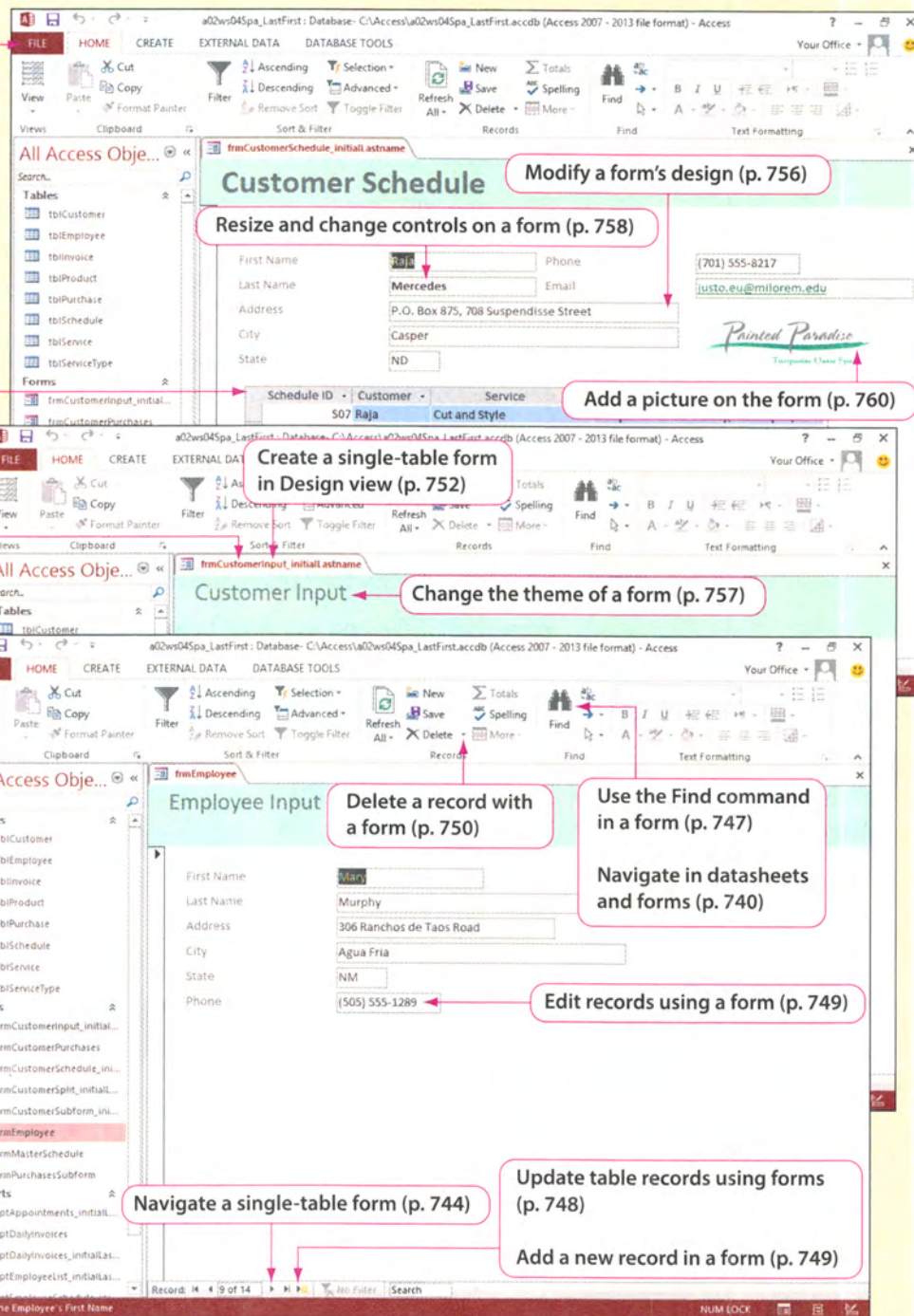


Figure 31 Turquoise Oasis Spa's New Database

Practice 1

Student data file needed:

- a02ws04Spa2.accdB
- a02ws04Spa.thmx

You will save your file as:

- a02ws04Spa2_LastFirst.accdB



Human
Resources

Turquoise Oasis Spa

The spa has just redecorated the staff lounge and has added bulletin boards and even a computer for the staff members to check their appointments and sign in and out. The manager would like to create reports to post on the bulletin boards with schedule and service

information, as well as make the database as easy to use as possible. You will help create some of the reports as well as forms to make the database easy for data entry and maintenance.

- a. Start **Access**, and then open **a02ws04Spa2**.
- b. Click the **FILE** tab, click **Save As**. Verify **Save Database As** and **Access Database** are selected. Click **Save As**. In the Save As dialog box, navigate to where you are saving your files and then type **a02ws04Spa2_LastFirst**, using your first and last name. Click **Save**. If necessary, in the Security Warning, click **Enable Content**.
- c. Create a form that will allow employees to edit their personal information as well as their upcoming appointments:
 - Click the **CREATE** tab, and then in the Forms group, click **Form Wizard**.
 - In the Form Wizard dialog box, click the **Tables/Queries** arrow, and then select **Table: tblEmployee**. Click the **All Fields** button to add all the fields to the Selected Fields list.
 - Click the **Tables/Queries** arrow, and then select **Table: tblSchedule**. Double-click **Customer**, **Service**, **Employee**, and **DateOfAppt** to add the fields to the Selected Fields list. Click **Next**.
 - Verify that the data will be viewed **by tblEmployee**, and then click **Next**.
 - Verify that **Datasheet** is selected as the layout for the subform, and then click **Next**.
 - Name the form **frmEmployeeSchedule_initialLastname** using your first initial and last name, name the subform **frmSubform_initialLastname**, and then click **Finish**.
 - Switch to **Form** view. On the main form Navigation bar, click **New (blank) record**, and then add your **first name**, **last name**, **address**, **city**, **state**, and **phone number**. On the Navigation bar, click **First record** to return to the first record in the table, and then click in the **Last Name** field.
 - Click the **HOME** tab, in the Find group, click **Find**. In the **Find What** text box, type **Rodriguez** and then click **Find Next**. When you find the record for Brenda Rodriguez, click **Cancel**.
 - On the HOME tab, in the Records group, click the **Delete** arrow, and then click **Delete Record**. Click **Yes** when prompted to delete the record.
 - Switch to **Layout** view. Double-click the **title**, select the **text**, and then type **Employee Schedule**.
 - Click the **Last Name** text box control, and then drag the **right border** of the text box to line up with the right border of the First Name text box.
 - Click the **subform label**, and then press **[Delete]** to delete the control. Click the **Subform**, and then using the layout selector, drag it to the left so it is right below the Phone label. Use the AutoFit feature on all the columns to best fit the data.
 - Click the **Employee** label in the subform datasheet, and then press **[Delete]** to delete the label. Click the **subform** control, and then drag the **right border** to the right until you can see all the fields in the subform. Click the **Date** heading in the subform datasheet, and then drag it to the left of the Customer field.
 - On the DESIGN tab, in the Themes group, click the **Themes** arrow, click **Browse for Themes**, browse to where you stored data files, click **a02ws04Spa**, and then click **Open**.
 - Switch to **Design** view, on the DESIGN tab, in the Controls group, select **Label**, move your pointer to the **Report Footer**, and then draw a label control about 2.5" wide in the top-left corner of the Report Footer section. In the new label control, type **Created by initial Lastname** using your first initial and last name.
 - Close the form, and then click **Yes** when prompted to save the changes.
- d. Create a report to show a list of customers and their purchases.
 - Click the **CREATE** tab, and then in the Reports group, click **Report Wizard**. In the Report Wizard dialog box, click the **Tables/Queries** arrow, and then select **Table: tblCustomer**. Double-click **CustFirstName**, **CustLastName**, **CustState**, and **CustPhone** to add the fields to the Selected Fields list.

- Click the **Tables/Queries** arrow, and then select **Table: tblProduct**. Double-click **ProductDescription** to add the field to the Selected Fields list.
 - Click the **Tables/Queries** arrow, and then select **Table: tblPurchase**. Double-click **PurchaseType**, **PurchaseDate**, and **Quantity** to add the fields to the Selected Fields list. Click **Next**.
 - Verify that the data will be viewed by **tblCustomer**, and then click **Next**.
 - Double-click **ProductDescription** to add it as a grouping level, and then click **Next**.
 - Click the **1 Sort** arrow, click **PurchaseDate**, and then click **Next**. Select a **Stepped** layout and **Portrait** orientation, and then click **Next**.
 - Name the report **rptCustomerPurchases_initialLastname** using your first initial and last name, and then click **Finish**.
- e. Customize the report's appearance.
- Switch to **Layout** view.
 - Click the **Date** text box control, and then drag the **left border** to the left until the date is visible. Move the **Date** text box control to the left until it lines up under the First Name field.
 - Click the **ProductDescription** label control, press and hold **[Shift]**, click the **PurchaseDate** label control, click the **PurchaseType** label control, and then press **[Delete]** to delete the controls.
 - Click the **Phone** text box control, and then drag the **right border** so the whole field is visible. Click the **ProductDescription** text box control, and then drag the **right border** to the right until the whole field is visible.
 - Double-click the **title**, select the **text**, and then type **Customer Purchases**.
 - **Save** the report.
- f. Add totals and subtotals.
- On the **DESIGN** tab, in the Grouping & Totals group, click **Group & Sort** to open the Group, Sort, and Total pane. Click **Group on ProductDescription**, and then click **Delete** to delete the group.
 - In the Group, Sort, and Total pane, click **Add a group**, and then select **PurchaseType**. Click the **PurchaseType** text box control—on the far right of report, and then drag it just below the customer's first name and just above the date.
 - In the Group, Sort, and Total pane, click **Add a sort**, and then select **ProductDescription**. Close the Group, Sort, and Total pane.
 - Click the **PurchaseType** text box. On the **FORMAT** tab, in the Control Formatting group, click **Conditional Formatting**, and then click **New Rule**. In the second box, select **equal to**, and then in the third text box type **Online**. Click **Font color**, and then select **Purple**. Click **OK** twice.
 - Click the **PurchaseType** text box control. On the **DESIGN** tab, in the Grouping & Totals group, click **Totals**, and then select **Count Records**. Click the **PurchaseType** text box control, press and hold **[Shift]**, and then click the **subtotal** text box control. On the **FORMAT** tab, in the Control Formatting group, click **Shape Outline**, and then select **Transparent**.
 - Right-click the **Subtotal** text box control, and then select **Set Caption**. Replace the text in the caption box with **Orders**.
 - Scroll to the bottom of the report. Click the **Grand Total** text box control, and then move it under the product description. Right-click the **Grand Total** text box control, and then click **Set Caption**. Replace the text in the caption box with **Total orders**.
 - Switch to **Design** view. On the **DESIGN** tab, in the Controls group, select **Label**, move your pointer to the **Report Footer**, and then when your pointer changes drag your pointer to draw a label control about 2.5" wide on the left side of the Report Footer. In the new label control, type **Created by initial Lastname** using your first initial and last name.
- g. Close the report, and then click **Yes** when prompted to save the changes.
- h. Close your database. Submit your files as directed by your instructor.



Student data file needed:

 a02ws04Clothing.accdb

You will save your files as:

 a02ws04Clothing_LastFirst.accdb
 a02ws04RptPriceCategories_LastFirst.pdf

Clothing Sales

Wanda Robinson runs a home business selling designer clothing and has started using an Access database to keep her records. The database has been created and is now able to retain data. Wanda wants to have some forms and reports created to make dealing with the data easier. She has hired you to develop the necessary forms and reports.

- a. Start **Access**, and then open the student data file **a02ws04Clothing**. Click the **FILE** tab, and then save the file as an **Access Database** in the location where you store your data files with the name **a02ws04Clothing_LastFirst** using your first and last name. If necessary, enable the content.
- b. Open **tblCustomer** and add a record with CustomerID **16**, your **last name**, **first name**, **address**, **city**, **state**, and **zip code**.
- c. Create a **split form** to show all the product information from **tblProduct**.
 - Save the form as **frmProductInfo_initialLastname**.
 - Apply the theme **Ion** to all objects in the database. Hint: The themes are listed alphabetically.
 - Add **Created by initial Lastname** to the Form Footer. Save and close the form.
- d. Use the **Form Wizard** to create a form that will display in the main form the customer's **LastName**, **FirstName**, and display **Product Description**, **Price**, **Size**, and **Color** in the subform. Keep all other default options. Name the form **frmCustOrders_initialLastname** and the subform **frmProductSubform_initialLastname**.
 - Remove the subform label. Move the subform to line up with the FirstName label control.
 - Resize the columns in the subform so all the product information fits. Resize the form to fit the columns.
 - Change the title of the form to **Customer Orders**.
 - Add **Created by initial Lastname** to the main form's Form Footer. Save and close the form.
- e. Use the **Report Wizard** to create a report to summarize each customer's purchases. Include **LastName**, **FirstName**, **ProductDescription**, **Price**, and **Quantity**. Hint: this information will come from three different tables. Accept the grouping options, sort by **ProductDescription**, use a format of **Stepped** and **Landscape**, and save the report as **rptCustSummary_initialLastname**.
 - Add the **sum of the quantities** for each customer. Add a caption of **Total Products**.
 - Apply conditional formatting to make any sum of quantities greater than **3** bold and red.
 - Add **Created by initial Lastname** to the Report Footer.
 - Change the title of the report to **Customer Summary**. Save and close the report.
- f. Use the **Report Wizard** to create a report that includes all product fields except ProductID. Group products by **category** and then **price**, sort by **ProductDescription** and then **Size**. Use **Summary Options** in the wizard to show the **sum of QuantityInStock**. Change the setting to **Landscape**. Name the report **rptPriceCategories_initialLastname**.
 - Use the AutoFit feature, and then move the fields as necessary for the best fit.
 - Add **Created by initial Lastname** to the Report Footer.
 - Change the title of the report to **Products by Category and Price**. Save and close the report.
 - Create a PDF file from the rptPriceCategories. Save the file as **a02ws04RptPriceCategories_LastFirst**.
- g. Close your database. Submit your files as directed by your instructor.

Perform 1: Perform in Your Career

Student data file needed:

 a02ws04Roadhouse.accdb

You will save your file as:

 a02ws04Roadhouse_LastFirst.accdb



Production &
Operations

Beverage Database at the Roadhouse Bar and Grill

You are the bar manager at the Roadhouse Bar and Grill, a local restaurant that specializes in home-cooked meals for breakfast, lunch, and dinner. You have developed a database for managing the inventory of beverage items.

You will expand the database by creating forms and reports to help you manage the database. You have loaded a few sample transactions to help you develop these forms and reports. For each report, choose which fields you need and which sort order makes sense. Choose appropriate titles and attractive formatting for all forms and reports. Add a Created by label to each report and form.

- a. Start Access, open the student data file **a02ws04Roadhouse**, and then save it as **a02ws04Roadhouse_LastFirst**.
- b. Open each table and familiarize yourself with the fields. Open the relationships window and note how the tables are related.
- c. Create a split form to add a supplier to the database. Name the form **frmSupplier_initialLastname**. Use your form to change the name of the first supplier to be your full name. Pick an attractive theme, and then apply it to the entire database.
- d. Create a form showing suppliers and the beverages they sell. Name the main form **frmSupplierBeverage_initialLastname** and the subform **frmBeverageSubform_initialLastname**. Use the form to add **Ginger Ale** to the canned beverages that you sell.
- e. Create a report that shows the supplier, the beverages they sold, and the sales date of the sales. Name it **rptSalesBySupplier_initialLastname**.
- f. Create a report that shows suppliers, the container types, container sizes, serving sizes, and price. Add a subtotal with average prices. Name the report **rptAveragePrice_initialLastname**.
- g. Create a report showing daily sales of beverages, count the number of sales per day of beverages, and then name the report **rptDailySales_initialLastname**.
- h. Create a report with conditional formatting to highlight something that you think is interesting.
- i. Create another report that would be useful for your job.
- j. Close your database. Submit your files as directed by your instructor. Close your database.



Additional
Cases

Additional Workshop Cases are available on the companion website and in the instructor resources.

MODULE CAPSTONE

More Practice 1

Student data files needed:

-  a02mpRecipes.accdb
-  a02mpIndigo5.jpg

You will save your files as:

-  a02mpRecipes_LastFirst.accdb
-  a02mpRecipesPDF_LastFirst.pdf



Production &
Operations

Indigo5 Restaurant

Robin Sanchez, the chef of the resort's restaurant, Indigo 5, has started a database to keep track of the recipes and ingredients that the restaurant includes. Right now there are no forms, queries, or reports created for this database, so the information available is very limited. You will help create some queries as well as forms for data entry and reports for the daily management of the food preparation.

- a. Start **Access**, and then open **a02mpRecipes**. Click the **FILE** tab, and then save the file as an **Access Database** with the name **a02mpRecipes_LastFirst** using your last and first name. If necessary, in the Security Warning, click **Enable Content**.
- b. Click the **CREATE** tab, and then in the Forms group, click **Form Wizard**. Add all of the fields from **Table: tblRecipes**. From **Table: tblRecipeIngredients**, and then double-click **IngredientID**, **Quantity**, and **Measurement**. View the form **by tblRecipes**, show the subform as a **Datasheet**. Save the form as **frmRecipe_initialLastname** and the subform as **frmRecipeSubform_initialLastname**, using your first initial and last name. Switch to **Design** view. On the DESIGN tab, in the Controls group, click **Label**, and then add a label to the form footer that says **Created by initial Lastname**.
- c. Switch to **Layout** view. Click the **DESIGN** tab, in the Themes group, click **Themes**. Click the **Ion Boardroom** theme to apply it to all objects in the database.
- d. Change the title of the form to **Recipe Input**. On the **FORMAT** tab, in the Font group, change the title font size to **28**, and then apply **Bold**.
- e. On the DESIGN tab, in the Themes group, click **Fonts**, and then click **Office Calibri Light** to apply it to all objects.
- f. Go to the recipe for **REC006, Pueblo Green Chili Stew**. Delete the subform label, and then move the subform to the left under the Instructions label. AutoFit the subform fields **Quantity** and **Measurement** to size them appropriately. Move the **right** border of the subform to the left to fit the subform columns.
- g. Click in the form **body**. On the DESIGN tab, in the Controls group, click **Insert Image**, click **Browse**, navigate to your student data files, and then locate **a02mpIndigo5**. Insert the **image** to the right of the Recipe information. Resize the **image** as necessary to fit above the Instructions text box.
- h. Switch to **Form** view. Click the **Recipe Name** text box. On the **HOME** tab, in the Find group, click **Find**, and then in the Find What box, type **Pasta Napolitana**, and then click **Find Next**. Click **Cancel**. Change the Quantity for the **IngredientID Honey** to **1**.

- i. Click the **New (blank) record** button on the main form Navigation bar, and then enter the following data into frmRecipe_initialLastname:

Recipe Name	Food Category ID	Subcategory	Prep Time (minutes)	Servings	Instructions
Avocado Salsa	Appetizer	Vegetarian	10	6	Peel and mash avocados. Add cayenne pepper, salt, chopped onion, and chopped tomato. Add lime juice and mix well. Refrigerate for at least 4 hours.

Enter the following data into the subform:

IngredientID	Quantity	Measurement
Avocado	2	whole
Tomato	1	cup
Cayenne pepper	.5	teaspoon
Salt	.5	teaspoon
Onions	1	cup
Lime juice	3	tablespoons

Save and close the form.

- j. Click the **CREATE** tab, in the Queries group, click **Query Design**, and then add **tblRecipes**, **tblRecipeIngredients**, and **tblIngredients**. Include **RecipeName**, **Ingredient**, and **Quantity** in the results. In the **Ingredient Criteria**, type **cumin or paprika**. Sort in **Ascending** order by **Quantity**. Run the query, and then use the AutoFit feature on the query columns. Save your query as **qryCuminOrPaprika_initialLastname**. Close the query.
- k. Create a query to show all ingredients not used in any recipe. Click the **CREATE** tab, and then in the Queries group, click **Query Wizard**, click **Find Unmatched Query Wizard**, and then click **OK**. Click **Table: tblIngredients**, and then click **Next**. Click **tblRecipeIngredients**, and then click **Next**. **IngredientID** will be the common field between the tables. Click **Next**, and then include all the available fields. Click **Next**. Save the query as **qryUnusedIngredients_initialLastname**. Click **Finish**. Switch to **Design** view, sort **IngredientID** in **Ascending** order. Save and close the query.
- l. Click the **CREATE** tab, in the Queries group, click **Query Design**, and then add **tblRecipes** and **tblFoodCategories**. Include **RecipeName**, **TimeToPrepare**, and **FoodCategory** in the results. Add criteria **< 30** to the **TimeToPrepare** field to find all recipes that take less than 30 minutes to prepare. Add criteria **soup or pizza** to the **FoodCategory** field. The results should show all recipes that take less than 30 minutes to prepare and are listed with the category of soup or pizza. Sort **TimeToPrepare** in **Ascending** order. **Run** the query. Use AutoFit on each column. Save the query as **qryTimeAndCategory_initialLastname** and then close the query.
- m. Click the **CREATE** tab, in the Queries group, click **Query Design**, and then add **tblRecipes**, **tblRecipeIngredients**, and **tblIngredients**. Include **RecipeName**, **Ingredient**, **Quantity**, **Measurement**, and **RecipeID** from **tblRecipeIngredients** in the results, in that order. Sort **RecipeID** in **Ascending** order. **Run** the query. Use AutoFit on each column. Save the query as **qryRecipeIngredients_initialLastname** and then close the query.
- n. Click the **CREATE** tab, in the Reports group, click **Report Wizard**, and then from **Table: tblRecipes** add the fields **RecipeName**, **Instructions**, **TimeToPrepare**, and **Servings**. From **Query: qryRecipeIngredients_initialLastname** add the fields **Ingredient**,

- Quantity**, and **Measurement** in that order. View your report by **tblRecipes**. Group by **RecipeName**. Sort in **Ascending** order by **Ingredient**. Accept all other default settings, and then name the report **rptRecipes_initialLastname**.
- Switch to **Layout** view, and then move the **Ingredient**, **Quantity**, and **Measurement** text boxes to the left under the Instructions field. Delete the **Ingredient**, **Quantity**, and **Measurement** labels. Move the **Servings text box** and **label** to the right. Make the **Prep Time (minutes)** and **Servings** labels wider so the text is visible. Double-click the report title, and then change it to **Recipes**.
 - Click the **Recipe Name** text field. On the **FORMAT** tab, in the **Font** group, click **Bold**. Move the right border for the **Recipe Name** text box to make it wide enough to fit all the text for every record. Scroll down to **Gambas al Ajillo (Shrimp with Garlic)** to make sure the field is wide enough.
 - Click the **Quantity** text box, and then move the **left** border to the right to make the field narrower. Click the **Ingredient** text box, and then move the **right** border to the right to make the field completely visible. Scroll down to see **Corn (whole kernel)** to make sure the field is wide enough.
 - Click the **Prep Time** text box, and then in the **Control Formatting** group, click **Conditional Formatting**. Click **New Rule**, select **greater than** in the second box, and then type **15** in the third box. Click **Bold** and change the font color to **Red**, and then click **OK**. Click **OK** again.
 - Switch to **Design** view. On the **DESIGN** tab, in the **Controls** group, click **Label**, and then add a label saying **Created by initial Lastname** to the Report Footer.
 - Save the report, switch to **Report** view to check your report, and then close the report.
 - Right-click **rptRecipes_initialLastname**. Select **Export**, and then select **PDF or XPS**. Navigate to the folder where you are saving your files, type **a02mpRecipesPDF_initialLastname**, in the **Open after publishing** box, clear the check box, click **Publish**, and then click close.
- o. Click the **CREATE** tab, in the **Reports** group, click **Report Wizard**, and then from **Table:tblRecipeIngredients** add the fields **IngredientID**, **Quantity**, and **Measurement**. From **Table: tblRecipes** add **RecipeName**. Click **Next**, check to make sure you view your data **by tblRecipeIngredients**, click **Next**, and then double-click **RecipeName** to add grouping. Accept all other default options, and then name your report **rptIngredientCount_initialLastname**.
- Switch to **Design** view. On the **DESIGN** tab, and then in the **Controls** group, click **Label**, and then add a label saying **Created by initial Lastname** to the Report Footer.
 - Switch to **Layout** view. On the **DESIGN** tab, in the **Grouping & Totals** group, click **Group & Sort**, and then delete the grouping by **RecipeName**. Click **Add a group**, and then group by **IngredientID**. Move the **IngredientID** text box to the left margin, under the **RecipeName** label. Click the **IngredientID** text box, and then on the **FORMAT** tab, in the **Font** group, click **Align Left**. Delete the **RecipeName**, **IngredientID**, **Quantity**, and **Measurement** labels.
 - Change the title to **Ingredient List**. Click the **IngredientID** text box, click **Shape Outline**, and then click **Transparent**. Click **Shape Fill**, and then under **Theme Colors**, click **Dark Purple, Text 2, Lighter 60%**.
 - Click the **Quantity** text box. Click the **DESIGN** tab, in the **Grouping & Totals** group, click **Totals**, and then click **Sum** to add subtotals. Right-click the **subtotal** text box, select **Set Caption**, and then change the text to **Total**. Click the **subtotal** text box, and then on the **FORMAT** tab, in the **Font** group, click **Align Right** to change the alignment. Scroll down to the bottom of the report to find the grand total text box (value 84.5), click the text box and then press **Delete**. Make the **RecipeName** text box wide enough to fit all the text for every record (scroll to find **Gambas al Ajillo (Shrimp with Garlic)** to check the width).
 - Close the **Group, Sort, and Total** pane. Close the report, and then save your changes.
- p. Close Access. Submit your file as directed by your instructor.

Problem Solve 1

MyITLab
Grader
Homework 1



Production &
Operations

Student data files needed:

-  a02ps1Hotel.accdb
-  a02ps1Paradise.jpg
-  a02ps1Paradise.thmx

You will save your files as:

-  a02ps1Hotel_LastFirst.accdb
-  a02ps1PdfCharges_LastFirst.pdf

Hotel Reservations

A database has been started to keep track of the hotel reservations with guest information, reservation information, and additional room charge information. There are no reports, forms, or queries built yet, so the staff feels like the database is not easy to use. You will create reports, forms, and queries to help the staff better manage the data in the database. Complete the following tasks:

- a. Start **Access**, and then open the student data file **a02ps1Hotel**. Click the **FILE** tab, and then save the file as an **Access Database** with the name **a02ps1Hotel_LastFirst** using your last and first name. If necessary, enable the content.
- b. Open **tblGuests**, and then add a new record with your **last name**, **first name**, **address**, **city**, **state**, **zip code**, and **phone**. Close the table.
- c. Create a query using **tblReservations** to calculate the average room rate, the minimum room rate, and the maximum room rate for each **DiscountType** of the rooms that are currently reserved. Rename the fields **Average Rate**, **Minimum Rate**, and **Maximum Rate**. Sort the query in **Descending** order by **DiscountType**. Resize the columns to best fit the data. Save the query as **qryDiscountTypeStatistics_initialLastname**. Close the query.
- d. Use the **Form Wizard** to create a form to enter guest information as well as reservation information. Add all fields from both tables EXCEPT **GuestID** (from either table) and **ReservationID**. The data should be viewed by **Guest information** first, and the subform should be in **Datasheet** layout. Accept all other default options, and then name the form **frmGuestReservations_initialLastname** and the subform **frmGuestSubform_initialLastname**.
 - Change the form **title** to **Guest Reservations**. Make the title font size **28** and **bold**.
 - Apply the theme **a02ps1Paradise** to all objects in your database. Insert and resize the image **a02ps1Paradise** in your form to the right of the guest fields.
 - Resize the **phone number** text field so the entire phone number is fully visible.
 - Delete the subform label. Move the **subform** to the left to line up with the labels for the guest fields. Resize the **column widths** in the subform datasheet, and then resize the object so all columns are visible. If necessary, collapse the navigation pane so you see the entire subform.
 - Add **Created by initial Last name** to the form footer. Save the form.
- e. Find the record for Elaine Foley. Add a new reservation from the information below.

CheckInDate	1/25/2015
Nights Stay	3
# of Guests	2
Crib	No
Handicapped	No
RoomType	Double (1 king bed)
RoomRate	\$289
DiscountType	None

Close the form.

- f. Create a query to find all guests who do not have matching reservations. Include the fields **GuestLastName**, **GuestFirstName**, **Address**, **City**, **State**, and **ZipCode**. Sort the query by **GuestLastName** and **GuestFirstName** in **Ascending** order. Save the query as **qryGuestsWithoutReservations_initialLastname**.
 - Change the font size of the query results to **14**, change the **Alternate Row Color** to theme color **Red, Accent 4, Lighter 60%**, and use **AutoFit** on all the columns. Close the query, and then save the changes.
- g. Create a query that will calculate the total due for each guest based on the number of nights they have stayed and the room rate for each guest. The results should show the **GuestFirstName**, **GuestLastName**, **NightsStay**, and **RoomRate** in that order. Select only guests who checked in between **December 1, 2014** and **December 31, 2014** but do not show **CheckInDate** in your results. Save the query as **qryDecemberRoomCharges_initialLastname**.
 - Name the new field **TotalRoomCharge**. Use **AutoFit** on the new column.
 - Sort the query in **Ascending** order by **GuestLastName**. Close the query, and then save the changes.
- h. Use the **Report Wizard** to create a report to show all room charges incurred for each guest (not including the charge for their room). Add the **GuestFirstName**, **GuestLastName**, **ChargeCategory**, and **ChargeAmount** to the report. View the report by **tblGuests**. Sort by **ChargeAmount** in **Ascending** order. Accept all other default options, and then save the report as **rptRoomCharges_initialLastname**.
 - Add a subtotal to the **Amount** field, set a caption, and then type **Total Charges**. Add conditional formatting to the subtotal text box to highlight in **Red** and **Bold** all subtotals that are over \$200.
 - Add a caption of **Grand Total** for the grand total.
 - Change the title to say **Room Charges by Guest**.
 - Add **Created by initial Last name** to the report footer. Save and close the report.
- i. Save the report as a PDF file and then name it **a02ps1PdfCharges_LastFirst**.
- j. Create a split form from **tblReservations**. Name the form **frmReservationSplit_initialLastname**. Change the title to **Reservations** and then bold the title. Add **Created by initialLastname** to the form footer. Save the form.
- k. Close the form, and then exit Access. Submit your file as directed by your instructor.

Problem Solve 2

MyITLab[®]
Grader
Homework 2

Student data files needed:

-  a02ps2Giftshop.accdb
-  a02ps2Giftshop.jpg
-  a02ps2Giftshop.thmx

You will save your file as:

-  a02ps2Giftshop_LastFirst.accdb

Painted Treasures



Sales &
Marketing

The Painted Treasures Gift Shop sells many products for the resort patrons including jewelry, clothing, and spa products. A database has been started to keep track of the customers, purchases, and products. There are no reports, forms, or queries built yet, so the staff feels like the database is not easy to use. You will create reports, forms and queries to help the staff better manage the data in the database. Complete the following tasks:

- a. Start **Access**, and open the student data file **a02ps2Giftshop**. Click the **FILE** tab, and then save the file as an **Access Database** with the name **a02ps2Giftshop_LastFirst** using your last and first name. If necessary, enable the content.

- b. Use the **Report Wizard** to create a report showing customers and their purchases. Include **LastName**, **FirstName**, **PurchaseDate**, **Quantity**, **ProductDescription**, **Category**, and **Price**. Accept the default view, and then add no additional grouping. Sort by **Category** and **Product Description**. Save the report as **rptCustomerPurchases_initialLastname**. Adjust the fields and titles so they are fully visible.

 - Add **Created by initial Lastname** to the report footer.
 - Change the report title to **Customer Purchases**.
 - Apply the theme **a02ps2Giftshop** to all objects in the database.
- c. Use the Form Wizard to create a form for inputting customers. Select all fields from **tblCustomer**, and then accept all defaults. Name the form **frmCustomerInput_initialLastname**.

 - Add **Created by initial Lastname** to the form footer.
 - Change the form title to **Customer Input**.
 - Click the **label** and **text box** for CustomerID and delete them.
 - Adjust the right margin of **LastName** to be as narrow as FirstName. Adjust the right margin of **StreetAddress** to be as narrow as City.
 - Change the Shape Fill for **LastName** and **FirstName** to be **Red, Accent 2, Lighter 80%**.
 - Insert the image **a02ps2PaintedTreasures** into the form. Resize it, and then move it so the top lines up with **LastName** and it fits in the form.
 - Use the form to change the first record to have your **last name** and **first name**.
- d. Create a query to see which customers made multiple purchases (Hint: This is a Find Duplicates Query). Show all fields available. Save the query as **qryMultiplePurchases_initialLastname**. Sort in **Ascending** order by CustomerID and PurchaseID.
- e. Create a query to see if any customers have made no purchases. Show **LastName**, **FirstName** and **ResortHotelRoom**. Save the query as **qryCustomerWithoutPurchase_initialLastname**.
- f. Create a query to find customers who made purchases but who have no ResortHotelRoom. Show **LastName**, **FirstName**, **PurchaseDate**. Do not show ResortHotelRoom. Sort in **Ascending** order by LastName and FirstName. Adjust the fields so that all fields are fully visible. Save the query as **qryNonGuestPurchases_initialLastname**.
- g. Create a query to show customers who have purchased **Indigo5** or **Spa** category products in January 2015. Show **LastName**, **FirstName**, **PurchaseDate**, and **Category**. Sort in **Ascending** order by LastName and FirstName. Use AutoFit on the fields. Save the query as **qrySpaIndigoJanuary_initialLastname**.
- h. Create a query to calculate the extended amount for each product purchased. Include **PurchaseID**, **PurchaseDate**, **PurchaseLine**, **Quantity**, **ProductDescription**, and **Price**. Save the query as **qryExtendedAmount_initialLastname**.

 - Add a new calculated field to the query to calculate each product's extended amount due based on the quantity and the price. Name the new field **ExtendedAmount**. Sort in **Ascending** order by PurchaseID. Use AutoFit on all fields. Save the changes, and then close the query.
- i. Use the **Report Wizard** to create a report showing a complete purchase. Include all the fields from **qryExtendedAmount_initialLastname**. Group by **PurchaseID**. Sort in **Ascending** order by PurchaseLine. Change orientation to **Landscape**, accept all other default options, and then name the report as **rptPurchases_initialLastname**.

 - Add **Created by initial Lastname** to the report footer.
 - Change the title to **Purchase Report**.
 - Click on **ExtendedAmount**, and then add a sum. Open the Property Sheet pane, and then change the format to **Currency**. Add a caption, and then change it to read **Total**

Purchase. Repeat for the grand total, and then change the caption to read **Grand Total Purchases**.

- Change the subtotal **Total Purchase** caption and text box to bold with a Shape Fill of **Red, Accent 2, Lighter 80%**.
- Change the grand total **caption** and text box to bold with a Shape Fill of **Red, Accent 2, Lighter 60%**,
- Save and close the report, and then close Access. Submit your file as directed by your instructor.

Perform 1: Perform in Your Life

Student data file needed:

 Blank Access database

You will save your file as:

 a02pf1Schedule_LastFirst.accdb



Class Schedule

One way to stay organized during the semester is to keep track of your schedule. You will create a database of all your classes and grades. The database should track the class information, your personal schedule, and the location of the class. To use this for more than one semester, you will keep each of the data in separate tables.

Once the tables are created, you will set up forms to make data entry easier, run queries to get more information, and create reports to help you manage your schedule. For each report, query, or form, make the object attractive and meaningful. You will start by adding data from your current schedule.

- Start **Access**, and then click the **Blank desktop database**. Save the database as **a02pf1Schedule_LastFirst**.
- To keep track of class information, design a table that includes fields for at least the class number, class description, credits offered, and professor name. Assign an appropriate primary key, and then save the table as **tblClasses**.
- Add the class information for your classes from last semester, or fictitious classes, if necessary. Add at least six classes to the table. Use AutoFit on the columns so all text is visible.
- To keep track of your class locations, design a table that includes fields for the building number, building name, and campus the building is located on. Assign an appropriate primary key, and then save the table as **tblBuilding**.
- Add the location of the classes you entered in Step c. Include at least three different locations. Use AutoFit on the columns so all text is visible.
- To keep track of your schedule, design a table that includes fields for the class number, semester, meeting days, meeting time, location, midterm grade (as a number), and Final Grade (as a number). Use AutoFit on the columns so all text is visible. Assign an appropriate primary key, and then save the table as **tblSchedule**.
- Enter last semester's schedule, or a fictitious one, that includes at least six classes in at least three different locations. The classes and locations should be the ones entered in **tblClasses** and **tblBuildings**.
- Create relationships as appropriate for **tblSchedule**, **tblClasses**, and **tblBuilding**.
- You would like to be able to enter all your class and schedule information at one time. Create one form that will allow you to enter all the information. Save the form as **frmSchedule_initialLastname**.
- Use the form to enter a new record for this semester. You should enter all the information except your grade. Add a new theme to the form, change the title to something more

meaningful than the form name, add **Created by initial Lastname** to the form footer. Save and close the form.

- k. You would like to see each class individually as well as all the class records at once. Create a form that will show you this view of the data. Change the form title to something meaningful. Save the form as **frmClasses_initialLastname**.
- l. You want to find out what your average midterm grade and average final grade was each semester. Even though grades are only entered for one semester, create a query to perform this calculation.
 - Rename the fields to something more meaningful, and then format the fields to show only two decimal places. Sort the query by Semester in **Descending** order. Save the query as **qryAverageGrades_initialLastname**.
- m. You want a schedule of last semester's classes only. Create a query that will show you last semester's classes, the instructor, and where and when it occurred. Save the query as **qrySchedule_initialLastname**.
- n. Create a report that will show you last semester's schedule organized by each day. Sort it in order of class time.
 - Make sure all the fields print on one page of the report and that all the fields are visible. Add **Created by initial Lastname** to the report footer. Save the report as **rptSchedule_initialLastname**.
- o. You want to know how to schedule your weekends. Create a query to see if you have classes after 9 a.m. on Friday. Save the query as **qryFridayClasses_initialLastname**.
- p. You also want to know your average grade for your classes between midterm and final. Create a query to calculate the average grade in each class. Sort the query by an appropriate field. Save the query as **qryGrades_initialLastname**.
- q. You want to print a report to show your parents your grades by class for the semester, including the average grade. Create a report that shows the class number, description, credits, midterm, final, and average grade for each class. Sort by an appropriate field. Resize all labels so all the text is visible. Change the title to something more appropriate. Save the report as **rptGrades_initialLastname**.
 - Add **Created by initial Lastname** to the report footer. Highlight all average grades over 90. Save and close the report.
- r. Close Access. Submit your file as directed by your instructor.

Perform 2: Perform in Your Career

Student data file needed:

 a02pf2Fitness.accdb

You will save your file as:

 a02pf2Fitness_LastFirst.accdb

Fitness Center



Production &
Operations

A new fitness center has opened and is developing a database for keeping track of members. So far the fitness center has two tables for Membership information and Member information, and another table with Roster Information. It has no queries, forms, or reports created, so the center has asked you to help answer some questions with queries, make data entry easier with forms, and print some reports for reference. For each report, query, or form, make the object attractive and meaningful.

- a. Start **Access**, and open the student data file **a02pf2Fitness**. Save the database as **a02pf2Fitness_LastFirst**.

- b. Open each table, and then familiarize yourself with the fields. Open the **Relationships** window, and then note how the tables are related.
- c. The staff wants to be able to enter all new member and roster information in the database at one time. Create a form that will allow them to enter the member records and the related membership records for a new member. Give the form a meaningful name. Add **Created by initial Lastname** to the report footer. Save the form as **frmMemberInput_initialLastname**.
- d. Using frmMemberInput, enter yourself as a member. Use your actual name and address; all other information can be fictitious. Join the club today and have your membership end a year from now.
- e. The staff wants to know how old each member is (in whole numbers) as of the date they joined the club. This will help them plan age-appropriate activities. Create a query to calculate the age of each member as of the date they joined the club. (Hint: When you subtract one date from the other, you get a total number of days, not years.) Save the query as **qryMemberAge_initialLastname**.
- f. The manager wants to know which membership types are creating the most revenue and are the most popular. Create a query to calculate the total number of each membership type and the total fees collected for each membership type. Format the query so the manager will understand exactly what each field represents. Save the query as **qryMembershipStatistics_initialLastname**.
- g. The manager would like to know if any membership types have not been applied for. Find any membership types that are not assigned to a current member. Save the query as **qryMembershipTypesUnused_initialLastname**.
- h. The staff likes to celebrate birthdays at the club. Assume the current year is 2014. Everyone born in 1974 will turn 40 this year, and the staff would like a list of all those members along with their actual birthdays so they can quickly see who is celebrating a birthday each day. Save the query as **qry1974Birthdays_initialLastname**.
- i. The staff likes to see each member's data as an individual record while still being able to view the whole table of data. Create a form that will allow the staff to view the data this way. Add **Created by initial Lastname** to the form footer. Give the form a meaningful name. Save the form as **frmMemberRecords_initialLastname**.
- j. The staff needs a master list of members with their membership information. Create a report that will show the relevant information so the staff knows who is a current member and what kinds of membership each person has. Save the report as **rptExpirationDates_initialLastname**.
 - Add **Created by initial Lastname** to the report footer. Change the report title to something meaningful.
 - Modify rptExpirationDates_initialLastname so the records are grouped by the month of the expiration date. Highlight the expiration date field with a color so it stands out from the other fields.
- k. The staff needs a list of members with the facilities their membership gives them access to. Create a report so the staff can quickly locate a member's name and determine which facilities they are allowed to access. Save the report as **rptFacilities_initialLastname**.
 - Add **Created by initial Lastname** to the report footer.
 - Change the report theme, change the report title to something other than the name of the report, and save the report.
- l. Close Access. Submit your file as directed by your instructor.

Perform 3: Perform in Your Team

Student data file needed:

 a02pf3Intern.accdb

You will save your files as:

 a02pf3Intern_TeamName.accdb

 a02pf3InternPlan_TeamName.docx



Human
Resources

Internships Coordination

You take a job with an organization that matches students from Indiana schools to internship opportunities. The database you use keeps track of the companies that offer internships, the potential intern's information, and interview information dates for the interns. You are often called upon to add new records to the table, find information for a company or intern, and provide reports for your staff. Currently there are no reports, forms, or queries, so you will have to build them from the existing data. For all reports, queries, and forms, use meaningful names, and make the objects attractive.

Because databases can only be opened and edited by one person at a time, it is a good idea to plan ahead. You will use a Word document to plan your database and to plan which team member will do what. You will use SkyDrive to store your Word document and Access database.

- a. Select one team member to set up the Word document and Access database by completing Steps b–e.
- b. Open your browser, navigate to <https://www.skydrive.live.com>, create a new folder, and name it **a02pf3Intern_TeamName** using the name assigned to your team by your instructor.
- c. Start **Access**, and open the student data file **a02pf3Interns**. Save the database as **a02pf3Intern_TeamName** replacing TeamName with the name assigned to your team by your instructor. If necessary, enable the content.
- d. Upload the **a02pf3Intern_TeamName** database to the a02pf3InternshipsFolder_TeamName folder, and then share the folder with the other members of your team. Make sure that the other team members have permission to edit the contents of the shared folder and that they are required to log in to SkyDrive to access it.
- e. Create a new Word document in the assignment folder in SkyDrive, and then name it **a02pf3InternPlan_TeamName** using the name assigned to your team by your instructor.
- f. In the Word document, each team member must list his or her first and last name as well as a summary of their planned contributions. As work is completed on the database, this document should be updated with the specifics of each team member's contributions.
- g. Open each table, and then familiarize yourself with the fields. Open the Relationships window, and then note how the tables are related.
- h. Create a form to enter data for new interns and their upcoming interviews. Pick a theme to apply to all objects in the database. Save the form as **frmInterns** and the subform as **frmInternSubform**.
- i. Each team member should add his or her name as a new intern with one interview date and company of your choice.
- j. You are scheduling for January and March and need to know which students already have interviews scheduled for those months, as well as the interview date and company the interview is with. Create a query, and then save it as **qryJanuaryOrMarch**.
- k. Indiana University Purdue University Indianapolis (IUPUI) would like to know which of its students have interviews with Del Monte Foods Company or MMI Marketing and when those interviews are scheduled. Create a query, and then save it as **qryIUPUI**.

- l. Your boss wants to know the total number of interns in the database from each university. Create a **query** with descriptive field names, and then sort appropriately to provide this information. Save the query as **qrySchoolCount**.
- m. In the past, there have been problems with interns being scheduled more than once with the same company or scheduled for interviews on the same day. You need to find all students who have multiple interviews scheduled to check for conflicts. Create a query, and then save it as **qryMultipleInterviews**.
- n. Your boss has asked for a master list of all interns who have interviews scheduled. He would like to be able to look up a student in the report to see when their interview is and who the interview is with. Save the report as **rptInterviewsScheduled**.
- o. You need a report that counts and highlights how many interviews are scheduled each month. The report should also show the interview date and intern information. Save the report as **rptInterviewDates**.
- p. When a company comes to interview, you need to quickly find who the interview is with. Create a report that will provide a master list of interviews that allows you to quickly see who is interviewing with each company. Save the report as **rptCompanySchedule**.
- q. You would like to stay one step ahead of your boss. Create two more queries that may be helpful in analyzing the database information. Name the queries something descriptive so your boss will know what information is provided.
- r. Once the assignment is complete, share the **a02pf3InternFolder_TeamName** folder with your instructor. Make sure that your instructor has permission to edit the contents of the folder.

Perform 4: How Others Perform

Student data file needed:

-  Blank Word document
-  a02pf4Lessons.accdb

You will save your file as:

-  a02pf4Answers_LastFirst.docx

Music Lessons



Production &
Operations

You have just taken a new job in a music store, and one of your responsibilities is to manage the music instructors and their students. A database has been created, but as you run the queries you notice they are either missing data or have wrong results. Answer the following questions about each of the objects as completely as possible:

- a. Start **Access**, and open the student data file **a02pf4Lessons**.
- b. Create a Word document **a02pf4Answers_LastFirst** where you will answer the questions.
- c. Open **rptListOfTeachers**. Why is the image repeated after each record? How could the image have been added to the report so it would not repeat like that?
- d. Open **qryGuitarPianoAndBeginners**. The query is supposed to show all teachers who are teaching piano or guitar and are taking new students. Why are other records in the results? Switch to **Design** view, and then explain how you would correct the query criteria to show the correct results.
- e. Open **qryLessonTimes**. The query is supposed to show the average lesson length for each teacher. Instead, the query shows different lesson times for each teacher. What is wrong with this query, and how can you fix it to show the average lesson length for each teacher?

- f. Open rptLessonList. Can you tell what the report is grouped by and sorted by without looking at the Group, Sort, and Total pane? Describe how you would change the grouping to group by Instrument.
- g. Open qryInstrumentList. The query was supposed to find all teacher names, student names, and the instrument the student plays. Instead there are over 200 records. What happened, and why did this happen? How can you fix the query so it will provide the information you really want?
- h. Open frmStudents. This form was created to see only one student at a time. Why is it showing one student and the whole student table? How was this form created? How would you create the form with only one student record at a time?
- i. Submit your file as directed by your instructor.

Microsoft Office PowerPoint 2013

Module 1

Understanding the Art of Presentation

WORKSHOP 1 | PRESENTATION FUNDAMENTALS

OBJECTIVES

1. Plan your presentation with a purpose for an intended outcome p. 798
2. Define the purpose, scope, and audience of a presentation p. 799
3. Plan the presentation content p. 803
4. Work with the PowerPoint window and views p. 807
5. Navigate in Slide Show view and Outline view p. 811
6. Understand the difference between a theme and a template p. 815
7. Create a presentation from a template p. 820
8. Add and delete slides, change slide layouts, and rearrange slides p. 825
9. Edit slides and move slide content p. 829
10. Replace words using the Research pane p. 831
11. Save a presentation p. 832
12. Preview and print a presentation p. 833

Prepare Case

The Red Bluff Golf Course & Pro Shop Putts for Paws Golf Tournament Presentation



Sales &
Marketing

The Red Bluff Golf Course & Pro Shop hosts a tournament each year to benefit the Santa Fe Animal Center. Golf pro John Schilling speaks at community meetings, such as the Community Club and Women's Business Council, to gather sponsors and golfers. He asked you to assist him with the Putts for Paws tournament this year. Your first assignment is to review and update the PowerPoint presentation he uses during his speeches. This is a persuasive presentation, but it also provides basic information, such as the time, date, and cost of the tournament, sponsorship opportunities, and special events.



sattahipbeach / Shutterstock.com

REAL WORLD SUCCESS



"I was in a job interview for a major investment banking firm. After they had asked me all the basic skills questions about spreadsheets and databases, they asked me if I had any design experience, which was not included in the original job description. I was able to tell them that I had training in presentation design for target audiences. They were pleasantly surprised, and they offered me the job."

- Tanya, recent graduate

Student data files needed for this workshop:



You will save your files as:

Understanding the Purpose of PowerPoint

Microsoft Office PowerPoint 2013 is a software application that enables you to efficiently build professional quality presentations that allow your audience to see what you are saying. PowerPoint is a visual and emotive aid used by a presenter. Adding a visual component to your presentation adds impact and helps make your presentation memorable. That is the primary reason to use presentation software. Unfortunately, many people use PowerPoint when they have nothing to say, pretending the slide show will do all the work for them. You have probably seen many presentations and may have even developed some of your own. Visual aids such as marks on a whiteboard or chalkboard, a test tube full of bubbling liquid, or a computer slide show support the speaker, but they cannot stand on their own; you must have a message that is compelling enough to ask for the attention of others.

Presentations are typically displayed on large screens for audiences; however, there are many creative ways to use PowerPoint. Kiosks, for example, are common in public locations such as malls, banks, hotels, zoos, or museums, and can display self-running PowerPoint presentations that provide information or display advertisements. PowerPoint is a versatile tool that can help you vividly communicate your message. In this section, you will explore PowerPoint and get a sense of how it can be used to enhance your presentation.

Plan Your Presentation with a Purpose for an Intended Outcome

PowerPoint presentations can help you communicate with your audience. Slides add interest and variety to your presentation. Because of the visual nature of the slides, your audience is able to grasp more information. Well-built presentations organize thoughts, stimulate interest, clarify and substantiate your message, reinforce what you say, and often motivate your audience to take some form of action.



REAL WORLD ADVICE

Defining Your Target Audience

Defining your **target audience** is important to effectively plan your presentation. Asking yourself a few starting questions can help identify your audience.

- Why were you invited to speak?
- Why is the topic important to the audience?
- What do they know about the topic? How will they use the information?
- How large is the audience? What is the physical layout of the presentation room?
- How long are you expected to speak?

Informing Your Audience

Generally, the purpose of your presentations will fall into one of three major categories. The first, an informational presentation, provides facts and figures to your audience. A fiscal report in business is an example of an informational presentation. The slides in a financial report may show business income and expense, perhaps employing charts and tables for the audience. Another example of an informational presentation is a museum kiosk, giving information about artists, their methods, and the history of the artwork. Yet another example is a class lecture, where objectives, concepts, examples, and questions for discussion are organized. When you provide information to your audience, you need to know what they already know about the topic and how you can support their needs.

Persuading Your Audience

The second purpose of a presentation is to persuade your audience. While this type of presentation may contain elements such as facts and figures, your main objective will be to appeal to members of the audience to persuade them to agree with you. Sales and political

presentations are examples of persuasive presentations. Whenever you try to generate support for an idea, fund a proposal, or get people to change their beliefs about something, you are making a persuasive presentation. For this type of audience you need to know their expectations, biases for or against the topic, and how you relate to them on a personal level. You will need to address what your audience is resisting with regard to your position, address what the risks are, and how they will be rewarded for taking such risks.

Preparing Your Audience

The third purpose of a presentation is to prepare your audience. In this case you may be preparing them for bad times, such as layoffs, or you may be preparing them for good times by cross-training them to do a different type of job. You will include important information and also help them to understand the circumstances they will encounter. When you prepare your audience, you need to know what their expectations are, and what they know about the topic.



CONSIDER THIS

Are There Mixed Purposes?

Can a presentation have a mixture of purposes? Or, if you begin with the purpose of persuading an audience, is it possible to also inform them? What role do your biases have in the purpose? Can an informational presentation really be devoid of persuasion? If you are preparing an audience, are you also informing them?

Telling a Story

Universally, your audience is concerned about “What is in it for me?” Your presentation should focus on answering this question while addressing what you want them to know. PowerPoint expert Cliff Atkinson, author of “Beyond Bullet Points” says, “Your audience doesn’t care as much about your company history as they do about whether you can help them solve the specific problems they face. Write a script for your presentation that makes the audience the protagonist, or the main character, who faces a problem that you will help to solve.”

Good presenters are often great story tellers and a pleasure to listen to. Good stories create a sense of tension that is somehow resolved. Chip and Dan Heath, authors of the bestseller “Made to Stick: Why Some Ideas Die and Others Survive,” encourage presenters to generate unexpected “sticky” ideas: to “break patterns, create mystery, build unique stories, and find knowledge gaps.” Give them something unexpected. Make them think. Stir up controversy, challenge their beliefs. Darrell Zahorsky, former About.com Guide, says to use these techniques as a method to “wake them up.” Do not do what everybody else does. Your job is to stand out.

Define the Purpose, Scope, and Audience of a Presentation

Every presentation begins with planning. According to David A. Peoples, author of “Presentations Plus,” “Ninety-five percent of how well your presentation is going to go is determined before you even start.” Start by defining the purpose of your presentation. Be specific, and use action words as you list objectives. Determine the outcome you expect from the audience. Allow approximately four hours of planning time for each hour of presentation time. Clear thinking about what your objectives are, the type of content you will include, and the composition of the audience will assist you in creating a slide show that truly serves your purpose. In this section you will prepare a presentation using tools to help you develop your content.

As you define your objectives for the presentation, be specific. Ask such questions as:

- What is your purpose? To persuade? Inform? Prepare?
- Why is the topic important?

- Why should the audience be interested?
- What is in it for the audience?
- What do you expect the audience to do after your presentation?

Use paper sticky notes to brainstorm the possible main ideas for your presentation. Do not try to edit these ideas in the early stages; just generate ideas. When you reach a point where no more ideas come to mind, then begin eliminating some of the ideas. Your goal is to focus your presentation on two to five main ideas. Translate these ideas into action verb objectives, such as “update our computer systems,” or “increase workflow by 15%.” The objectives will determine the **content** of the presentation, determine the scope or level of detail, and enable you to give an effective presentation.

With the objectives clearly stated, continue to add sticky notes to develop the subtopics of the presentation. These subtopics will likely become the titles on your slides and will make the content of your presentation meaningful because they directly relate to the objectives. Consider the order of the subtopics, and try to provide organization so you can lead your audience through the presentation and achieve the purpose you have defined. You must understand and be clear about what needs to be communicated. If you are unsure, your audience will be, too.

Opening PowerPoint

In this section you will open the file for the Red Bluff Putts for Paws Golf Tournament, look at the beginning of a presentation, and review the objectives for the presentation.

P01.00



To Open a Presentation

- From the Start screen or desktop, point to the **bottom-right** corner of the screen. The Charms will be displayed on the right side of the screen. Note the labels underneath each of the charms. Click the **Search** charm. Click inside the **search** box at the top of the page. Type **PowerPoint**.
- Click **PowerPoint 2013** in the search results. The PowerPoint Start screen displays.

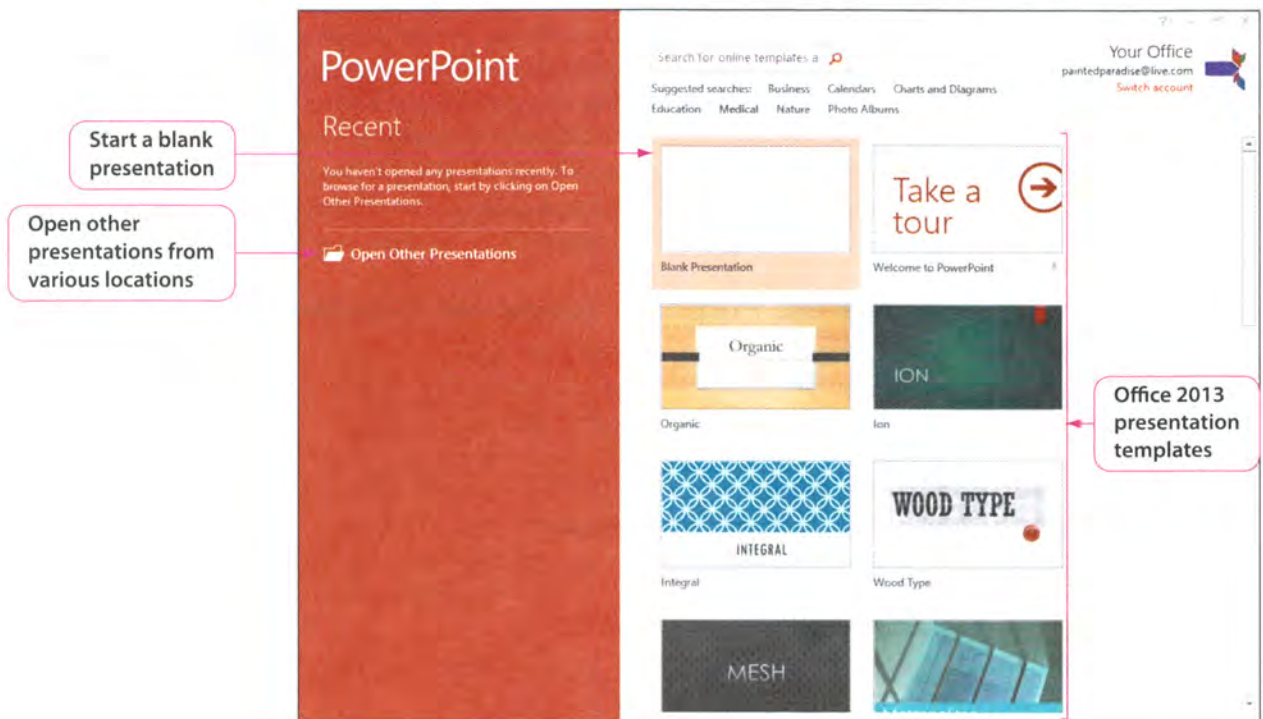


Figure 1 PowerPoint Start Screen

- c. Click **Open Other Presentations**. Under Open, click **Computer**.

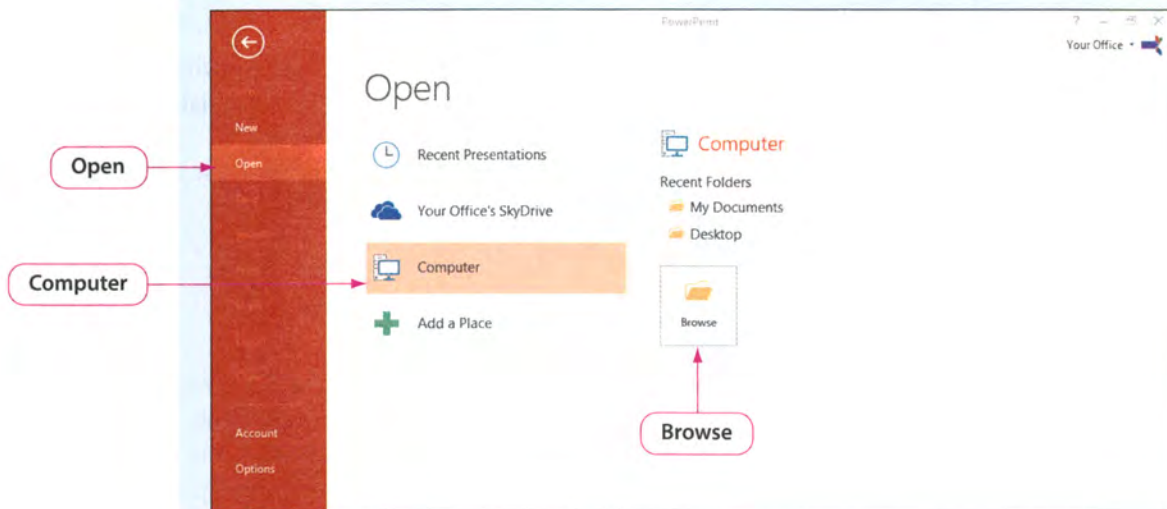


Figure 2 PowerPoint Backstage view

- d. Under Computer, click **Browse**. Navigate to where your student data files are located, click **p01ws01Sponsor**, and then click **Open**.
- e. Click the **FILE** tab, and save the file in the location where you are saving your files with the name **p01ws01Sponsor_LastFirst**, using your last and first name.

SIDE NOTE

Saving Files

Save the file with a new name so you will have the original in case you need to start over. Save often.



REAL WORLD ADVICE

Pecha Kucha Presentations

Pecha Kucha, pronounced "pe-CHALK-cha," is a unique format for presentations, first used in Tokyo, Japan, in 2003. This type of presentation automatically displays 20 slides, for 20 seconds each, during which the presenter speaks. While this trend in presentations began with architects, it has spread worldwide, and now Pecha Kucha nights cover topics such as travels, artwork, business, and research. Practicing a Pecha Kucha presentation can help you become a better presenter by being more concise and clear in a short period of time. To give effective short presentations such as Pecha Kucha you must start early while planning! Think about how Pecha Kucha relates to various online videos you have seen and how it relates to presentation planning.

Considering the Target Audience and Their Needs

Figuring out the characteristics of an audience enables you to produce a presentation that is worthwhile to the audience and achieves your objectives. Many characteristics can help you to shape your presentation. Consider these questions:

- Why are they listening to your presentation?
- What are the attitudes they have about your topic?
- What do they know about the topic?
- What are the constraints? Are they political? Financial? Knowledge based?
- How will they use the information you present?

- What are the demographics of the audience? Number of people? Location of the presentation? What technical equipment is available? Will you have a microphone? Computer? Projector?
- What is the size of the audience? Is it small and intimate? Or is it large and formal?

Clearly, there are many things to consider, but knowing your audience will enable you to streamline your presentation, customize the materials, and feel more comfortable as you deliver the presentation.

As you think about your audience's needs, answer these questions:

- What do they want to hear?
- What do they need to know?
- What are the potential benefits to the audience?
- What questions might they have?

Another consideration is to determine what the audience members are doing before and after your presentation. Are they listening to another speaker? Are they about to go home or return to their desks? Have they had lunch? Put yourself in their shoes. Understanding their frame of mind enables you to better prepare to meet their needs.



CONSIDER THIS

How Many Audiences Do You Really Have?

Will you have only one target audience or multiple audiences in your presentation? Should you plan your presentation around all the different potential audiences or just your main target audience?

Understanding Commonality with Your Audience

Understanding the relationships you have with the audience and the relationships they have with each other helps you to set the tone for your presentation. You may find yourself making a presentation to your superiors, in which case you will want to make suggestions related to the topic so they can make an informed decision. Another audience might be made up of your peers or team members. You will want to engage these audience members by having them share their experiences or expertise. Use “we” language, such as “We can improve our customer service by responding to calls within 1 minute.” Special interest groups expect you to focus on their concerns as they relate to your topic.

Anticipating Audience Expectations

Audiences anticipate that you have expertise in your topic area. This may call for concentrated study so you have a complete knowledge of the subject matter. This additional study can add significant time to your preparation for the presentation. The audience will ask you questions. Anticipating their questions and adding them to the planning of the presentation helps the audience to understand your topic more clearly.

An audience that is interested in your topic is concerned with what additional information you can provide. For this kind of presentation you can focus on teaching them about your topic. Another audience may not be quite as interested and may need to be involved in some way with your presentation. Group work or discussions are often the key in this situation. Still another audience will be uninterested in your presentation but forced to attend. With this group, strive to include them, too, maybe even directly, but if you have not established a common ground then this may backfire. Stay true to the purpose and objectives of your presentation.

Understanding Your Audience's Interaction with the Presentation

The expectation of most audiences is that your topic will be presented with few surprises, cover points A through D, and end on time. Planning for interaction should extend well beyond the standard question-and-answer period. Creatively develop activities that draw the audience into the presentation. Use a variety of visual aids, including PowerPoint slide shows, to explain concepts. Bring in a object that everyone can hold. Pass out specially made fortune cookies with questions about your topic for the audience to consider. Keep in mind that people remember much more when visual aids are used in the presentation.

As you plan for organization in your presentation, begin by telling the audience what you are going to discuss. Remember that first impressions do count. Capture the attention of the audience by establishing common ground. Often, presentations outline the objectives or major topic areas first. Next, follow through and talk about each item you said you would discuss in the same order. Finally, review what you have discussed as a summary of the presentation. Finish strong with a call to action or an appeal that supports your purpose for the presentation.



REAL WORLD ADVICE

Everyone Needs a Road Map

You can help to organize the thinking of your audience by providing a road map of your presentation. Set the tone early to draw them in to listening to you during the presentation instead of reading a lot of text; consider sharing a picture or graphic that invokes the tone of the presentation. The bulleted list you had in mind can be given to them verbally. The road map should be a part of the beginning of the presentation, and then you can do a short recap at the end to remind the audience of the important parts in the presentation.

Plan the Presentation Content

Once you have your script, you can begin to visualize your ideas. Developed by the Walt Disney Studio during the 1930s, storyboards are often used in business today to plan ad campaigns, web sites, and interactive user interfaces. Storyboards are conceptual drawings of your story, much like a comic book. Using a storyboard can enable you to plan and visualize how everything comes together in a scene or sequence of shots, to use the film industry analogy. Being an artist is not a prerequisite to using storyboards to plan your presentations. Quick drawings suffice and remind you of elements you want to include. Importantly, the best presentations are visual and not all text on the screen. Storyboarding also takes your concentration away from typing on the keyboard back to the visual the audience will see. Remember, PowerPoint presentations are not your notes but rather visual aids.

Using a Storyboard

Typically, storyboards are composed of three panels situated left to right: content, layout or action, and audio/visual elements, but this is not a rule. Storyboards should include information about your script, props or visual aids, backgrounds, and transitions. In this section, you will review a storyboard for the Red Bluff Putts for Paws Golf Tournament and review the objectives in this presentation.

P01.01



To Review a Storyboard

- Point to the **bottom-right** corner of the Start screen. On the Charms bar, click the **Search** charm. Click inside the **search** box at the top of the page and type **Word**.
- Click **Word 2013**.
- Click **Open Other Documents**. Then under Open, click **Computer**.

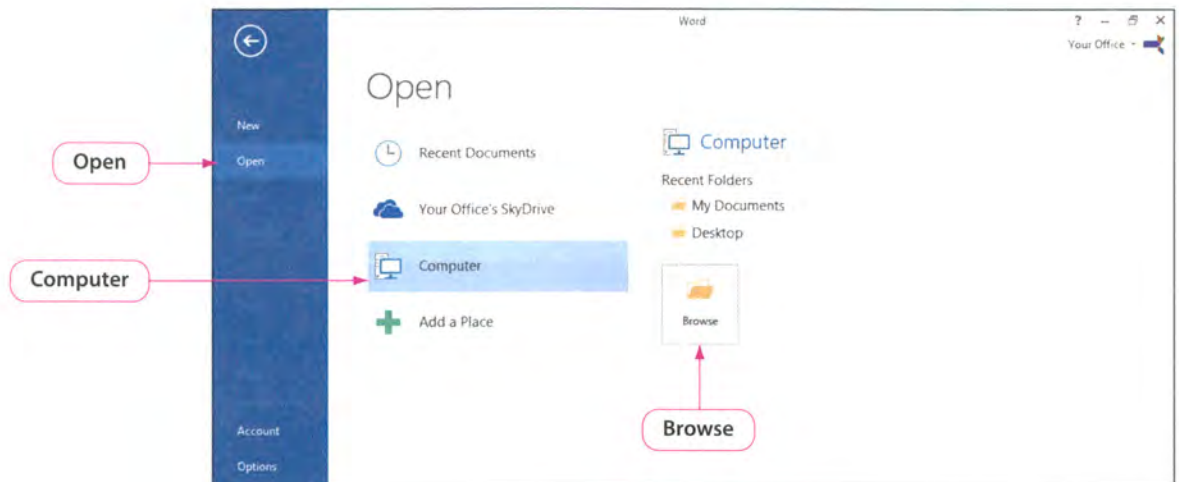


Figure 3 Word Backstage view

- Under Computer, click **Browse**. Navigate to where your student data files are located, click **p01ws01SponsorStory**, and then click **Open**.
- Scroll through the document, making note of the content, layout, and visual elements planned for each slide. Notice the progression from opening material about logistics, to the golfer incentives, corporate incentives, and contact information.

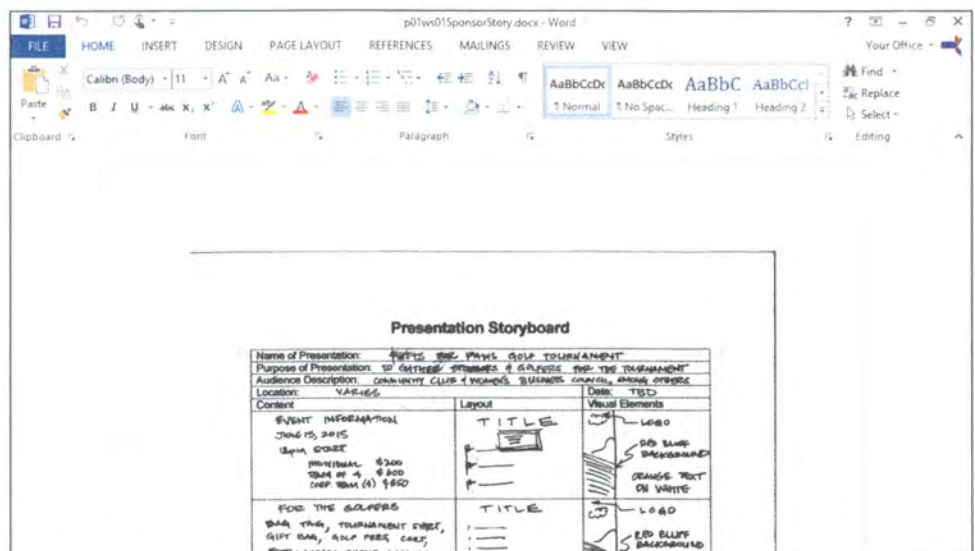


Figure 4 Sponsors Storyboard

- Close Word.

As you build your story, keep in mind that you are the focus of the audience. The presentation text and graphics will assist the audience in seeing what you are communicating. People cannot listen and read at the same time. Thus, any text should be minimal and thoroughly edited to include only the main points or key terms. Complete sentences, with the exception of quotations, should be avoided as slide content. When complete sentences are used, the presenter must allow silence during the presentation to give the audience time to read before listening to the presenter. Think like a headline writer, distilling the content down to the essence of the topic. You want the audience to read and understand your slide in less than 10 seconds. People also like numbers in presentation content, such as “Four Hot Tips” or “Three Steps to Success.” This helps you to organize content in a way that the audience will recall.

You have probably heard a picture is worth a thousand words, and in fact, media elements such as photographs, video, audio, charts, and graphics should be the bulk of your presentation. Media can be used to summarize, demonstrate, inject humor, clarify, and reinforce what has been said. As often as possible use pictures to replace words. Instead, keep it modern with well-chosen, professional-quality photos.

Using Anecdotes and Quotations

Anecdotes and quotations support your message and can be used either as an opening or closing statement. They give your presentation credibility. They can convey a startling fact or statistic. Anecdotes, such as stories in the news or experiences you have had, help you connect to your audience by explaining a situation. Quotations that relate to the subject can add humor to your presentation. Be sure to attribute the quotation to the proper person.

Encouraging Audience Participation

One of the reasons why people enjoy giving presentations is to make a connection with the members of the audience. Encouraging audience participation is an important part of your planning. This is one place where the evaluation of the audience comes into play. In a large group environment, you will use different strategies than in a conference room meeting. Remarkably, games are very engaging, and audience members become very active when a simple prize is offered, if appropriate. Asking questions of your audience helps to keep them on their toes and gives you feedback. Be sure to not put someone on the spot or make them feel uncomfortable. Small group discussions are effective if your presentation is educational in nature, or when debate or argument is necessary to make a decision. As with everything else involved with presenting, planning is the key in successful audience participation.

Including Quantitative and Statistical Content

When presenting data, you should resist the urge to put all of the numbers on the screen. If it is necessary for the audience to have all of the numbers, provide handouts. Just as you edited the text content of your presentation, critically review the numerical data and pull out the important numbers, such as the totals, for your slide.

Converting the numbers into a graph often enhances your slide show. It provides information related to trends or quantitative information. The graph can organize the information in a new way. The picture will last longer in the minds of the audience members. A rich visualization will add interest and color to your presentation and can often make a point more clearly than words.

As you create graphs for your presentation, make sure they convey the information in a way the audience can comprehend. Critically view the graphs and determine if the point you wish to make is evident. As you select the type of chart, consider these characteristics:

- **Pie chart**—Parts make up a whole; usually contains percentages
- **Bar or column chart**—Compares items in rank or changes over a period of time
- **Line chart**—Changes over time, frequency, or relationship between items

Using Appropriate Media

Good media choices, including graphics, audio, and video, stimulate interest, help you clarify important points, and reinforce what has been said. Poor media choices confuse the audience and distract them from your purposes.

Cliff Atkinson says, "When you overload your audience, you shut down the dialogue that is an important part of decision making." Pointing to research by educational psychologists, he says, "When you remove interesting but irrelevant words and pictures from a screen, you can increase the audience's ability to remember the information by 189% and the ability to apply the information by 109%."

As you select media consider the length of your presentation and the technology available in the presentation room:

- Does the media element completely support your objectives?
- Is the media element clear enough to see and understand?
- Will you have a good Internet connection for loading a web page or a YouTube video?
- Do you want to devote 3–8 minutes to a video?

Be ready to engage the audience regardless of the technology that is available. If the technology does not work as expected, how would you compensate?

Respecting Copyrights

As you select the content for your presentation, it is important to respect copyrights. Copyrights include the rights to reproduce, distribute, create derivative works, perform, and display intellectual property. Many people believe that everything on the Internet is copyright free, but it is not. Works that you create, such as photographs, poems and other writing, music, and video, are copyrighted to you automatically as soon as they are in a fixed format. You have the right to post them on the Internet, sell the work to another party, or display them in any way you see fit. If someone uses your materials without your permission, you have a legal path to follow if you want to protect your copyrights.

Copyright law and the Digital Millennium Copyright Act of 1998 address many aspects of how media elements are protected. A good rule of thumb is to seek permission before using copyrighted elements in your PowerPoint slide shows. Using the Internet, it is easy to research and request permission to use these elements. Often permission to use the elements is granted without cost or restriction, and sometimes you make a direct connection with the person that created the item. In some cases, the copyright holder will request a citation or attribution recognizing their contribution.

REAL WORLD ADVICE

Citing Sources

Depending on the presentation's purpose and audience, you should consider citing the sources you used in creating your presentation. Citation formats, such as APA (American Psychological Association), MLA (Modern Language Association), or the *Chicago Manual of Style*, may be recommended by your instructor or supervisor. You can learn more about the formats on the websites for each:

- **APA**—www.apa.org
- **MLA**—www.mla.org
- **The Chicago Manual of Style**—www.chicagomanualofstyle.org

Work with the PowerPoint Window and Views

PowerPoint allows you to view the presentation from various perspectives. **Normal view** is the default view shown in Figure 5 below and provides the basic layout for presentation preparation. **Outline View** is a view that allows the presentation creator to focus on the content. In the early stages of presentation development, you should first focus on the quality and brevity of content in the presentation.

PowerPoint also has several panes for editing the presentation. On the left side, the **left hand pane** allows you to select a slide. In the middle, the **Slide pane** allows you to edit the text, images, and other objects on the slide. On the bottom, the **Notes pane** allows you to add speaker notes that the audience will not see.

As the tournament manager working with the golf pro at the Red Bluff Golf Course & Pro Shop, you will modify a persuasive presentation previously created for the Red Bluff Golf Course & Pro Shop Putts for Paws Golf Tournament. This presentation will be given by the golf pro to civic groups in the community with the purpose of soliciting financial sponsorship for the tournament, a benefit for the Santa Fe Animal Center. Also, golfers will be encouraged to register for the event. The golf pro has asked you to update the slides for the current year. You begin by reviewing the slide show from the previous year.

P01.02



To Explore PowerPoint and Add Notes

- a. Using the file **p01w01Sponsor_LastFirst**, notice PowerPoint is divided into three main areas: the Slide pane, left hand pane, and Notes pane. The Ribbon is across the top of the window. The orange Status bar is across the bottom.

Click through each slide in the **left hand pane**. Notice the progression from introductory material, to the incentives, to a call to action.

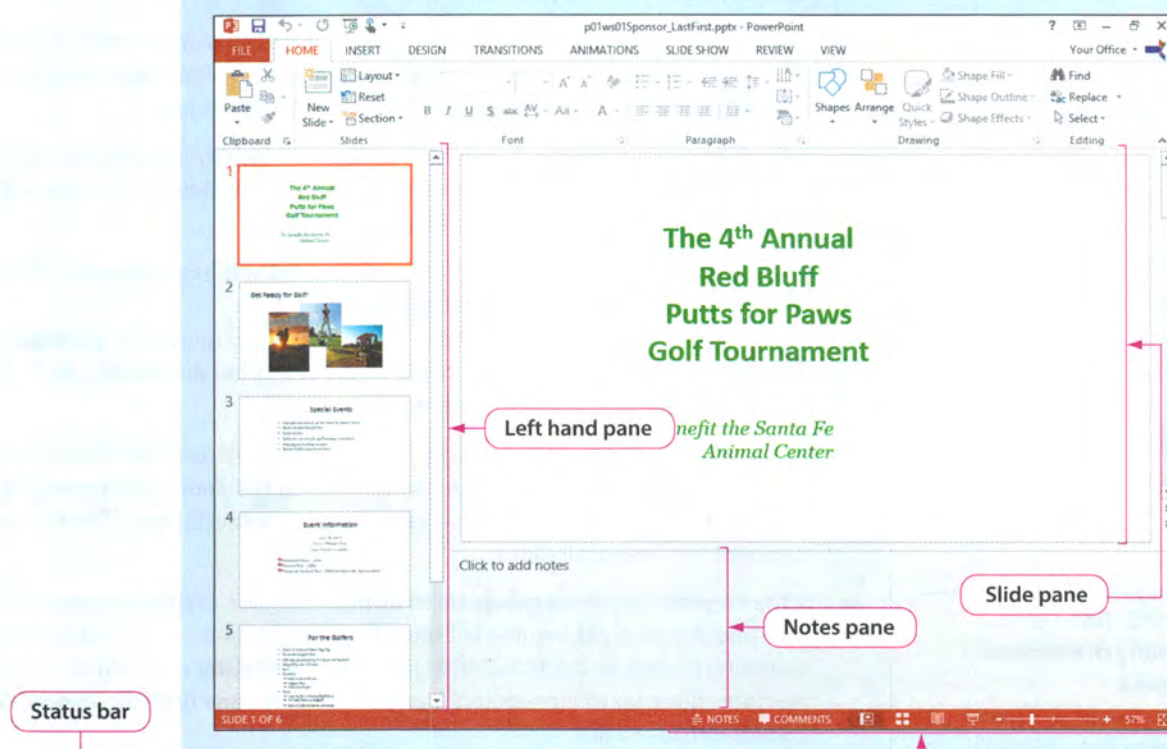


Figure 5 PowerPoint default, Normal View

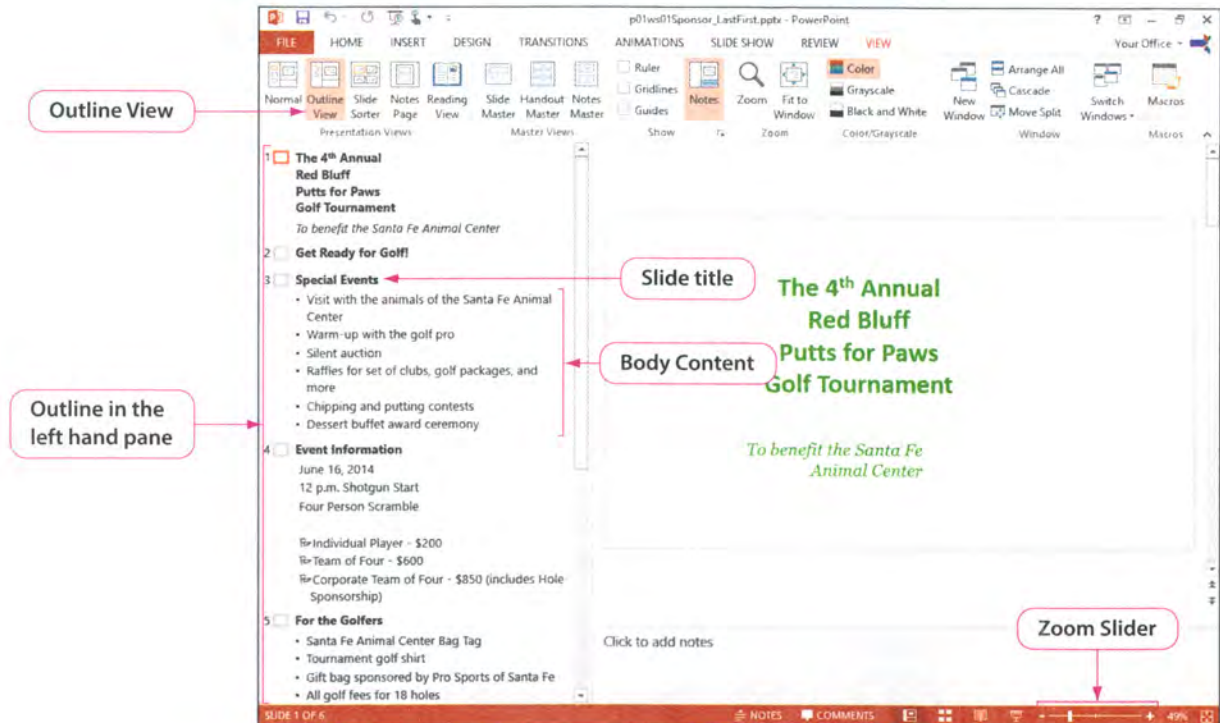


Figure 6 Outline view

- b. Click the **VIEW** tab, and then in the Presentation Views group, click **Outline View**. Notice how the left hand pane changes. Outline view enables you to concentrate only on the text content of the slide presentation.
- c. **Normal View** and **Outline View** enable you to move quickly between slides by clicking on the slide in the left hand pane that you want to view. Use the scroll bar on the right side of the **Slide** pane to move up or down through the slides.
- d. In the Presentation Views group, click **Normal**, and then click the thumbnail for **Slide 2**.
The left hand pane displays thumbnail views of the slides in the presentation. The selected slide is displayed in the Slide pane.
- e. Point to each of the areas on the **status bar** located at the bottom-right of the window, and then click the **Slide Sorter** button .
Notice, the number of the selected slide and the total number of slides are on the left side of the status bar. On the right side of the status bar are buttons for changing the view and look of the PowerPoint window.
- f. Drag the **Zoom Slider**  to the right to increase the magnification of the slides to **150%**. Click the **Zoom Out** button  on the Zoom Slider until the slide is at **30%** magnification. Click the **Fit slide to current window** button  in the status bar to maximize the view of all slides.
- g. In the Presentation Views group, click **Normal**. Drag the **divider** between the left hand pane and the Slide pane to the left until the scroll bar in the left hand pane disappears, increasing the size of the Slide pane. Next, drag the **divider** between the Slide pane and the Notes pane up to increase the size of the Notes pane until the **Zoom level** on the status bar reads **33%**.
- h. With **Slide 2** selected in the Slide pane, click the **Notes** pane, and then type **Introduction - Name and job title**. Press **Enter** to move to the next line, and then type **Purpose - Introduce you to the opportunities for sponsorship of the Putts for Paws Golf**

SIDE NOTE

Modify the Window Layout

If you need more room to view and work on the notes, you can drag the dividers to produce more space.

Tournament and to advocate for the needs of the animals and those who care for them at the Santa Fe Animal Center.

The Notes pane contains the speaker's notes for each slide in the presentation. These notes are not seen by the audience when the presentation is displayed. As the presenter, you can print the notes with the slides or use them in the new Presenter view when two displays exist.

- i. **Save**  the presentation.

Displaying the Presentation in Various Views

PowerPoint can display slides in a variety of views. Each view has a purpose, and the available tools change as you switch between views. Normal view is used to edit the slides. Slide Sorter view provides options for rearranging slides and reviewing slide transitions. In Slide Sorter view, you see thumbnails of each of the slides. Reading view displays the slides one at a time, offering tools such as the title bar Minimize, Maximize/Restore, and Close buttons, and navigation buttons for moving between slides. Slide Show view is used to display the presentation to an audience. The views are accessed using the View tab or the view buttons on the status bar.

P01.03



To Zoom and Display a Presentation in Various Views

- a. Click the **Slide Sorter** button  on the status bar.

Slide 2 is highlighted with an orange border because it was the slide selected in the previous view. Thumbnails of all six slides in the presentation are displayed.

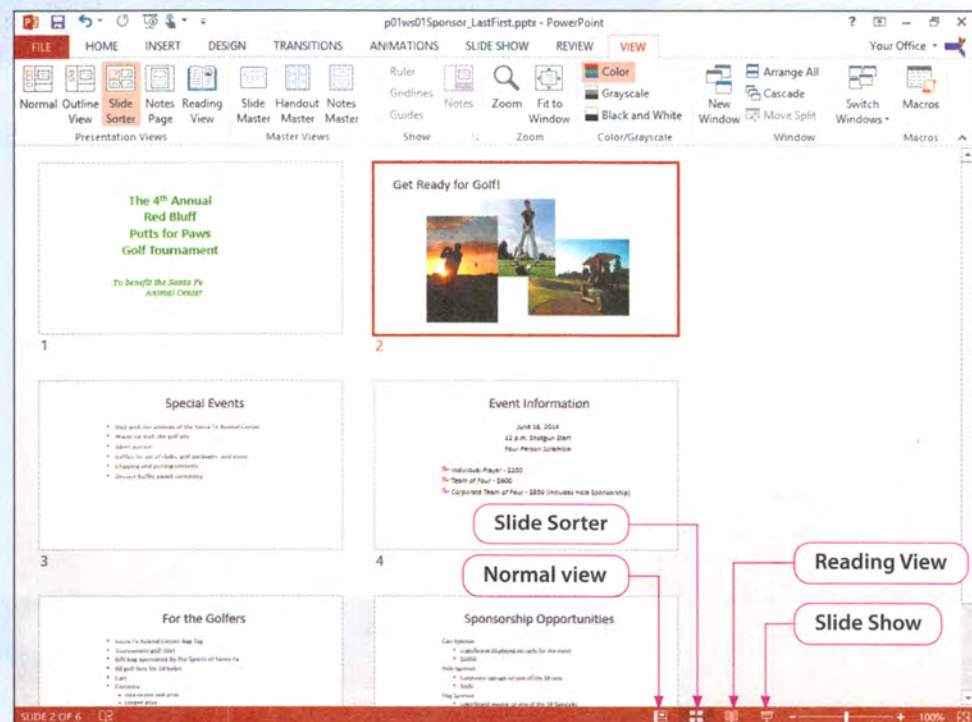


Figure 7 PowerPoint view buttons

b. On the VIEW tab, in the Zoom group, click **Zoom**, and select **50%**.

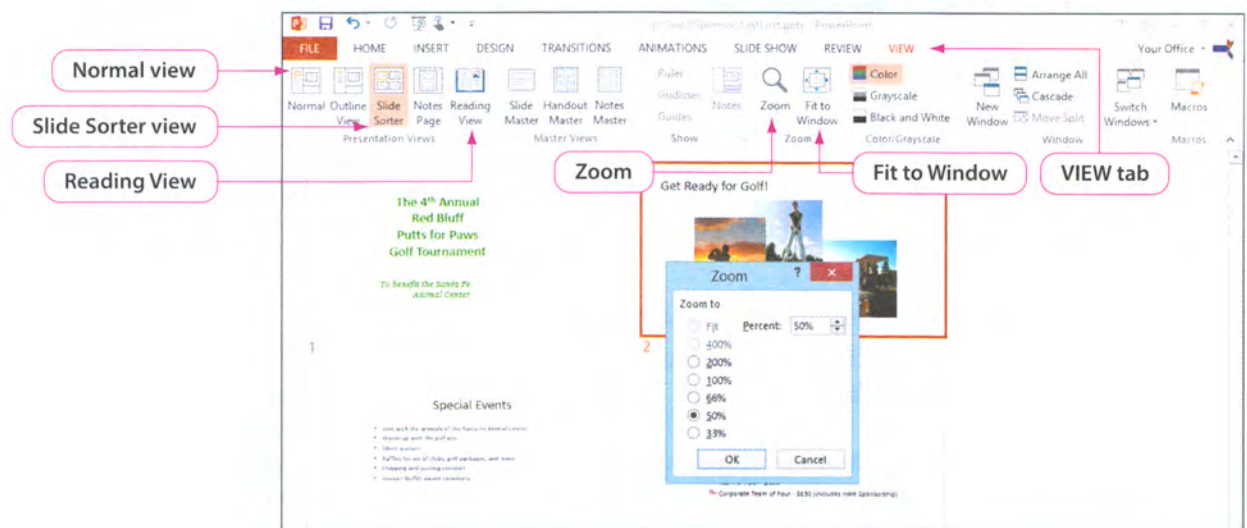


Figure 8 Slide Sorter view

- c. Click **OK**. The thumbnails become smaller, which is useful for displaying more slides in a large slide show.
- d. In the Zoom group, click **Fit to Window**. This causes the slides to be displayed as large as possible in this Slide Sorter view.
- e. Click **Slide 5**, and then click **Reading View**  on the status bar. Slide 5 is displayed in a view designed for reading on the screen.

SIDE NOTE Reading View

Reading View on the View tab displays the first slide, but Reading View on the status bar displays the active slide.

SIDE NOTE Black Bars

In PowerPoint 2013, slides size to Widescreen by default. Widescreen slides displayed on a Standard screen create black bars at the top and bottom—like the figures shown here.

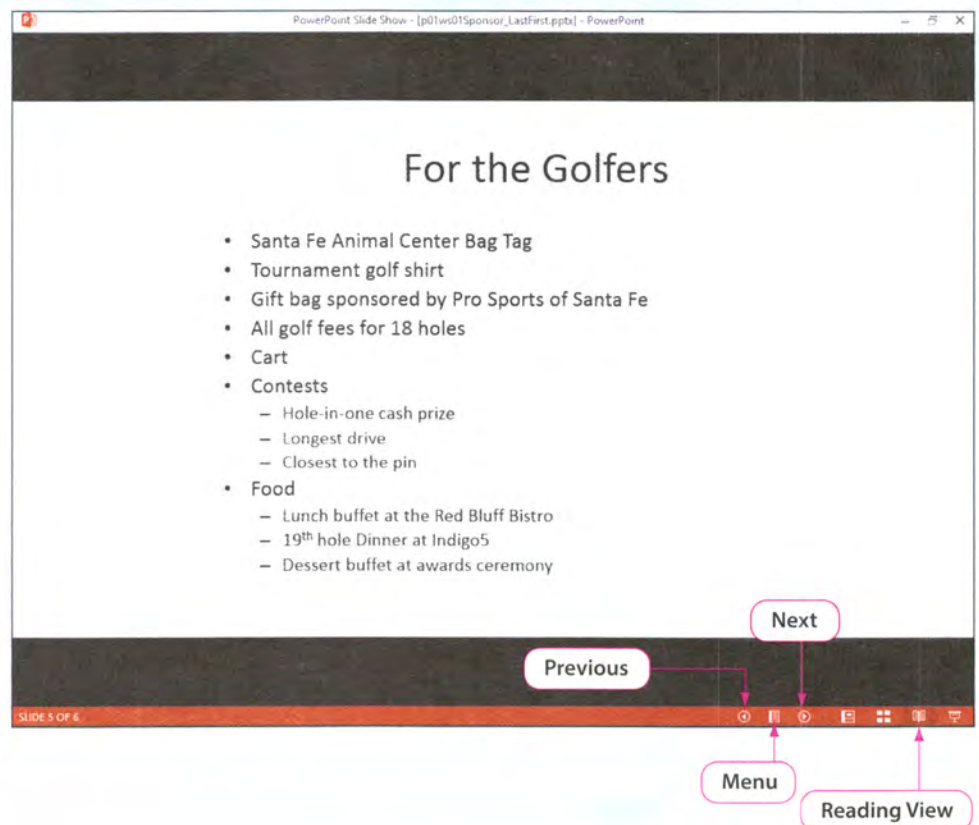


Figure 9 Reading view

SIDE NOTE Using the Menu

The Reading View menu enables you to navigate through the slides, preview, print, copy, edit, and end a show.

- f. Click the **Next**  button on the status bar to view Slide 6. The Next and Previous buttons on the status bar make it easy to navigate through the slide show in this view.
- g. Click **Menu**  on the status bar, and then click **Edit Slides**. You return to Slide Sorter view.
- h. In Slide Sorter view, click **Slide 2**, and then click **Slide Show**  on the status bar. Slide 2 fills the primary screen. If a different slide was selected, then that slide would have been displayed. If you have two displays, you will also see the Presenter View. The Presenter View is not displayed to the audience and is new to Office 2013. Keep the slide show open as you move to the next section.

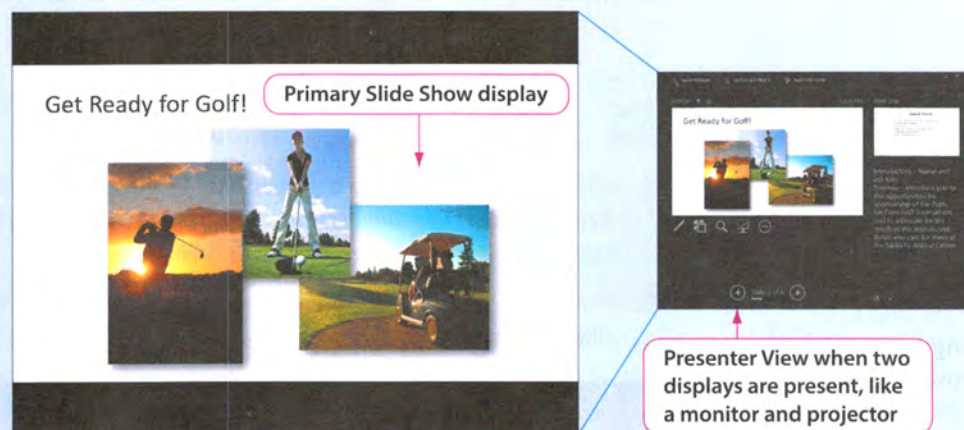


Figure 10 Slide Show displays

REAL WORLD ADVICE

Widescreen versus Standard Screens

New to PowerPoint 2013 is a default layout to widescreen size—16:9 ratio. However, if you open a file first started in a prior version of PowerPoint, the file will be in standard screen size—4:3 ratio. You can easily change the screen size by going to the Design tab and clicking the Slide Size button. The size of slide will change what your slide looks like and where you want to place text, objects, and pictures. If you have a standard screen size and a widescreen slide size, you will see black bars at the top and bottom similar to some of the screen shots in this workshop.

So, how do you know which one to use? You want to use the same size as the projector for the presentation. Thus, make sure you know what size the projector is in the room where the actual presentation will take place.

Navigate in Slide Show View and Outline View

Most often, when you give a presentation, you will display the slide show in Slide Show view, advancing each slide after you have spoken about the contents of the slide. PowerPoint offers many methods for advancing the slides and returning to previous slides. Some people prefer to use the mouse to move between the slides, yet others like to use the keyboard. Windows 8 enables you to gesture on touch devices to navigate. A presenter remote control can also free you from standing close to your computer while giving your presentation.

REAL WORLD ADVICE

Presentation Remote Controls Free You from the Computer

Consider using a remote control when presenting; it gives you the flexibility to move around. You can use a wireless mouse, connected via USB to your host PC, or a mobile app on your smartphone. Senstic makes an app called i-Clickr Remote, which controls the host PC from your smartphone or tablet. With this app, you can instantly broadcast annotations made on your device while you present. Using a new technology can be empowering, but make sure you always practice using it before you present.

Navigating the Presentation in Various Views

In this section you will practice various methods to navigate through a slide show.

P01.04



To Display and Navigate Through a Slide Show

- Click once to advance to the next slide in the presentation. Right-click, and then click **See All Slides**. This view enables you to select a specific slide to display. Click the **Back** button in the top-left corner of the screen.
- Right-click, and then click **Previous**. Using the mouse you can advance through the slides, return to previously viewed slides, or select specific slides to display.

SIDE NOTE

Using the Keyboard Arrows

↑ and ← return to the previous slide, and ↓ and → move to the next slide.

Slide displayed in Slide Show view

Special Events

- Visit with the animals of the Santa Fe Animal Center
- Warm-up with the golf pro
- Silent auction
- Raffles for set of clubs, golf packages, and more
- Chipping and putting contests
- Dessert buffet award ceremony

Shortcut menu is displayed

Next
Previous
Last Viewed
See All Slides
Zoom In
Zoom Out
Hide Presenter View
Screen
Printer Options
Help
Pause
End Show

Figure 11 Slide Show view

- Press **Spacebar** to display Slide 3, Special Events, again. Many people like to use the spacebar to advance through their presentations because it is a large key that is easy to find in a darkened room.

- d. Use your favorite method to advance to the end of the presentation. When you advance the slides beyond the last slide, a black screen alerts you that the slide show is over. While the black screen is showing, any of the methods for moving to the next slide will return you to the view and slide from before you started the Slide Show. On the VIEW tab, in the Presentation Views group, click **Normal**.

Troubleshooting

To exit a presentation while it is displayed in Slide Show view, press **[Esc]**. This returns you to the previous view.

QUICK REFERENCE

Navigating the Slide Show

There are many options for navigating through the slide show:

1. To advance to the next slide, either type an **N**, or press **[Enter]**, **[Page Down]**, **[→]**, **[↓]**, or **[Spacebar]**. On a touch-enabled surface, swipe forward.
2. To return to a previous slide, either type a **P**, or press **[Page Up]**, **[←]**, **[↑]**, or **[Backspace]**. On a touch-enabled surface, swipe backward.
3. To view all slides, type a **G**, or zoom all the way out. To view a specific slide, press the number of the slide, and then press **[Enter]**.
4. To zoom in, either type a **+** (a plus sign) or stretch or double-tap on a touch-enabled surface.
5. To zoom out, either type a **-** (a minus sign) or pinch or double-tap on a touch-enabled surface.
6. To display a blank black screen, type a **B** or a **.** (a period). To return to the display, type a **B** or a **.** again.
7. To display a blank screen, type a **W** or a **,** (a comma). To return to the display, type a **W** or a **,** again.
8. Using the mouse, click the transparent icons in the lower-left corner of the slide in the Slide Show view.
9. To end the slide show, press **[Esc]**.

Promoting, Demoting, and Moving Text in Outline View

Outline view displays the titles and bullet points of the slides in the presentation. It is easy to add, modify, and delete text content in this view. You can also move the slides by dragging them to new positions in Outline view. Promoting outline text moves it up a level, and demoting outline text moves it down a level. In this next step, you will promote and demote text.

Some of the slides might appear to be blank in Outline view, when in fact they are not blank. Outline text is drawn from the title and content placeholders. **Placeholders** are objects in PowerPoint that hold different types of content for the presentation. Slides that do not contain text in these placeholders will appear to be blank in Outline view. To make modifications to these slides, you use Normal view.

In this next exercise, you will update the golf tournament presentation in Outline view.

P01.05



To Use Outline View

- a. Click **Slide 6**. On the **VIEW** tab, in the Presentation Views group, click **Outline View**. If necessary, drag the **border** between the outline in the left hand pane and the Slide pane to increase the amount of text you can see in the outline.

Minimizing the size of the slide in the Slide pane enables you to focus more on the outline content.

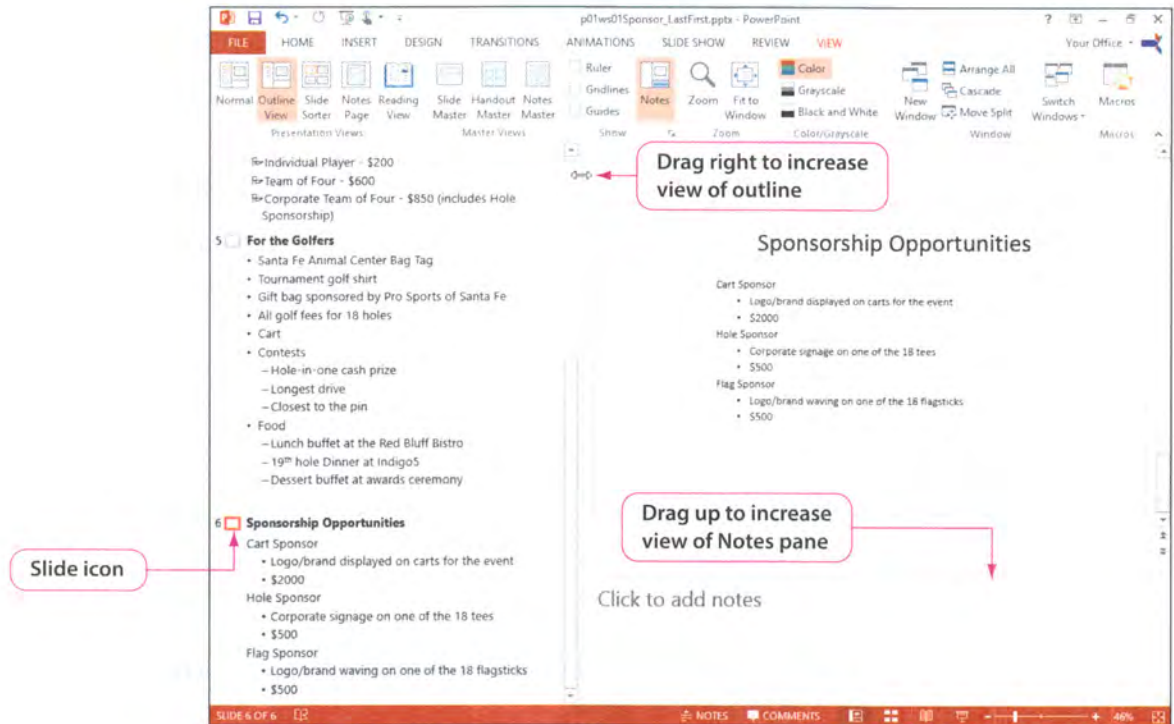


Figure 12 Using Outline view

- b. On **Slide 6** in the outline on the left hand pane, position your cursor at the very end of the **bulleted text** right after \$500, and then press **[Enter]**. Type the following, pressing **[Enter]** after each line:

- **Program Sponsor**
- **Logo/brand on program materials**
- **\$200**

- c. Place your cursor anywhere in the text **Program Sponsor**, click the **HOME** tab, and then in the Paragraph group, click **Decrease List Level**.

The text has been promoted in the outline. You will change the bullet and font size later.

- d. On **Slide 5** in the outline on the left hand pane, click and drag to select the text for the sixth bullet beginning with the word **Contests** and ending with the word **pin**. On the **HOME** tab, in the Clipboard group, click **Cut** to remove the text and copy it to the Clipboard. On Slide 3 click to place your insertion point in front of the word **Chipping** in the fifth bullet, and then in the Clipboard group, click **Paste**.

- e. Select the four bullet points in the outline on the left hand pane, beginning with the text **Hole-in-one** and ending with **putting contests**, and then in the **Paragraph** group, click **Increase List Level**.

SIDE NOTE

Pressing **[Tab]** in Outlines

Use **[Tab]** to increase the list level in the outline, and **[Shift] + [Tab]** to decrease it.

The text has been demoted in the outline. Pasting left inconsistent formatting, you will change the bullets and font size later.

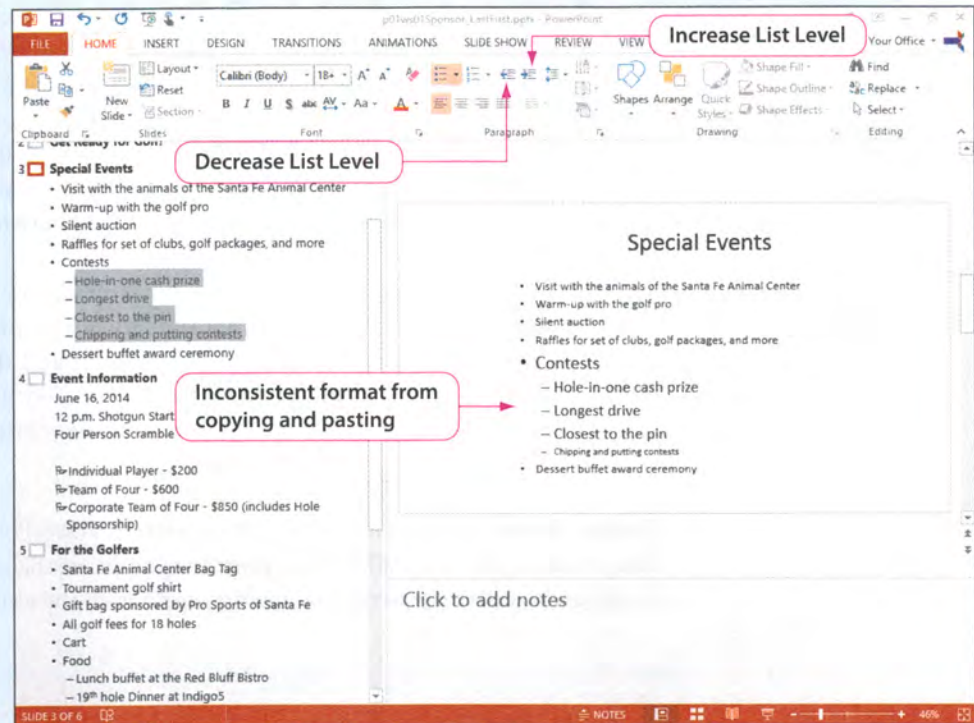


Figure 13 Demoting text

REAL WORLD ADVICE

Amount of Text on a Slide

Audience members cannot read and listen well at the same time. Text on the screen should be as minimal as possible without sacrificing the message. Some use the 6x6 rule to help guide the amount of text. This rule limits the number of bullets to six and the number of words per bullet to six. Ideally, each slide would have even less text than 6x6. However, sometimes the message necessitates more text than 6x6. Your presentation will be at its best when you minimize text. How exciting was the last PowerPoint presentation that you saw with text heavy slides?

Understanding Effective Communication

You will want to develop your presentation with an eye toward what your audience will see as well as what they will hear. Effective communicators are good storytellers. They have a keen sense about designing imagery to generate interest and about using emotion to create tension. In this section, you will use effective communication techniques to help firmly implant your message into the minds of your audience.

Understand the Difference Between a Theme and a Template

PowerPoint enables you to concentrate on the message you are trying to convey to your audience and build your presentation around that message. Design themes and templates add visual interest to your message. Background, color, and font selections are included as part of the design themes that can easily be applied to your slide show. PowerPoint has

at least 10 built-in themes, with more available online at Office.com. In some cases, you may want to build your own theme. Many businesses have a standard corporate theme that makes their presentations recognizable and professional. Themes can be used in the various Microsoft applications, so you can apply a theme to a Word document or Excel worksheet that matches the theme of a presentation. Themes can be applied at any time during your work on the presentation, but they will override other formatting changes, so it is best to apply them as you begin working on the presentation.

Like themes, **templates** contain background, color, and font selections, but they may also include sample content, slide transitions, and slide layouts. Many people use templates to guide them in creating presentations. For example, templates are available for project status reports, training, quiz shows, and photo albums. Templates are selected as you begin a new PowerPoint presentation.

Both themes and templates are starting places for the design of your presentation. As you apply design themes or templates to your slide show, consider your purpose, audience, and message. You can modify the colors, font selections, and theme effects to fit your needs. You will apply a theme to the Putts for Paws presentation, and then modify it according to the standards set by the marketing department at the resort for the golf courses.

Applying a Design Theme

Design themes are available on the Design tab in PowerPoint. You will briefly look at the design themes that are available and select an appropriate theme for the Red Bluff Golf Course. It will give consistency to the presentation and add to the visual appeal of the presentation.

P01.06



To Use a Design Theme

- Click the **DESIGN** tab.
- In the Themes group, point to the individual **theme thumbnails**, pausing momentarily so Live Preview displays the theme on the slide in the Slide pane.

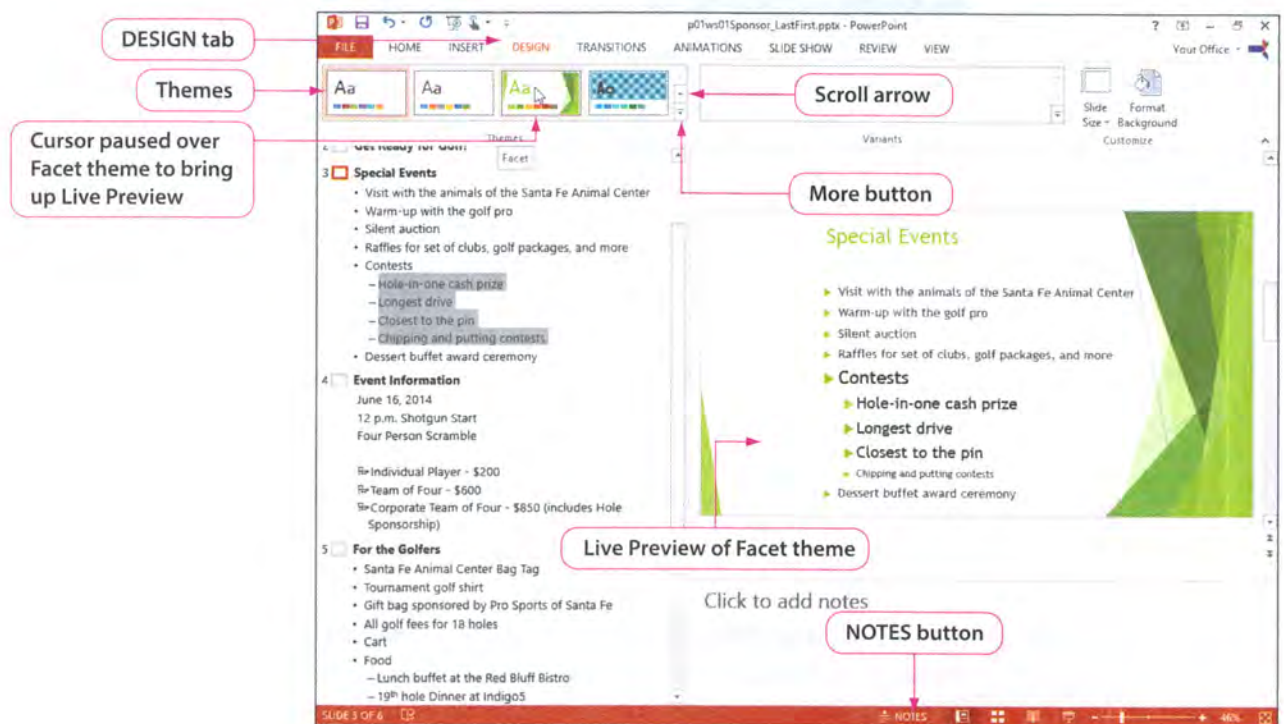


Figure 14 Using design themes

- c. In the Themes group, click **More** , and then preview additional themes.
- d. Select the **Whisper** theme. The theme is applied to all slides in the presentation and on the DESIGN tab the Variants group populates with available variations—do not change the variant default.
- e. Click the **VIEW** tab, and then in the Presentation Views group, click **Normal**. Zoom to **66%** in the Slide pane. On the status bar, click **NOTES** to toggle off the Notes pane and provide more space for the slide. Click through each of the **slides** in the left hand pane to review the changes made by applying the theme.
- f. **Save**  the presentation.



REAL WORLD ADVICE

Break the Pattern for Emphasis

One way to generate a paper sticky note idea, explained earlier, is to break up the pattern established by the template. Perhaps to emphasize a point in the flow of your story, insert a picture that takes up an entire slide.

Modifying a Theme

There are times when you will not be able to find a design theme that fits your preferences. In this case, you can select a theme and then modify it. You can change the theme colors, fonts, and effects. When you change the theme elements, the changes can affect the entire presentation. This saves you time and effort over changing elements individually on each slide. For example, creating a **font group** for themes will enable you to apply a predetermined font family to Heading fonts and Body fonts simultaneously.

You see the presentation theme fonts do not comply with the resort font standards. The text you entered earlier on Slide 6 is not consistently sized with the surrounding text, and neither is the text you pasted into Slide 3.

P01.07



To Modify Theme Fonts

- a. Click **Slide 1** in the left hand pane, if necessary, to display it in the Slide pane.
- b. On the **VIEW** tab, in the Master Views group, click **Slide Master** and then scroll up in the left hand pane so the first slide—the Master Slide—appears. In the Background group, click the **Fonts** button, and then point to a few **fonts** on the list to view the preview of the title slide. As you view each font group, notice the change to the fonts on the title slide.

SIDE NOTE

Exploring Font Groups

Theme fonts are grouped so applying them for Heading fonts and Body fonts is simultaneous, quick, and easy.

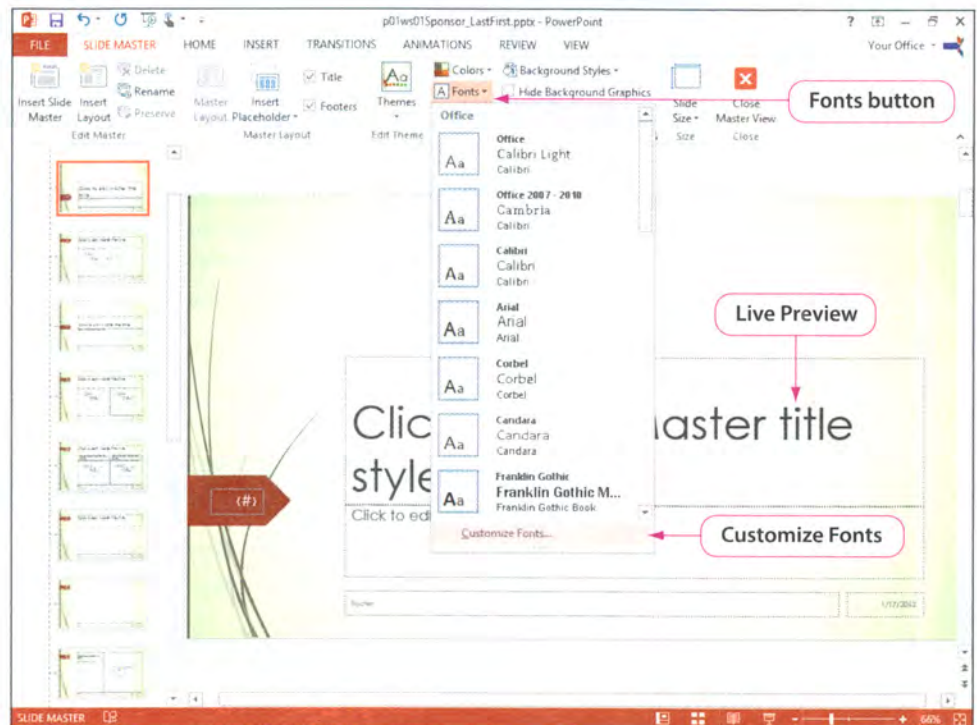


Figure 15 Modifying theme fonts

- c. Click **Customize Fonts** at the bottom of the Fonts gallery.
- d. Click the **Heading font** arrow, and then scroll to and click **Times New Roman**.
- e. Click the **Body font** arrow, and then scroll to and click **Times New Roman**.
- f. Select the text in the **Name** box, and then type **Red Bluff LastFirst**, using your last and first name.

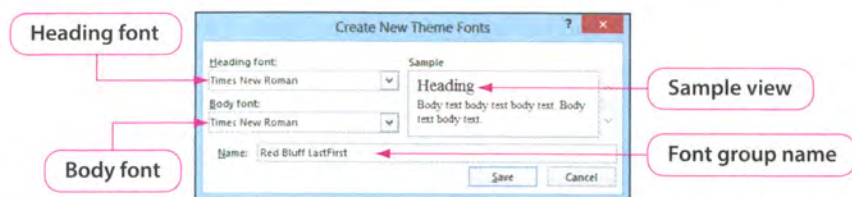


Figure 16 Creating New Theme Fonts

- g. Click **Save**, and then in the Close group, click **Close Master View**.
- h. Click **Slide 6**, then select the text **Program Sponsor**. Click the **HOME** tab, and then in the Font group, in the Font Size box, type **19**, and then press **[Enter]**. In the Paragraph group, click **Bullets** to deselect it. The bullet has been removed.
- i. Click **Slide 3**, and then select the three lines of text beginning with **Hole-in-one** and ending with **Closest to the pin**. On the **HOME** tab, in the Font group, in the Font Size box, type **17**, and then press **[Enter]**. In the Font group, click **Font Color** arrow, and then select **Black, Text 1, Lighter 25%** the second color in the fourth row. All of the second level bullets on Slide 3 automatically resize to 18pt font.
- j. Select the fifth bullet text **Contexts**. On the **HOME** tab, in the Font group, in the Font Size box, type **22**, and then press **[Enter]**. In the Font group, click **Font Color** arrow, and then select **Black, Text 1, Lighter 25%**.
- k. **Save** the presentation.

Using Color Strategically

There are many aspects to consider when using color in a presentation. Color can be used to emphasize important elements and to organize the message. Colors are also associated with emotions or qualities, with different colors suggesting various things in different parts of the world. For instance, in the American culture, black is associated with death, but in the Chinese culture, the color associated with death is white. Business presentations are often clean and crisp, while presentations to children are often colorful and whimsical. Carefully consider your audience, objectives, and message as you make your selections for color in your presentation.

REAL WORLD ADVICE

Color Associations

When using color in presentations, consider the psychology of common color associations. People may associate feelings of danger or excitement when using red colors. Blue can invoke calm and tranquility, and yellow can invoke cheer or optimism.

As you select the colors for the presentation, it is best to choose the background color first, and then place high contrast colors on top of it. Be careful the colors do not clash. For instance, a medium blue background and red text almost vibrates because the colors clash. Select a maximum of four colors to use in a presentation, and keep the colors consistent throughout the presentation. Use the brightest colors as accents in areas needing the most attention. Focus on design, and not decoration.

You will change the color of the title and subtitle text to coordinate with the color scheme of the theme.

P01.08



To Modify Theme Colors

- a. Click **Slide 1** on the left hand pane, and then click the **HOME** tab. Select the title text **The 4th Annual Red Bluff Putts for Paws Golf Tournament**.

You will only change the color of the font on this one slide, so you select just the text you want to change.

- b. On the HOME tab, in the Font group, click the **Font Color** arrow , and then click **More Colors** in the gallery.

- c. In the Colors dialog box, click the **Custom** tab, and then modify the color numbers at the bottom of the dialog box as follows:

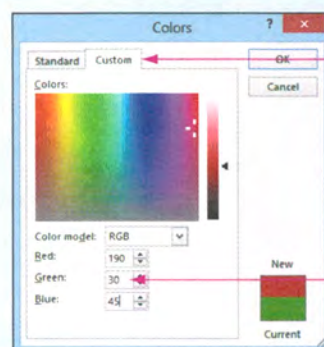
- Red: **190**
- Green: **30**
- Blue: **45**

The color created is a color matching the Painted Paradise Resort and Spa logo.

SIDE NOTE

Custom Colors

For precise image matching colors, the eye dropper tool under Font Color can sample the image for the color. Image editing software can also provide RGB numbers.



Custom tab

Custom color numbers

Figure 17 Selecting font colors

- d. Click **OK**, and then click outside of the text placeholder. The color of the title text has changed to red.
- e. Select the subtitle text, **To benefit the Santa Fe Animal Center**, click the **Font Color** arrow , and then click **Red** in the Recent Colors section of the gallery.
- f. **Save**  and **close**  the presentation, but leave PowerPoint open for the next exercise.

Create a Presentation from a Template

PowerPoint templates enable you to focus on the content of your presentation by providing professional-looking designs. Additional templates can be downloaded for free from Office.com. You can also find free templates by completing an Internet search for “free PowerPoint templates.” Templates, like themes, contain slide backgrounds, color schemes, and font selections. In some cases, templates also contain sample content or unique slide layouts. Templates are applied to new slide shows and can be modified as needed.

You will work on the Red Bluff Golf Club & Pro Shop tournament presentation by selecting a template recently developed by your marketing department, and then reusing your slides in the template.

Using a Template to Create a New Presentation

The tournament template you will use is based on the Red Bluff Golf Club & Pro Shop theme designed by the resort’s marketing department and available in the student data files folder.

P01.09



To Create a Presentation with a Template

- a. Click the **FILE** tab, and then click the **New** tab. On this tab, you can start a new presentation from blank slides with or without a theme applied. You can also search for and use an Office template.
- b. Click **Open**, click **Computer**, and then click **Browse**. Navigate to where your student data files are located, and then open the file **p01ws01RedBluff**.
- c. Click the **VIEW** tab, and then in the Master Views group, click **Slide Master**. Click each of the **slides** in the left hand pane. Scroll to the top of the left hand pane until you see the top slide, the Slide Master.

If you point to a slide, the ScreenTip indicates the type of layout used on that slide. You will work with slide layouts later in the workshop.

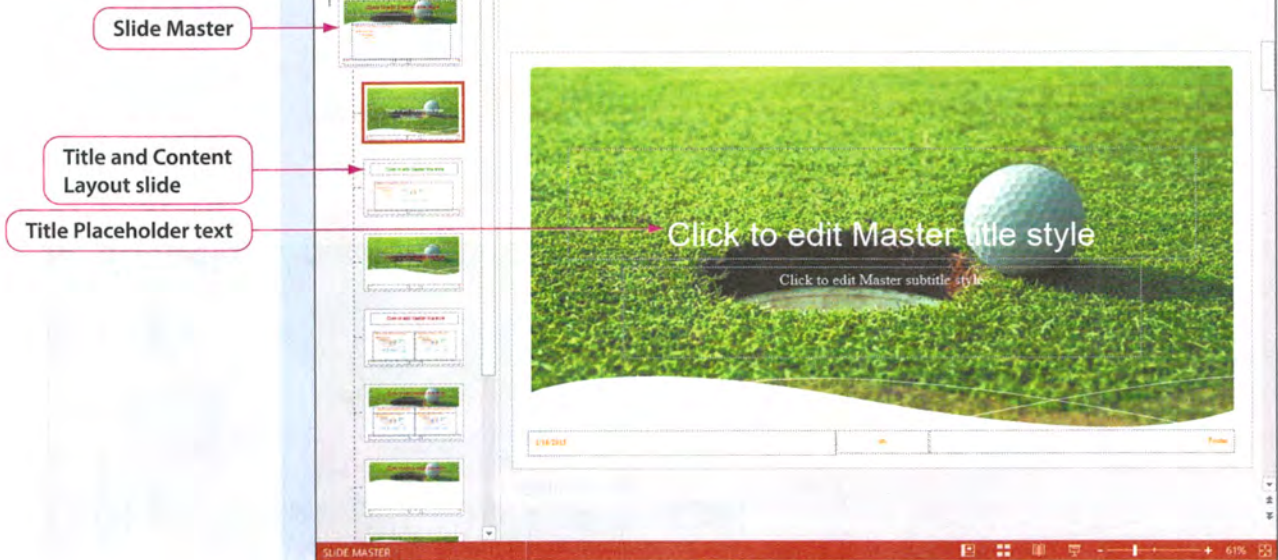


Figure 18 The Red Bluff template

SIDE NOTE

Save Often

Save at different intervals. If something goes wrong, you can open the previous file and recover most of your work.

- d. In **Slide Master** view, click the **Title and Content Layout** slide, which is the third slide in the left hand pane. In the Slide pane, in the slide title select the text **Click to edit Master title style**. Release the mouse button to display the Mini toolbar. On the Mini toolbar, click **Font Color** arrow , to display the Theme Colors, and select **Red, Text 1**—top row, second from left. In the Close group, click **Close Master View** to return to Normal view.
- e. Click the **FILE** tab, and then click **Save As**. Click **Computer** and then click **Browse**. Navigate to the location where you are saving your files. In the **File name** box, type **p01ws01Sponsor2_LastFirst**, using your last and first name. In the **Save as type** box, select **PowerPoint Presentation**, and then click **Save**.

Reusing Slides

Slides from other slide shows can be imported into your current slide show. Reusing slides saves you time. You can reuse the slides that you currently have available on your computer, or use Slide Libraries that are stored on a server. People with access to the server can share the slides in Slide Libraries, which is a more efficient and accurate way to build content.

The presentation given to you by the golf pro contains the information needed for the tournament presentation. You will reuse slides from that presentation in your current presentation.

P01.10



To Reuse Slides

- Click **Slide 1** in the left pane. Click the **HOME** tab, and then in the Slides group, click the **New Slide** arrow. Notice all the slide layouts available from the template.

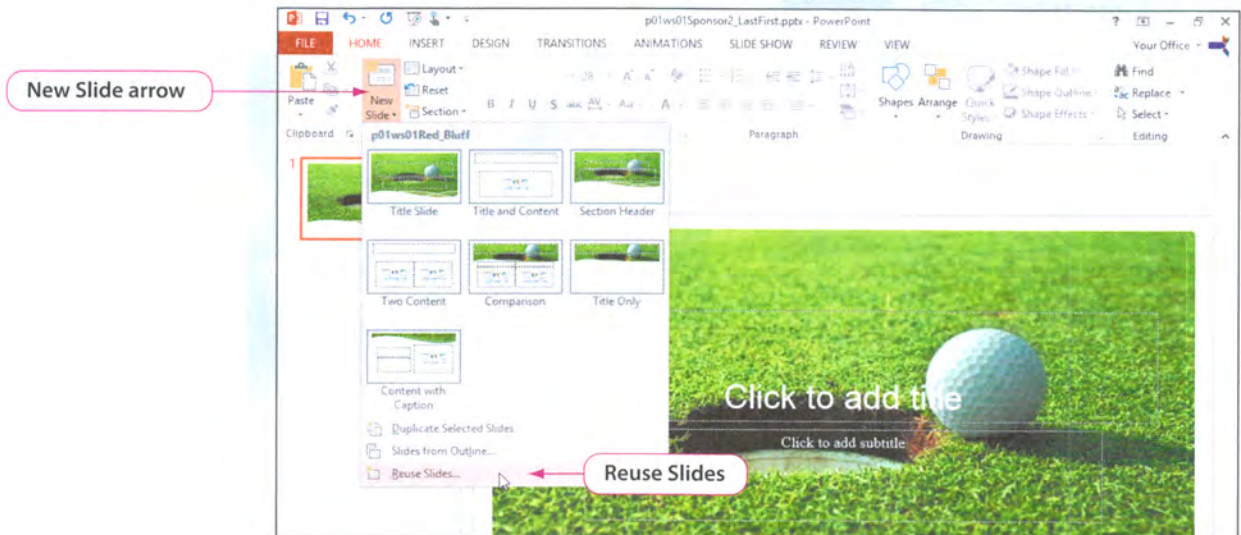


Figure 19 Reusing Slides

- Click **Reuse Slides**. The Reuse Slides pane opens on the right side of the window.
- Click **Browse**, and then click **Browse File**. Navigate to where you saved your solution file, click **p01ws01Sponsor_LastFirst**, and then click **Open**.
Slide thumbnails are displayed in the Reuse Slides pane. The title of each slide is listed beside the thumbnail.

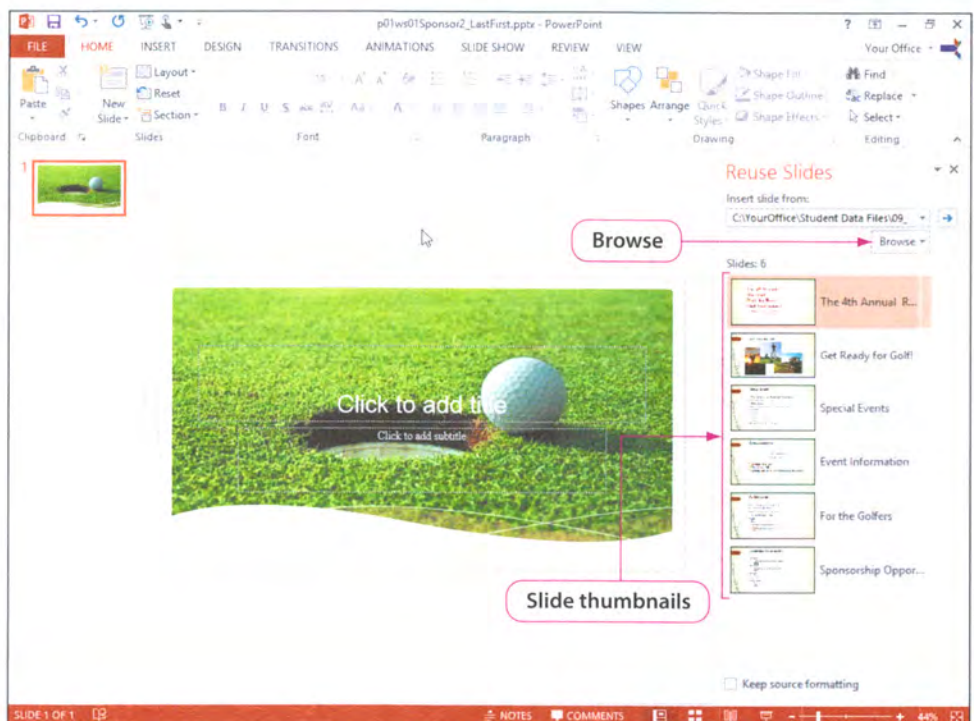


Figure 20 Reuse Slides pane

- d. In the Reuse Slides pane, click the first slide thumbnail titled **The 4th Annual R....** The slide is inserted into the current Golf tournament presentation as Slide 2. However, it inherited the characteristics of the new slide show created with the new template. Now, there are two titles slides in the presentation. The first one is a blank slide remaining from the template. The blank slide will be deleted later in this workshop.
- e. In the Reuse Slides pane, click each of the remaining **slides** to insert them into the presentation.

Troubleshooting

If you accidentally get the slides out of order, select a slide in the left hand pane. When inserting a slide from the Reuse Slides pane, it will be inserted after the slide you have selected in your presentation. You can also click and drag slides in the left hand pane to reorder them.

- f. On the Reuse Slides pane, click close . **Save**  the presentation.

Inserting Footers

Custom **slide footers** can be displayed on slides. Footers often contain the name of the company, the company slogan, dates, name of the presenter, or copyright notices. Slide numbers can also be displayed in the footer of slides.

The footer in this presentation needs to have slide numbers and the tournament name, Putts for Paws Golf Tournament. You will modify the presentation by placing footers on the content slides but not the title slide.

P01.11



To Add Slide Footers

- a. Click **Slide 3**, click the **INSERT** tab, and then in the Text group, click **Header & Footer**. The Header and Footer dialog box opens. There are two tabs in this dialog box, Slide and Notes and Handouts. You will focus on the Slide tab.
- b. In the Include on slide section, click the **Slide number** check box, and then click the **Footer** check box. In the **Footer** box type **Putts for Paws Golf Tournament**. This footer text will appear in the bottom-right portion of the slide.

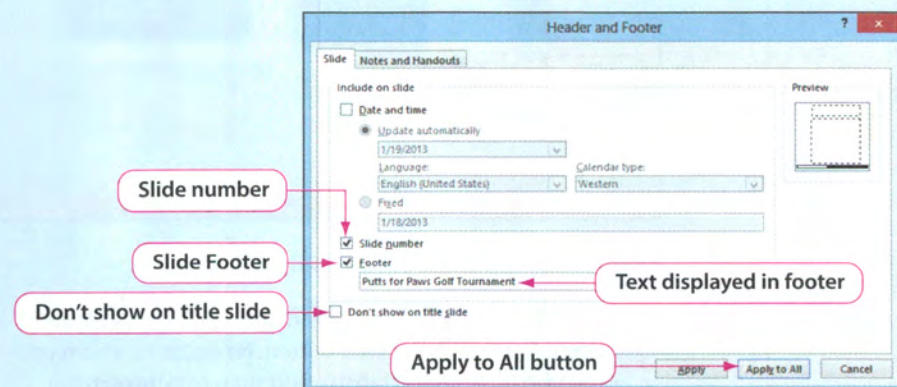


Figure 21 Applying slide footers

- c. Click the **Don't show on title slide** check box, and then click **Apply to All** at the bottom of the dialog box.

The footer is applied to all but the title slide. The title slide will contain the name of the golf club, and a footer would detract from the overall design of the title slide.

- d. **Save**  the presentation.

While templates and design themes often include background images, you can apply your own image to the background of a slide. It is important to remember that text on top of the background must still be easy to read.

Modifying the Slide Background

You will remove the background picture in the presentation and apply an appropriate picture to the background of a slide.

P01.12



To Modify a Background

- a. Click **Slide 3**, hold down the **Shift** key, and then click **Slide 7** to select all but the first two slides.
- b. Click the **DESIGN** tab, and then in the Customize group, click **Format Background**. The Format Background pane will open on the right.

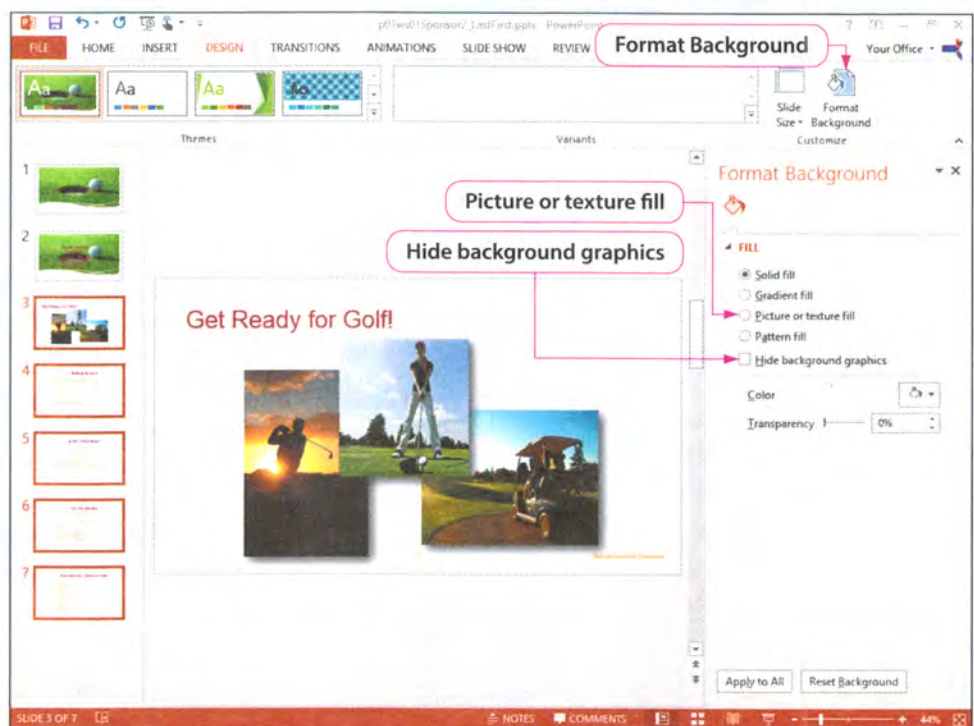


Figure 22 Applying a background to several slides

- c. Click **Picture or texture fill** in the Format Background pane, and then under Insert picture from, click the **FILE** button. Navigate to where your student data files are located, select **p01ws01RedBluffBG**, and then click **Insert**.
- d. Move the **Transparency** slider to **20%**, and set the **Offset right** box to **80%**. Ensure the remaining offsets are set to **0%**.

The background adjusts to fill the background of the slide, but because it is a narrow image, it was stretched across the screen. Offsetting it from the right kept the entire image on the left of the slides.

- e. In the Format Background pane, click the **Hide background graphics** check box.

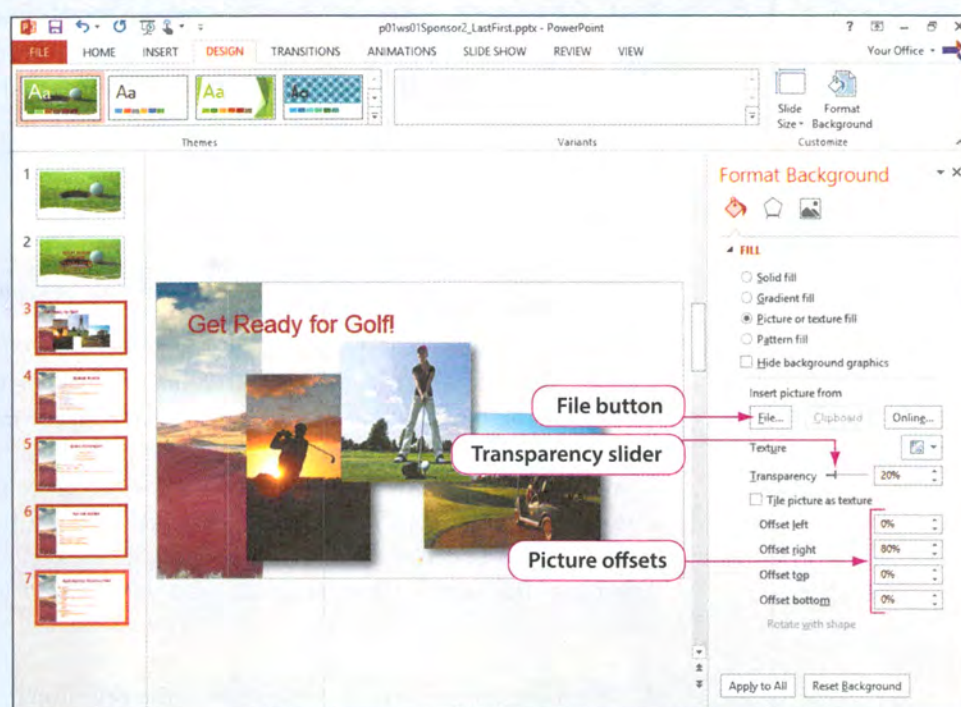


Figure 23 Background image setting applied

- f. Click **Slide 2** so the slides are no longer selected together, and then **Close**  the Format Background pane.
- g. **Save**  the presentation.

Add and Delete Slides, Change Slide Layouts, and Rearrange Slides

PowerPoint includes tools that make it easy to add, modify, and delete content on the slides. It goes further by providing tools that enable you to manipulate the slides themselves. You can add new slides at any point in the presentation. The layout of the slides can be changed to provide better balance. You can delete unwanted slides. In addition, moving slides from one position in the presentation to another is as simple as a drag-and-drop operation.

You may have noticed some problems with the Putts for Paws presentation, such as no contact information. In addition, one slide does not have a real purpose in the presentation, and the organization of the slide show does not convey the most important information at the beginning of the presentation.



REAL WORLD ADVICE

Provide Contact Information

It is always a good idea to have contact information at the end of the presentation. Audience members will contact you to learn more about your topic and suggest that others, with similar interests, contact you.

Adding a New Slide

You can add slides anywhere in the presentation, but they should always be intentional. Your audience will appreciate a concise presentation with a clear message. To insert a slide, select the slide that comes before the slide you want to insert. Then on the Home tab, in the Slides group, click New Slide. The new slide is added after the slide you selected. You can also right-click the space between slides and then click New Slide. If you want to put a slide before the first slide, right-click above Slide 1 on the left hand pane, and then click New Slide.



REAL WORLD ADVICE

Planning the Number of Slides

Plan to display a new slide every 2 to 3 minutes during your presentation. In a 20 to 30 minute presentation, this is a total of 10 slides. Be minimalist. The fewer the slides the better. Slides are aides and not a replacement for the presenter or speaker notes. This guideline keeps you on track with timing your presentation as you plan for and deliver your speech. Make sure you prepare for your presentation rather than relying on slides to guide you. How did you feel the last time a presenter either read slides to you in lieu of discussion? How did you feel the last time a presenter flipped through slides quicker than you could read—not alone listen?

With the exception of the title slide at the beginning of the presentation, every time you insert a new slide using the New Slide button, it will default to the layout of the previous slide. Most of the time this will be what you want, but in some cases you may want to use a different layout. To add a slide different than the last, click the New Slide arrow, and then select your slide layout.

P01.13



To Add Slides

- a. Click **Slide 7** on the left hand pane, click the **HOME** tab, and then in the Slides group, click the **New Slide** arrow and then select **Title and Content**. The thumbnail slide appears at the bottom of the left hand pane as Slide 8, and the slide with empty placeholders is displayed in the Slide pane.

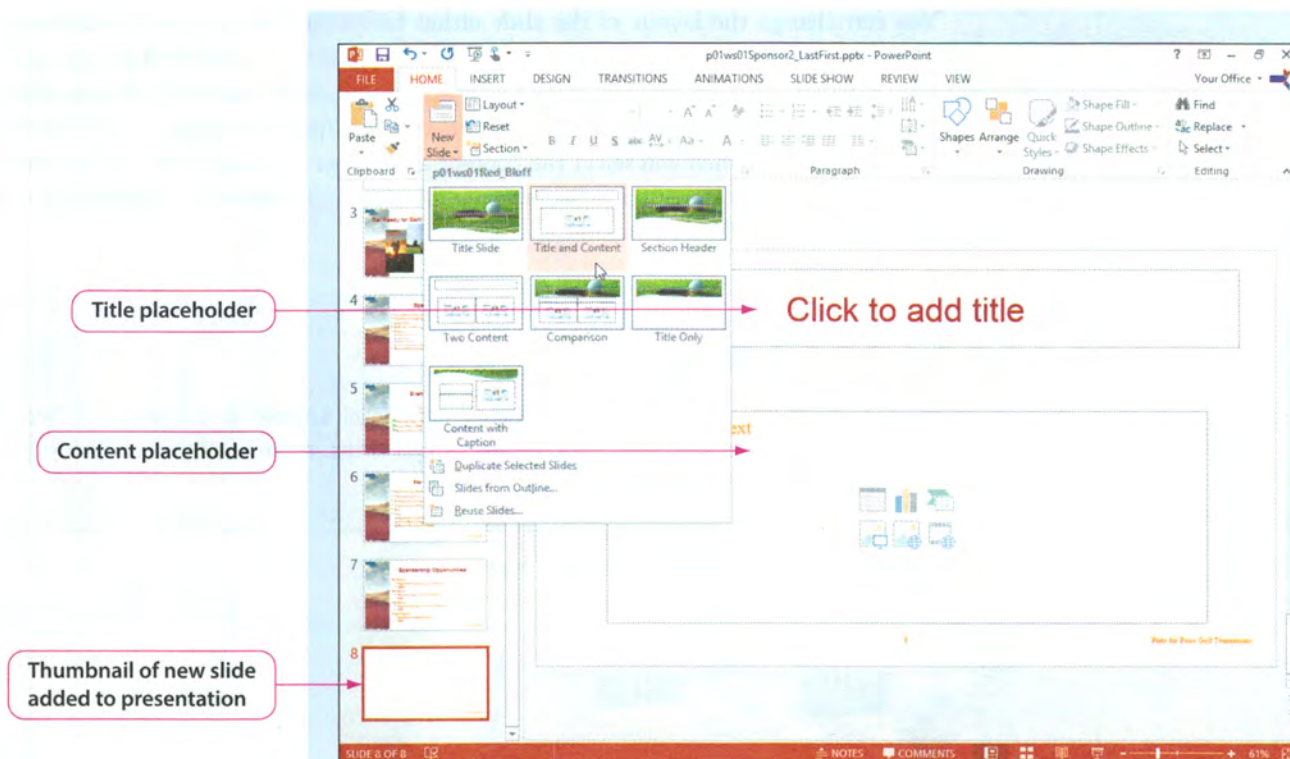


Figure 24 Adding a slide

- b. Click **Slide 8** in the left hand pane, and then click the title placeholder text. Click to add title, and then type **Contact Us**.
- c. You will need to insert the contact information from an old presentation. Click the **FILE** tab, and then click **Open**. Browse to your student data files folder, and then open the file **p01ws01SponsorOLD**. Click **Slide 1**, and then right-click the border of the content placeholder text box below the words **Contact Us**. Click **Copy**.

Troubleshooting

To make sure you have selected the box and not the text inside of the box, the border of the box will appear as a solid line instead of a dashed line.

- d. Point to the **PowerPoint** program icon on the taskbar, and then select the file **p01ws01Sponsor2_LastFirst** from the open files. Select **Slide 8**, and then right-click the content placeholder text below the words **Contact Us**. On the shortcut menu, under Paste Options, click **Use Destination Theme**. **Save** the presentation.
- e. Point to the **PowerPoint** program icon on the taskbar, and then select **p01ws01SponsorOLD** from the open files, and then **close** p01ws01SponsorOLD.

Changing the Slide Layout

Changing the layout of a slide can improve its readability. You can group similar information together. For example, you have listed yourself and John Schilling on the slide, but by changing the layout, you can be sure that your audience understands why to contact either of you.

The slide layouts are provided as part of the template and theme used for the presentation. The Putts for Paws presentation currently uses a template that provides slide layouts. Some templates offer more, some less. Most contain a title slide and a slide for title and content. Often you will find a blank slide that enables you to place elements where you wish.

You can change the layout of the slide either before or after you add information. Placeholders indicate the types of information you can place on the slide. Content slides not only have placeholders for text, but also for graphic elements, such as pictures, tables, charts, and media clips. The size of placeholders can be adjusted by dragging the **sizing handles** that appear when you select the content area. After copying in the contact information, you realized that a different layout would be better. In this next exercise, you will change the layout for the contact slide.

P01.14



To Change Slide Layouts

- a. Click **Slide 8**. On the HOME tab, in the Slides group, click **Layout**, and then select **Two Content**. This layout gives you two columns, but all of the information you copied is in the first column.

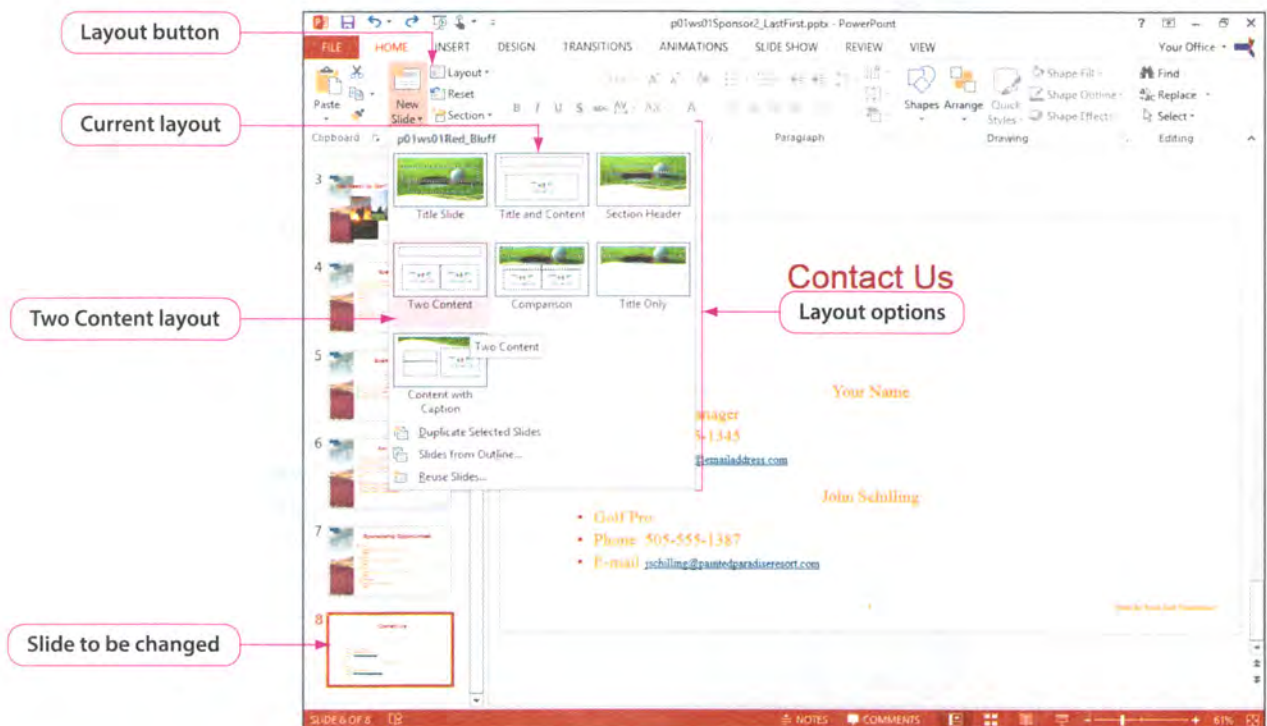


Figure 25 Selecting a layout

- b. Select **John Schilling's** information, and then drag it to the text box in the right column.
- c. Select **John's** name, and then in the Font group, click **Increase Font Size** [A⁺]. The font size is increased to 28. Repeat these steps for the text **Your Name** in the other text box. Replace the text **Your Name** using your first and last name. Change the email address to your email address.
- d. **Save** [F12] the presentation.

Deleting Slides

On occasion you will delete unneeded slides from your presentation. The slide or slides you want to delete are selected in the left hand pane, and then you press [Delete]. If you delete a slide by mistake, click Undo to return it to the presentation in the original position. In this next exercise, you will delete the first, blank slide that remains from the template.

P01.15

**To Delete Slides**

- a. Click **Slide 1** in the left hand pane. The slide is displayed in the Slide pane.
- b. Press **Delete**. The next slide in the sequence is displayed in the Slide pane.
You should now have seven slides in your presentation. **Save** the presentation.

Moving Slides in the Left Hand Pane

Even after the best planning, you may realize that the organization of the presentation would benefit from moving some slides. In PowerPoint there are two ways to do this. You can use the left hand pane, or you can use Slide Sorter view to drag slides to new positions.

The flow of the Putts for Paws presentation can be improved by moving the Special Events slide into position after the Event Information slide.

P01.16

**To Rearrange Slides in the Left Hand Pane**

- a. Click **Slide 3** on the left hand pane, and then drag **Slide 3** on the left hand pane downward between Slide 4 and Slide 5. The Event Information slide will move up to the Slide 3 position. Release the mouse button and the Event Information slide is moved.
- b. You should now have the title slide, Get Ready for Golf, Event Information, Special Events, For the Golfers, Sponsorship Opportunities, and Contact Us slides shown in this order in the left hand pane.
- c. **Save** the presentation.

SIDE NOTE**Rearrange Slides in the Slide Sorter**

You can also use Slide Sorter view to rearrange slides and then you can view more slides at one time.

Edit Slides and Move Slide Content

Your presentations can be quickly updated and modified, recycled, and personalized for the current audience. For instance, your sales presentation may have the basic information about your products, but for each customer you visit, you may wish to update the slide show to include the customer name and date. You may also want to move the slides around so the most relevant products are at the beginning of the presentation. In this section, you will edit the slides.

Editing Slides

As you continue with the Red Bluff Putts for Paws Golf Tournament presentation, you will modify last year's slide show to reflect a new date and add text to a slide.

P01.17

**To Modify a Slide Show**

- a. Click **Slide 1** on the left hand pane to display it in the Slide pane.
- b. Select the text **4**, and then type **5**, indicating the years the tournament has been running.
- c. Click **Slide 3**. Select the **date**, and then type **June 13, 2015**.
- d. **Save** the presentation.

Various design principles apply to slides and serve as useful guidelines as you make adjustments to your presentations. Keep it short and simple. In most cases your presentation will benefit from simplicity to focus attention on the topic. Your audience should be able to read and understand your slide in less than 10 seconds. This means that they can quickly read the displayed slide and turn their attention back to you.

Aim to design slides with a path the eye can follow naturally. Keep in mind that people who read English are used to beginning at the top left of the page and reading to the lower right. While it may be interesting to place the titles of the slides in the bottom-right corner, it may also be very confusing to your audience without some additional clues such as font size, emphasis, or color changes.

Strive to make some important element on each slide dominant while achieving a sense of balance with the remaining elements on the slide. The dominant element can be the title, a quotation, or a graphic. Look at the slides in your presentation, and think about the purpose of each slide. The dominant element should reflect the purpose of the slide.

White space, which is not always white, is space on the slide without text or graphics. It serves as a resting place for the eye. It helps to provide organization to your slides. You can use white space to divide your slides in interesting ways to keep your audience involved.

Moving Slide Content

Slide placeholders, the containers for text and graphic elements, can be moved and resized to improve the use of the white space on your slides. You can also manipulate the placeholders to suggest a relationship between items on the slide. Placeholder adjustments can help to move the eye around the slide.

You notice that the Red Bluff Golf Club & Pro Shop logo is nowhere in the presentation, so you will add it. Additionally, you notice that the title slide text isn't readable. In this next exercise, you will fix these issues.

P01.18



To Move Slide Content

- Click **Slide 7**, and then click the **INSERT** tab, and then in the Images group, click **Pictures**. Navigate to your student data files, select **p01ws01LogoRB**, and then click **Insert**.
- Click the **FORMAT** tab, and then in the Size group, click in the **Shape Width** box and type **4.5"**, and then press **Enter**. Drag the picture into the lower-left corner of the slide. You can make small adjustments using the arrow keys if necessary.

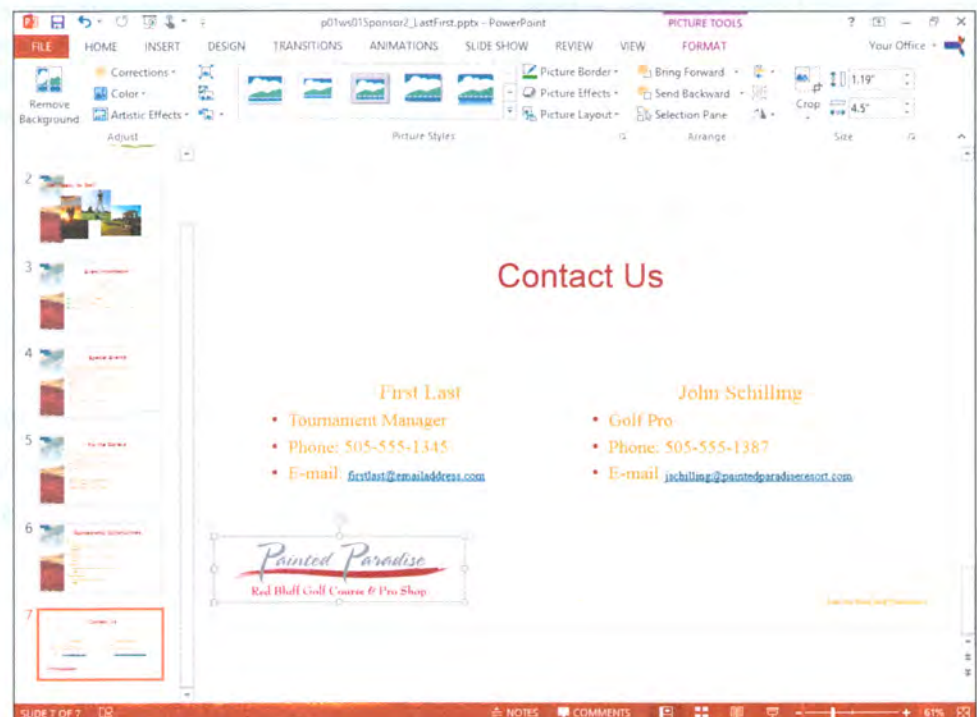


Figure 26 Moving slide content

- c. Click **Slide 1**, click on the **title**, and then click the **border** to select the title object. On the **FORMAT** tab, in the **WordArt Styles** group, click **Text Outline**  arrow and select **White, background 1**—the first color in the upper left hand corner.
- d. With the title shape still selected, on the **FORMAT** tab, in the **Arrange** group, click the **Align Objects**  arrow and select **Align Left**. Click the **HOME** tab, and then in the **Paragraph** group, click the **Align Text**  arrow and select **Top**.
- e. Click on the **subtitle**, and then click the **border** of the subtitle object. On the **FORMAT** tab, in the **Arrange** group, click the **Align Objects**  arrow and select **Align Left**. Again, click the **Align Objects**  arrow and select **Align Bottom**. Click the **HOME** tab, and then in the **Paragraph** group, click the **Align Text**  arrow and select **Bottom**.

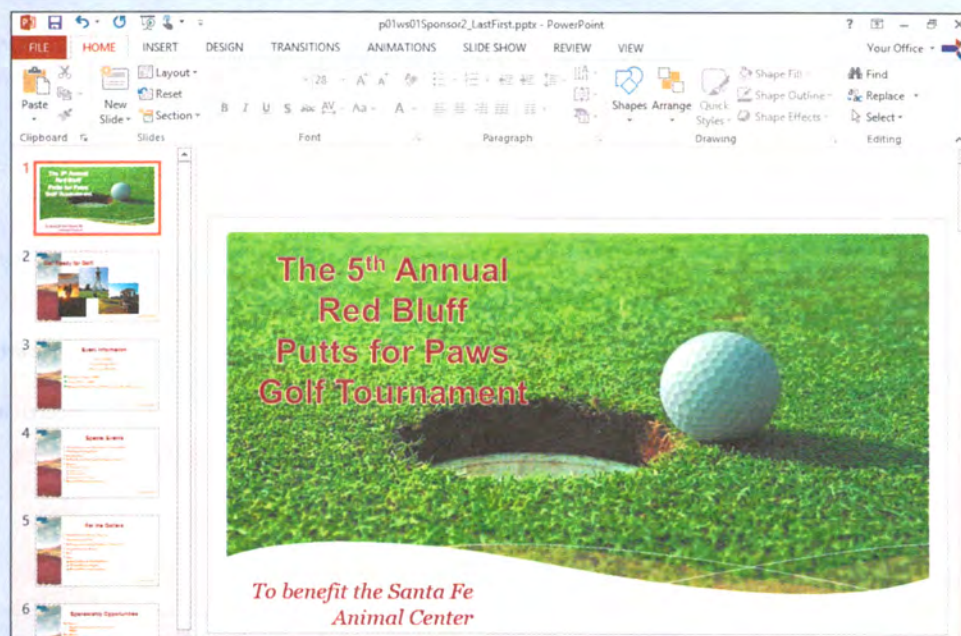


Figure 27 Finished Slide 1

- f. **Save**  the presentation.

Replace Words Using the Research Pane

PowerPoint provides access to other tools that can help you as you prepare presentations. The Research pane, opened by clicking Research in the Proofing group on the Review tab, provides access to a variety of reference books, research websites, and business and financial sites. You can use this pane to find and review information posted on the Internet by the Santa Fe Chamber of Commerce.

One of the reference books available on the Research pane is a **Thesaurus**. You notice that the word “sponsor” is used four times on Slide 4, and you would like to view other words that have a similar meaning.



To Use the Thesaurus

- a. Click **Slide 6** on the left hand pane, select the word **Sponsor** in the Cart Sponsor heading, click the **REVIEW** tab, and then in the **Proofing** group, click **Thesaurus**.

Troubleshooting

When selecting text for the Thesaurus, be careful not to select the space after the word "Sponsor". If you do, the end-of-line marker will be replaced, and the next bullet point will merge with the first line. Press **Enter** after the word "Sponsor" to resolve the problem.

- b. Point to **Champion** in the Thesaurus listing, click the **arrow** that appears to the right of the word Champion, and then click **Insert**. The word **Champion** is applied to the largest sponsorship opportunity.

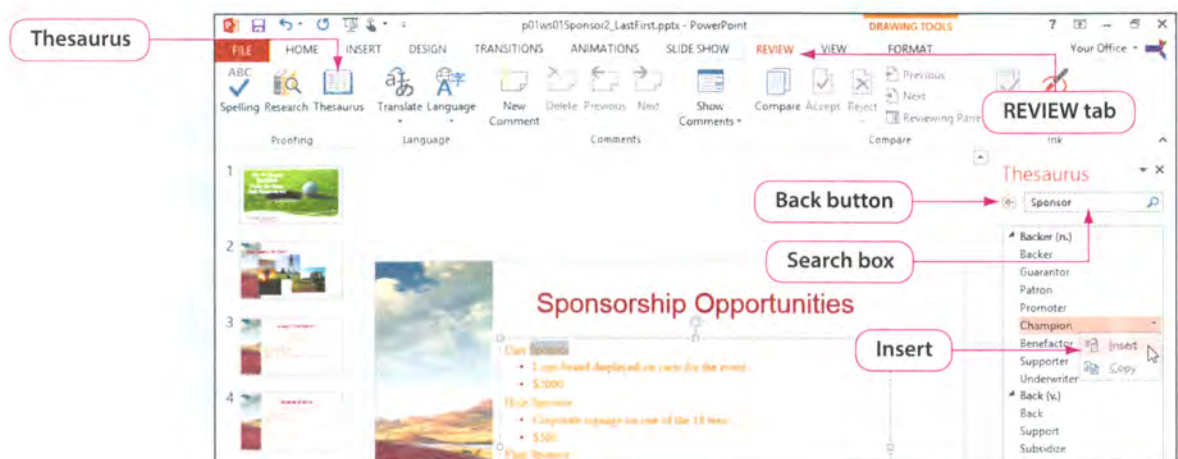


Figure 28 Using the Research pane

- c. Close **X** the Thesaurus pane. **Save** **D** the presentation.

Saving and Printing a Presentation

PowerPoint has many options for saving a presentation to fit different needs. So far you have been saving your presentation in a format that can only be opened with PowerPoint 2007 or later. Because not everyone has the most recent version of the software, some options include saving the presentation so it is compatible with a previous PowerPoint version, in an OpenDocument format, or in a Portable Document Format (PDF). In this section, you will explore saving a presentation.

Save a Presentation

Sometimes it is appropriate to save the file so it opens directly in Slide Show view. **PowerPoint Show** is convenient because you do not have to open the software and then click the Slide Show button. It looks more professional to start the presentation without fumbling with additional clicks. This method also works well if you want to keep others from editing your slide content, because when you have displayed all of the slides, the application closes automatically.

Another option you have is to save the file for distribution on a website, via **PDF** (Portable Document Format). When a file is saved as a PDF file it does not open in PowerPoint but rather in a PDF Reader application. This means that you can not use PowerPoint to update a PDF file. Be sure to always save the file in PowerPoint format too so you have the latest version of your presentation in an editable format.

Saving Your Presentation in Different Formats

You will save the Putts for Paws presentation as a PowerPoint Show and as a PDF file. Each one will be named differently so you can observe the differences between them.

P01.20



To Save in Different File Formats

- a. Click the **FILE** tab, and then click **Save As**.
- b. Click **Computer**, and then click **Browse** on the bottom right. Click the **Save as type** arrow, and then click **PowerPoint Show**.
- c. Click in the **File name** box, and then change the file name to **p01ws01SponsorShow_LastFirst**, using your first and last name.
- d. Click **Save**.
The file is saved in PowerPoint Show format, and the Normal PowerPoint view is displayed.
- e. Click the **FILE** tab, and then click **Save As**. Click **Computer**, then click **Browse**.
- f. Click **Save as type**, and then click **PDF**.
- g. Click **File name**, and then change the file name to **p01ws01SponsorPDF_LastFirst**.
- h. Click **Save**. The file is published in PDF format. Close the **PDF** and return to PowerPoint.
- i. Close your **PowerPoint Show**, but keep PowerPoint open. Open the folder where you store your PowerPoint projects. You should now see the several different files saved as a result of this exercise and you can explore opening the various file types.

Preview and Print a Presentation

Many audiences will request a copy of your presentation for future reference. Many speakers make the PDF version available on a website as an eco-friendly option, but more importantly, it is a universal format that anyone can read with a free reader. Other speakers will make hard copies of the most important slides in the presentation to distribute after the presentation. For other audiences, handouts with thumbnail versions of the slides are appropriate. The presentation can also be printed in outline format, so the audience has the text from the presentation but not the slide graphics, tables, or pictures. You can print the presentation as Notes Pages, which prints the slides and the notes in the Notes pane, so you can have a copy to use as your speaker notes. The decision to print or not depends upon the audience description and the purpose of the presentation.



CONSIDER THIS

When Should You Pass Out the Handouts?

Should you pass out the handouts before you begin the presentation or at the end? Describe a situation where it would be good to hand them out before the presentation. Is there any reason why it may be distracting for the audience to have printed versions of the slides during a presentation? List some reasons for waiting until the end of the presentation to distribute handouts.

The rule of thumb for printing is to print as few sheets as possible to conserve resources. It is important to use the preview function of PowerPoint to review the potential printout prior to printing the slide show. Keep in mind that it is more economical to print in black and white than color or gray scale, especially if you are planning to use a copier to make additional copies.

Printing Slides

Printing each slide individually is time consuming and not generally necessary. At times, one or two slides may contain information that is important. You will print Slides 3 through 7 from the presentation to share with the marketing director.

P01.21



To Print Selected Slides

- a. Open the file **p01ws01Sponsor2_LastFirst** file, click the **FILE** tab, and then click **Print**.
- b. Select the **printer name** as directed by your instructor.
- c. Click the **Print All Slides** arrow, and then select **Custom Range**.
- d. Type **3-7** in the **Slides** box. Be sure to include the dash.
- e. Click **Color**, and then click **Pure Black and White**.
- f. If your instructor directs you to submit a printed copy, click **Print** after reviewing the Preview pane.
- g. Click the **Back** button to return to the presentation in Normal view.

Printing Handouts

As you print handouts for your audience, you have many style choices to make. You can print one to nine slides per page, determining whether they are sequential either horizontally or vertically. You can choose to frame the slides, scale them to fit the paper, and select high-quality printing.

You will print a copy of your entire presentation to use in a discussion you will have with the golf pro, John Schilling. He will give the presentation at various times during the next month and should review the slides. You will preview a few options before printing the final document.

P01.22



To Print Handouts

- a. Click the **FILE** tab, and then click **Print**. Click **Custom Range**, and then click **Print All Slides**.
- b. Under **Settings**, click **Full Page Slides**, and then click **6 Slides Horizontal** in the Handouts section. The slides are displayed on a single sheet of paper, with Slide 2 next to Slide 1, and so on down the page.

SIDE NOTE

Print Handouts with Note Lines

The 3 Slides handout is ideal to take notes during the presentation. Print on both sides.

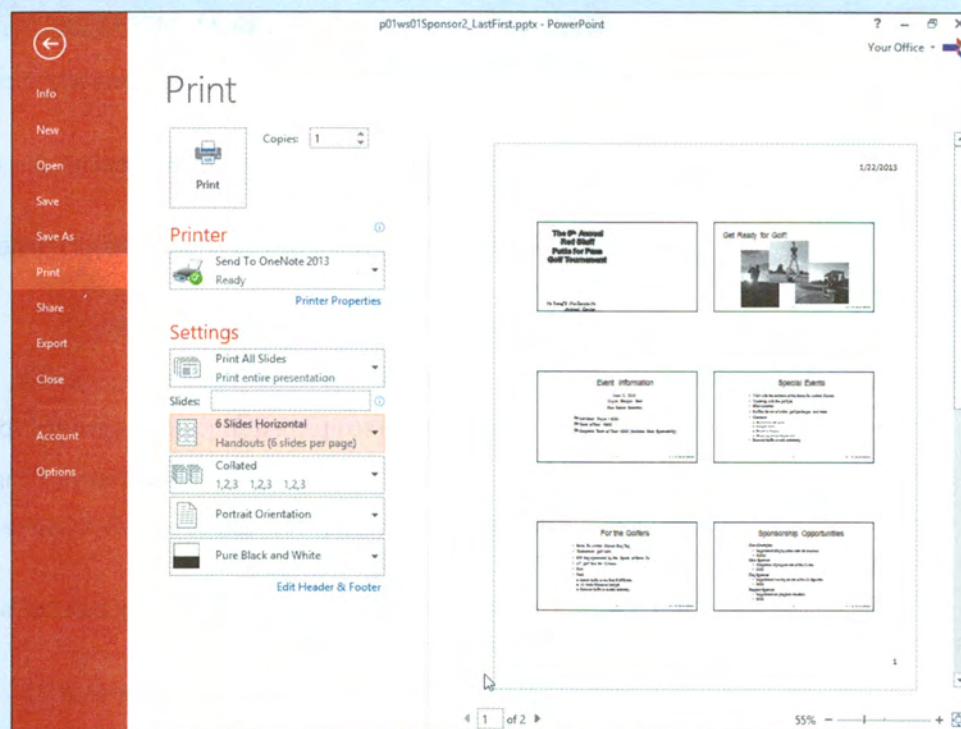


Figure 29 Printing handouts

- c. If your instructor directs you to submit a copy of the document, click **Print**.
- d. Click the **Back** button to return to Normal view.

Printing the Outline

For some audiences, an outline of the presentation is sufficient. The outline displays the headings and body text on the slides, but not the graphics. You will print an outline to use as a reminder sheet when you talk to potential sponsors and players. You want to accurately discuss the perks for the golfers, describe the special events, and recall the costs for participation.

P01.23



To Print an Outline

- a. Click the **FILE** tab, and then click **Print**.
- b. Click the **Print Layout** arrow, and then click **Outline**.
The content of the slides is displayed on two pages. You decide that you do not need to have the title slide information or the Contact Us slide, so you will set a range for the Slide numbers 2 to 6.
- c. Type **2-6** in the Slides box, and then click the **Next Page** button, if necessary, to view the outline. Review the document preview.
- d. Click **Print** if your instructor directs you to submit a copy of the document.
- e. On the FILE tab, click **Close**. Exit **PowerPoint**, and then submit your files as directed by your instructor.

Concept Check

1. What is the difference between the following presentation purposes: Inform, Persuade, Prepare, and Tell a Story? p. 798–799
2. What questions might you ask to help you define the purpose and scope of your presentation? p. 799–800
3. What kinds of questions will help you to understand the needs of your target audience? p. 802
4. List three presentation views in PowerPoint. p. 809
5. Explain when it is appropriate to use Outline view. p. 813
6. In what primary way is a template distinct from a theme? pp. 815–816
7. Describe one benefit of creating a presentation from a template. p. 820
8. When selecting placeholders, how can you know if you have selected the text box and not the text inside the box? p. 827
9. Keeping it short and simple includes striking a balance between visual elements and white space. What is white space? p. 830
10. For what reason would you use the Research pane? p. 831
11. Explain when you would save a slide show as a PowerPoint Show versus a PDF. p. 832
12. List three options for printing a presentation. p. 833

Key Terms

Content 800
Design theme 816
Font group 817
Left hand pane 807
Normal view 807
Notes pane 807
Outline View 807
PDF 833

Pecha Kucha 801
Placeholder 813
PowerPoint Show 832
Reading view 809
Sizing handles 828
Slide footer 823
Slide layout 827
Slide pane 807

Slide placeholder 830
Slide Show view 809
Slide Sorter view 809
Target audience 798
Template 816
Thesaurus 831
White space 830

Visual Summary

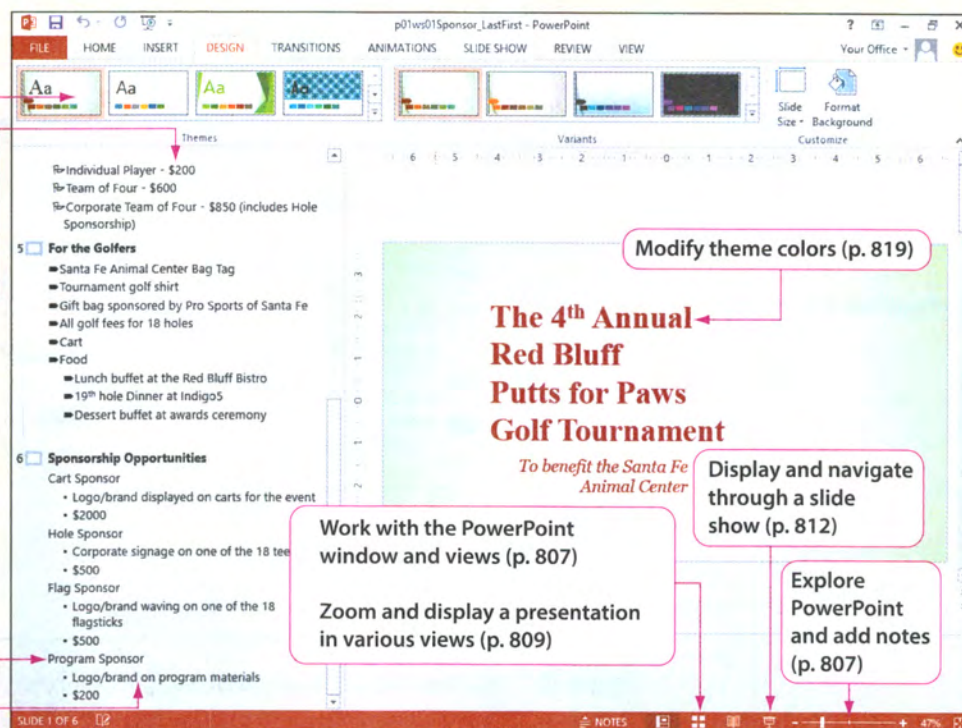
Use a design theme
(p. 816)

Understand the difference
between a theme and a
template (p. 815)

Navigate in Slide Show
view and Outline view
(p. 811)

Modify theme fonts (p. 817)

Use Outline View (p. 814)



Create a presentation
using a template (p. 820)

Delete slides (p. 829)

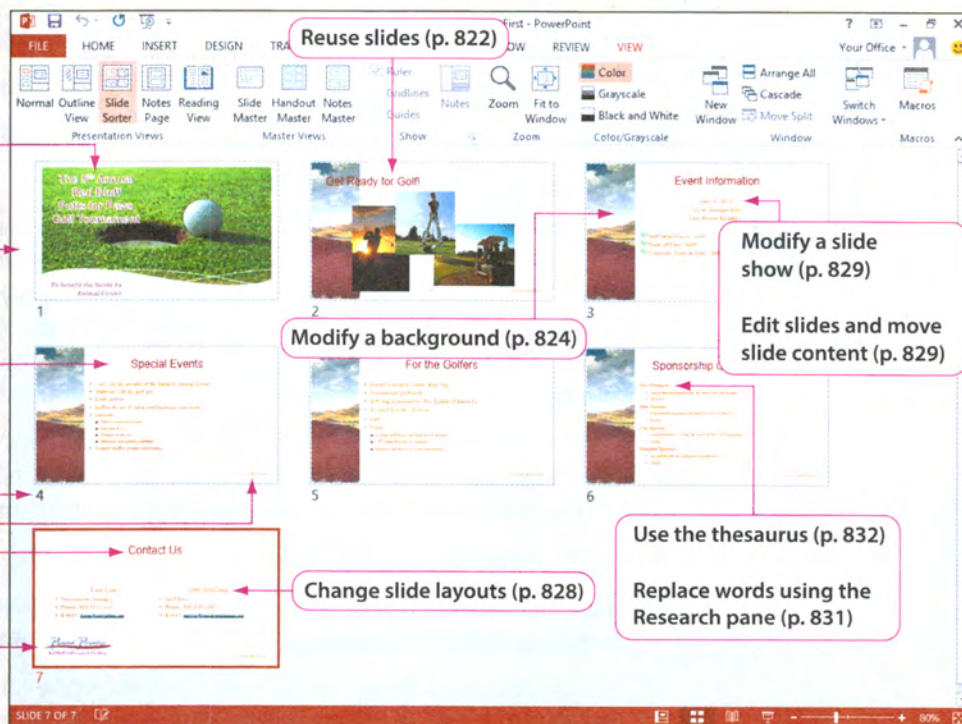
Rearrange slides in the
left hand pane (p. 829)

Add and delete slides,
change slide layouts, and
rearrange slides (p. 825)

Add slide footers (p. 823)

Add slides (p. 826)

Move slide content (p. 830)



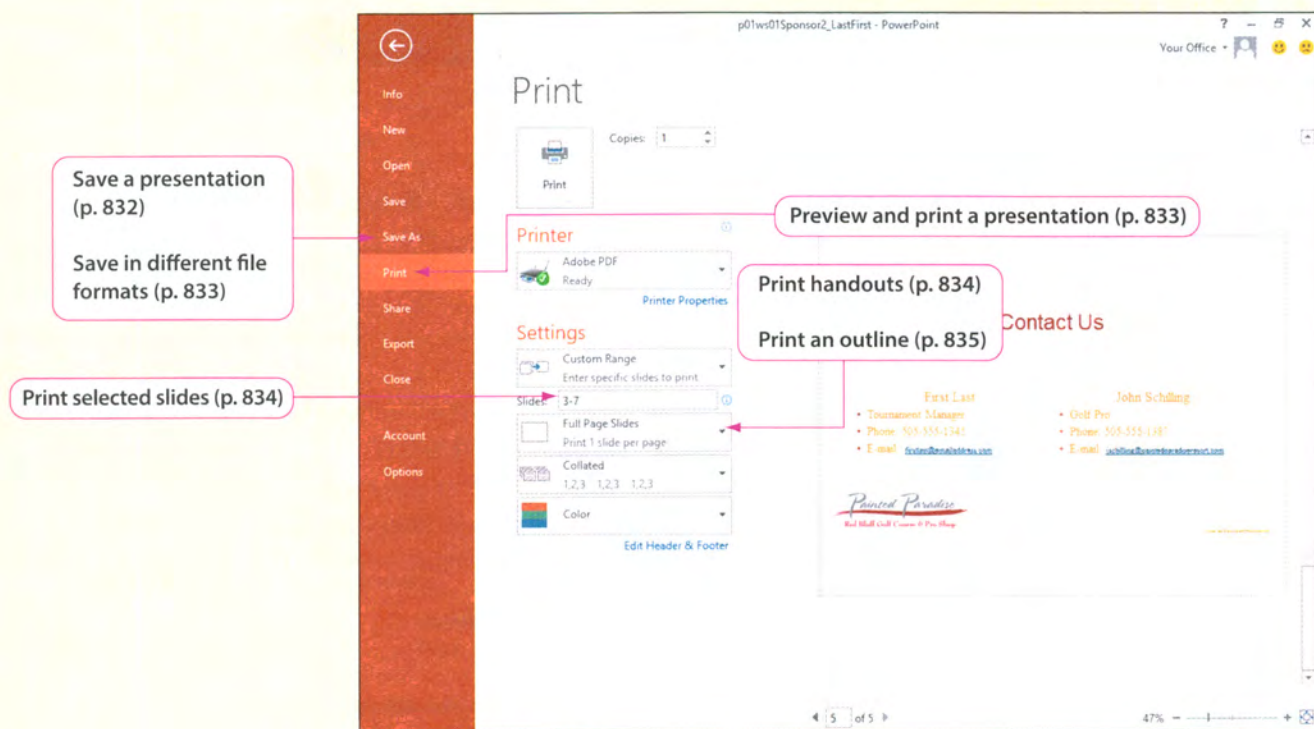


Figure 30 The Red Bluff Golf Course & Pro Shop Putts for Paws Golf Tournament Presentation Final

Practice 1

Student data files needed:

-  p01ws01Products.pptx
-  p01ws01LogoPT.jpg

You will save your files as:

-  p01ws01Products_LastFirst.pptx
-  p01ws01ProductsPDF_LastFirst.pdf

Gift Shop Product Line Presentation



The Painted Treasures gift shop manager requested your assistance in improving a presentation that she will make to the staff to introduce them to some new products for the shop. You will modify and reorganize the slides, apply a theme to the presentation, make minor modifications to the theme, and proofread the slides. You will print handouts of the slides to distribute to the staff for taking notes during the presentation, and you will save the file in PDF format so it can be posted on the resort's training website.

- a. Start **PowerPoint**, and then open **p01ws01Products**. Click the **FILE** tab, and then click **Save As**. Navigate to the location where you are saving your files, and then type **p01ws01Products_LastFirst**, using your last and first name.
- b. In the left hand pane, click **Slide 1**.
- c. Click the **DESIGN** tab, and then in the Themes group, click the **Ion Boardroom** theme, and then in the **Variants** group, click the orange/brown **Variant**—the fourth variant.
- d. You decide you will change the fonts. Click the **VIEW** tab, and then in the Master Views group, click **Slide Master**. In the Background group, click **Fonts**, and then click **Office**.
- e. In the Background group, click **Colors**, and then click **Customize Colors**. Click the **Text/Background - Dark 2** arrow, and then select **More Colors**. Click the **Custom** tab, and then type **241** in the **Red** box, **90** in the **Green** box, and **41** in the **Blue** box. Click **OK**.
- f. Click the **Accent 5** arrow, and then select **More Colors**. On the Custom tab, type **40** in the **Red** box, **83** in the **Green** box, and **160** in the **Blue** box. Click **OK**, and then click **Save**. Click **Close Master View**.

- g. Click **Slide 1**, click the **INSERT** tab, and then in the Images group, click **Pictures**. Browse to your data files, select **p01ws01LogoPT**, and then click **Insert**.
- h. Right-click the **image**, and then click **Size and Position**. In the Format Picture pane, click the **POSITION** arrow, and type **1.5"** in the **Vertical position** box. Close the Format Picture pane.
- i. Click the **FORMAT** tab, and then in the Picture Styles group, click **Drop Shadow Rectangle**, the fourth from left.
- j. Right-click the image again, and then click **Copy**. Click the **VIEW** tab, in the Master Views group, click **Slide Master**. Scroll up to the **Ion Boardroom Slide Master** slide, right-click the slide, and then click **Paste, Use Destination Theme**.
- k. Right-click the image again, and then click **Size and Position**. Click the **SIZE** arrow, and then type **2** in the Width box. Click the **POSITION** arrow. Type **0.1"** in the Horizontal position box, and then type **0.1"** in the Vertical position box.
- l. Close the Format Picture pane, and then return to **Normal** view. With **Slide 1** selected, click the **DESIGN** tab, and then in the Customize group, click **Format Background**. Check **Hide background graphics**. Select the image on Slide 1, and then set it to **Align Center**.
- m. Insert the following text in the footer, **Copyright 2015, Painted Paradise Resort and Spa** on all slides except the Title Slide.
- n. Click the **HOME** tab, and then in the Slides group, click the **New Slide** arrow, and then click **Title and Content**. In the title placeholder of the new slide, type **Our Goals**. In the body placeholder type the following.
 - **Introduce our new product lines**
 - **Increase sales by 18%**
 - **Have fun!**
 Select the text you just typed, and change the **font size** to **24**.
- o. On **Slide 1**, select the **subtitle text**, and then click **Increase Font Size** to **24**.
- p. Display **Slide 5**. Select the second line of body text, press and hold **[Ctrl]**, and then select the **fourth** and **sixth** line. In the Paragraph group, click **Increase List Level**. Select all of the body text, and then set the font size to **20**.
- q. Display **Slide 4**, and select the **Content Placeholder**, displaying the text **Comfort**, **Beauty**, and **Style**. Move the placeholder down until there is no background behind the text. It is okay if some of the placeholder overlaps the picture.
- r. On **Slide 4**, click the **top sizing handle** of the **Content Placeholder** beginning with **Cashmere Blankets** and drag it down until it aligns with the top of the picture on the left.
- s. Click **Slide 6**. Select the **jewelry items**, including the bulleted items under each type of jewelry, and then set the **font size** to **20**. Drag the **top sizing handle** down until the placeholder aligns to the bottom of the title placeholder background.
- t. On **Slide 7**, change the **font size** of the body text placeholder to **24**.
- u. Click **Slide 3**, and then in the Slides group, click **Layout**, and then select **Two Content**. Select the text beginning with **Ask** and continuing through **Suggest additional items based on purchase**, and then drag the text to the placeholder on the right. In the Font group, click **Increase Font Size** once to change the font to size **20**.
- v. Drag the **top sizing handle** of the left placeholder down to visually balance the text, and so that the first bullet of the text box on the left aligns with the one on the right. Click **Increase Font Size** once to change the font to size **20**.

- w. Drag **Slide 3** on the Slide pane to the end of the slide show. Click **Slide 4** on the Slide pane, and drag it to the Slide 3 position. Delete **Slide 7**, "Contact Us."
- x. Click the **Slide Show** button in the status bar, and hold the left and right mouse buttons down at the same time for two seconds to begin at the first slide. Press **[Enter]** to advance through the slides.
- y. Click the **FILE** tab, and then click **Save As**. Click **Browse**, navigate to where you are saving your files, click the **Save as type** arrow, and then click **PDF**. Type **p01ws01ProductsPDF_LastFirst**, using your last and first name, and then click **Save**.
- z. On the FILE tab, click **Print**, click the **Full Page Slides** arrow, and then click **3 Slides** in the Handouts group. Click the **Color** arrow, and then click **Grayscale**. If your instructor directs you to submit a printed copy, click **Print**. Save the presentation, close the presentation, and then exit PowerPoint.

Problem Solve 1

MyITLab[®]
Grader
Homework 1



Sales &
Marketing

Student data file needed:

 p01ws01Wonders.pptx

You will save your files as:

 p01ws01Wonders_LastFirst.pptx
 p01ws01WondersShow_LastFirst.ppsx

Your World Travel Presentation

100 million votes were cast through the Internet or by telephone for a project conducted by the New7Wonders Foundation. On July 7, 2007, the 7 New Wonders of the World were announced at a ceremony in Lisbon, Portugal. Claire Alexander, owner of Your World Travel Agency, would like to encourage clients to visit these 7 Wonders. Each month she holds an open house at her agency and would like to use a presentation featuring the 7 New Wonders to generate interest in both individual and group tours. Claire has already created a presentation with basic information and pictures. Your job is to add a theme and to format the slides attractively. You will also save the file in PowerPoint Show format so it can be shared.

- a. Start **PowerPoint**, open **p01ws01Wonders**, and then save the presentation as **p01ws01Wonders_LastFirst**. Review the information on the slides.
- b. Apply the **Integral** theme.
- c. Create a new **Theme** color. Click the **Accent 2** color, and then select **Dark Red** under Standard Colors. Type **LastFirst New Integral** in the Name box, and then click **Save**.
- d. After Slide 1, add a new slide with the **Title and Content** layout. In the title placeholder, type **New 7 Wonders of the World**. In the body placeholder, type:
 - Elected by more than 100 million votes from around the world
 - Represents global heritage throughout history
 - Announced at ceremony in Lisbon on 07-07-07
 - Pyramids in Egypt were granted an honorary status as the only remaining Ancient Wonder
- e. Insert a footer, **Copyright 2015, Your World Travel**. Have it appear on every slide except the title slide.
- f. Select the **footer** placeholder, and change the font color to **Dark Red**.
- g. On Slide 1, click after **Wonders** in the title, and add the words **of the World**.
- h. On Slide 2, select the text **Cuzco Region, Peru (1460-1470 CE)** and apply bold formatting. Apply the same formatting to the first line of body text on Slide 4 through Slide 9.

- i. On Slide 10, right-align the **title**. For the three lines of body text, increase the font size to **28**. Drag the **top sizing handle** down so the body text is the same distance from the bottom of the placeholder as it is from the top.
- j. Change to **Slide Sorter** view. Change the Zoom to **100%**, if necessary. You should be able to see the dates on the first line of body text for Slides 3 to 9. You will arrange these slides in the order in which the sites were built. Drag **Slide 5**, The Great Wall of China, so it becomes Slide 3. Arrange the remaining slides in chronological order so that BCE dates come before CE dates. When a beginning date and ending date are given together, use the beginning date.
- k. Return to **Normal** view. On **Slide 3**, format the background as **Picture or texture fill** using the image in your data files folder that matches the image on the slide. Make the background 80% transparent. Do this for the remaining slides with their respective background pictures.
- l. On **Slide 8**, format the foreground picture with the Picture Style **Reflected Bevel, White**. Repeat this format for the remaining slides.
- m. On **Slide 4**, drag the **right sizing handle** of the body text placeholder so that it aligns with the left edge of the foreground image. Repeat this for **Slide 9**.
- n. View the slide show from the beginning, and then save the presentation.
- o. Save the presentation as a PowerPoint Show as [p01ws01WondersShow_LastFirst](#).
- p. Close the presentation. Exit PowerPoint, and then submit your files as directed by your instructor.

Perform 1: Perform in Your Career

Student data files needed:

-  Blank PowerPoint presentation
-  p01ws01Cloud.jpg
-  p01ws01CloudLogo.jpg

You will save your files as:

-  p01ws01Cloud_LastFirst.pptx
-  p01ws01CloudPDF_LastFirst.pdf

Cloud Storage Presentation



You have been asked to present options for cloud-based file storage at your company. You will create a presentation with five competing storage options and discuss the pros and cons of each, recommending your top pick at the end of the presentation. You will apply a theme to the presentation, make minor modifications to the theme, and include a logo in the top-left corner of each slide. You will print handouts of the slides to distribute for taking notes during the presentation, and then you will save the file in PDF format so it can be shared with remote attendees.

- a. Create a new **presentation** from a template using available options. You may use an Office.com template in place of a built-in template if you prefer.
- b. Modify your template by replacing the **background** of the title slide with the image **p01ws01Cloud**. Be sure to set an appropriate level of transparency so the title text is easy to read.
- c. Your title text should read [Cloud Storage Alternatives](#).
- d. Your presentation should include a title slide, an agenda slide, one slide for each of the five alternatives presented, and a recommendation slide.
- e. Make use of at least two different layout styles, in addition to the title slide.

- f. On each slide presenting an alternative cloud storage service, be sure to include the following relevant facts: the name of the service, storage capacity, desktop and browser and mobile client support. Be sure to also include at least one positive and one negative evaluation for each about, for example, performance, file sync and versioning, security, or file and folder sharing and collaboration.
- g. Insert your logo, **p01ws01CloudLogo**, in the top-left corner of every slide except the title slide. It should be sized appropriately and have a picture style applied from the available choices.
- h. Save the presentation as **p01ws01Cloud_LastFirst**, print handouts with three slides to a page, and then save the presentation as a PDF, using the file name **p01ws01CloudPDF_LastFirst**. Submit your files as directed by your instructor.



Additional
Cases

Additional Workshop Cases are available on the companion website and in the instructor resources.

Microsoft Office PowerPoint 2013

Module 1

Understanding the Art of Presentation

WORKSHOP 2 | TEXT AND GRAPHICS

OBJECTIVES

1. Modify text p. 844
2. Use text hierarchy to convey organization p. 848
3. Reuse formats p. 849
4. Use special symbols p. 850
5. Work with images and art p. 853
6. Work with shape and line graphics p. 865
7. Create a table p. 873
8. Create and insert charts p. 878
9. Create a SmartArt graphic p. 882

Prepare Case

The Red Bluff Caddy School Presentation

The Red Bluff Golf Course & Pro Shop is sponsoring a caddy school. You will create the first-day presentation for training. The audience will be people 18–25 years old who are interested in learning about golf and who want to be caddies at the golf club. You will modify a presentation and add appropriate graphics before passing it along to John Schilling, the golf pro, for final approval.



Human
Resources



Patricia Homeester / Shutterstock.com

REAL WORLD SUCCESS



"I remember how cluttered, confusing, and boring the vendor's presentation was. Then the presenter said, 'I think I'm putting Clark to sleep here.' That's when I woke up. It was embarrassing, but I was on the client team and unimpressed. His company did not win our business that day, and I learned a valuable lesson about how important a good presentation really is. The text and graphics have to come alive, and that's usually left to the presenter."

- Clark, client executive

Student data files needed for this workshop:



p01ws02Caddy.pptx



p01ws02Caddy.jpg



p01ws02GolfBall.jpg



p01ws02ProShop.jpg



p01ws02GolfGirl.jpg



p01ws02Green.jpg



p01ws02Pink.jpg



p01ws02Blue.jpg



p01ws02Bullet.png

You will save your file as:



p01ws02Caddy_LastFirst.pptx

Using Text Effectively

The content of your presentation, especially the text, is a very important element of your slide show. You must ensure the accuracy of your words. People remember and believe more of what they see on the screen than what they hear. In this section, you will review your content carefully because making retractions or corrections after a presentation is difficult.

Modify Text

As you use PowerPoint, you will make a lot of decisions. You will decide how to group content items. You will select fonts for the text elements. You will align the text and organize it on the slide. You will edit your content to improve the layout of slides.

After a discussion on font selections, you will continue to modify the Caddy School presentation to improve the readability of the slides. You will also align the text to better organize the information.

Understanding Print-Friendly and Screen-Friendly Fonts

Typography, the art of selecting and arranging text on a page, is an interesting topic for in-depth study. Understanding some basic concepts enables you to produce slides that are easy to read. People read printed pages and screen pages differently, which affects the choices you make for the fonts in your slide show.

REAL WORLD ADVICE

Readability Is Key!

Readability is the most important aspect of a presentation. If possible, project your slides and stand at the far back of the room. Can you still read everything easily? What if you had vision problems? Anything that is too small to read should be adjusted prior to displaying the slide show to your audience. A common occurrence in the business world is a presentation that contains financial information or other numbers that are small and hard to read. A solution to the problem is to summarize the numbers on the slides and provide the complete data in handouts.

Printer-friendly fonts have characteristics that make them easy to read on paper, as shown in Figure 1. They are usually printed in black ink on a white page giving them high contrast, which improves the readability of the text. Serif fonts are considered formal, business-like, and powerful. Often, **serif fonts**, such as Times New Roman, are used for large blocks of text. The serifs, or small lines at the ends of the letters, provide guidelines for the eye to follow as the text is read. These fonts move the eye quickly across the page. Black-and-white printing is also less expensive than printing with color.

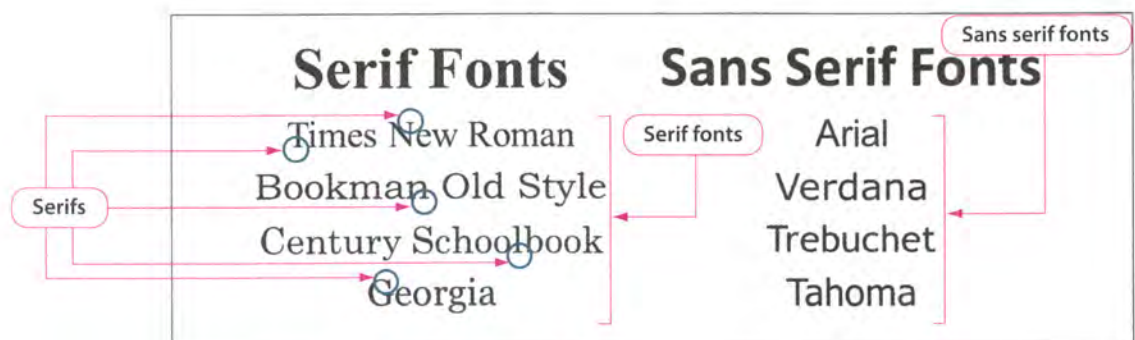


Figure 1 Serif and sans serif fonts

Screen-friendly fonts are easy to read on the screen, help protect the eyes, and reduce stress. Because of the resolution of the text on displayed slides, fonts on slides must maintain their integrity at great size. **Sans serif fonts**, such as Verdana and Trebuchet, were designed specifically for screens. “Sans” means “without” in Latin, so sans serif fonts do not have small lines at the ends of the letters. Sans serif fonts give the text a casual, modern feel. The serif font Georgia is also a good screen-friendly font. You will often find the title of slides displayed in a serif font, while the content of the slide is set to a sans serif font. Screen-friendly fonts have an additional perk: you can use color without additional expense. Be aware that you must still select colors that have a good amount of contrast to make the text easy to read. Avoid color combinations that are hard on the eyes, such as a red background with turquoise text. Select two or three colors to use consistently throughout your presentation. Later you will learn about PowerPoint themes that enable you to use colors consistently. Remember that your goal is to have people read your slides.

CONSIDER THIS | Selecting Color for Accessibility

Did you know that about 8 percent of males and .5 percent of females are color-blind? How could you accommodate these individuals as you select colors and format important concepts and information? Are you limited to black and white?

Making Font Selections

Generally, you will design slides with a sans serif font for the majority of the text, occasionally using a serif font for emphasis. Text should be a mixture of upper and lowercase characters, even for headings. It is more difficult to read text that is written in all capitals. You should avoid hyphenation of words on your slides when possible. Tracking between the parts of hyphenated words is difficult when the slide is projected. It is a good idea to use bold for emphasis. Italic text is hard to read and underlined text can be confused with hyperlinks.

Importantly, you must also decide the font size. Your goal is to have your slides read. Text that is too small frustrates the audience. Slide titles are set in a larger font than the body of the slide. The minimum font size you should use for the body text is 18 point. Of course, larger is better!

Providing an Appropriate Amount of Text on a Slide

As you create content for your slides, think like a headline writer, striving for the fewest words possible to convey your point. For instance, replace “Our goal is to increase sales by 55% in the coming year,” with “Goal—Increase sales 55%.” Use bullet points rather than complete sentences. Remove repetitive words, replacing them with a heading. Rather than placing a number-rich table on a slide, summarize the numbers. Focus your audience on your purpose by covering one major point or concept per slide.

A worthwhile rule of thumb is the **rule of six**—also known as the 6×6 rule. This rule calls for a maximum of six lines per slide and six words per line, not including the title. The rule helps to ensure that your slides are readable. Do not worry if you occasionally have more words on a line. This is a guideline. Your goal is to put the absolute essence of your message on your slides. You want the audience to interact with you—not spend all of their time reading the screen. Remember that the slide show is a visual aid, meant to support your presentation.