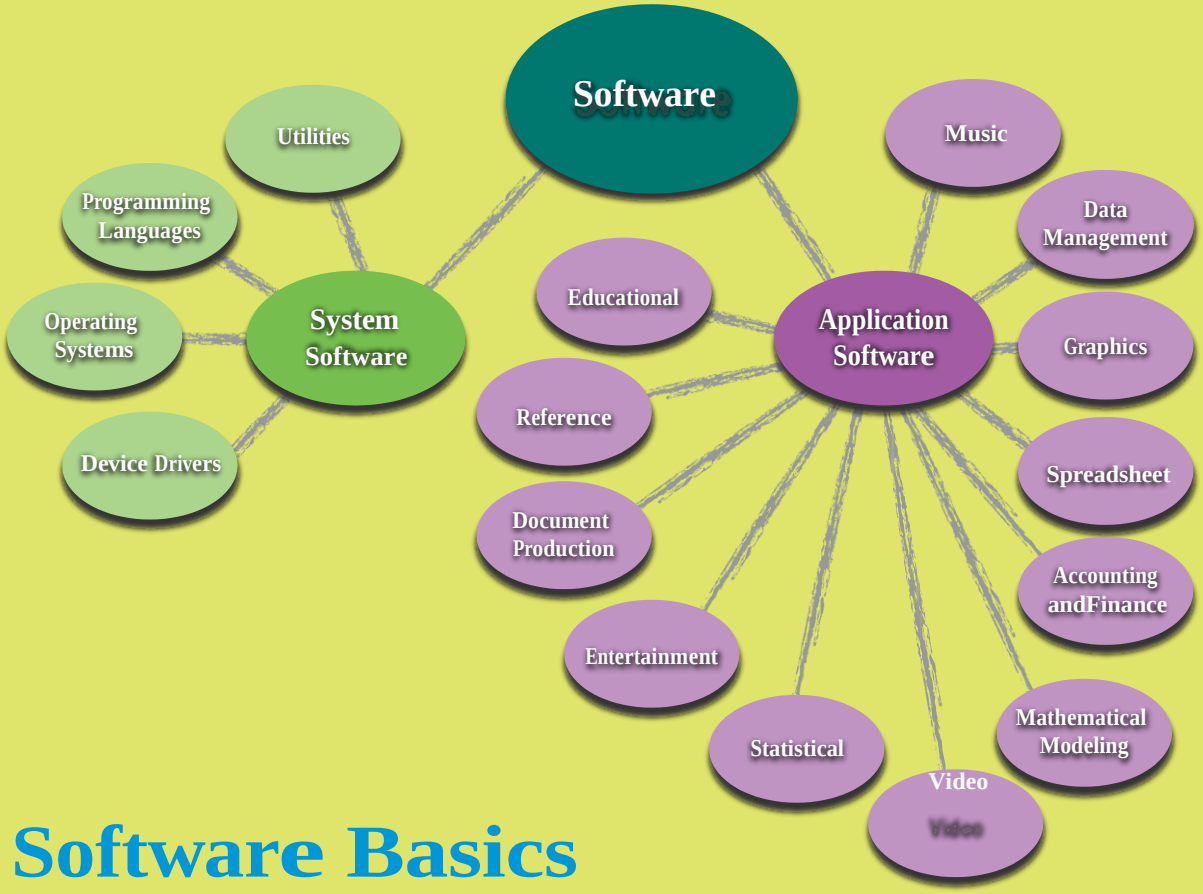


Software Basics

software determines the tasks a digital device can help you accomplish. Some software helps you create documents, while other software helps you block viruses or fine-tune computer performance. Section A helps you categorize application software, utilities, and device drivers.

software Categories

◗ **What is software?** the instructions that tell a computer how to carry out a task are referred to as a computer program. These programs form the software that prepares a computer to do a specific task, such as document production, photo editing, virus protection, file management, or Web browsing.

◗ **How is software categorized?** The two main categories are system software and application software. Operating systems, which are covered in the next chapter, are classified as system software. Device drivers, utilities, and programming languages are also system software. Application software categories include music, graphics, mapping, finance, and entertainment.

Application software is designed to help people accomplish real-world tasks, whereas system software is designed for computer-centric tasks. For example, you would use application software to edit a photo, write a term paper, or play a game, but you would use system software to diagnose a problem with your hard disk drive or Internet connection. Let's take a look at some of the applications you might have on your digital devices.

TERMINOLOGY NOTE

The term *software* was once used for all non-hardware components of a computer. In this context, *software* referred to computer programs and to the data the programs used. It could also refer to any data that existed in digital format, such as documents or photos. Using today's terminology, however, the documents and photos you create are usually referred to as data files rather than as software.

music software

What are the basic capabilities of music software?

Music software offers many ways to work with music, sound effects, and narration from your desktop, laptop, or handheld computer. The most popular music software capabilities are listed in Figure 3-1.

Figure 3-1

- Download music and other sound files
- Play music and sound files
- Create playlists
- Transfer music to handheld devices
- Convert audio CDs into digital music
- Record music and narrations
- Edit volume, speed, and quality of digital recordings
- Crop and mix recordings
- Stream radio music to your computer
- Identify songs playing on the radio
- Voice training

Music software may offer some, but not all, of these features. For example, some music software offers extensive playback features, but no way to make recordings. You might have to use more than one music software product to complete a project.

What's the most popular music software?

The premier music software, iTunes, can be used by anyone who wants to listen to digital music (Figure 3-2).

Figure 3-2

iTunes helps you collect digital music and arrange it into playlists; you can also use it to pull music from audio CDs and convert it into a format supported by your portable media player.

If you want tools that allow you to record, edit, and mix digital audio, you can turn to **audio editing software**, also called recording or mixing software. Your operating system might supply audio editing software, such as Windows Sound Recorder, or you can download software, such as the ProStudio app or open source Audacity (Figure 3-3).

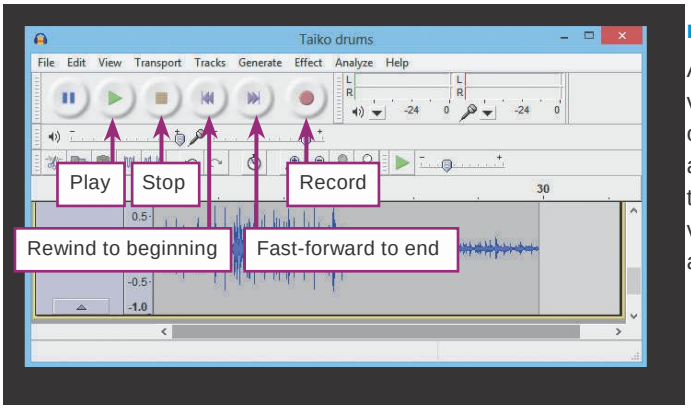


Figure 3-3

Audio editing software provides controls much like those on a DVD player. Menus offer additional digital editing features, such as speed control, volume adjustments, clipping, and mixing.

Video software

What do I need to work with video on my digital devices? The most popular video software plays movies on your computer or handheld device. As with digital music, the source of videos is usually an online store such as iTunes or Netflix, or a video sharing site such as YouTube. Another popular video application is video editing software.

What can video editing software do? **Video editing software** provides a set of tools for creating video productions from raw footage. Professional versions are used by video production studios, whereas simpler, consumer-level software is designed for the casual user.

The popularity of video editing can be attributed to consumer-level video editing software, such as Windows Movie Maker and Apple iMovie, included with many new computers. Consumer-level video editing software provides a set of tools for video production tasks, such as these:

- Transfer footage from camera to computer hard disk
- Split video into smaller clips
- Rearrange clips
- Add still photos
- Add transitions between clips
- Add soundtracks
- Add titles and captions
- Add special effects
- Alter colors
- Zoom in and out
- Export in formats for e-mail, Web pages, or desktop viewing

Despite an impressive array of features, video editing software is relatively easy to use, as explained in Figure 3-4.

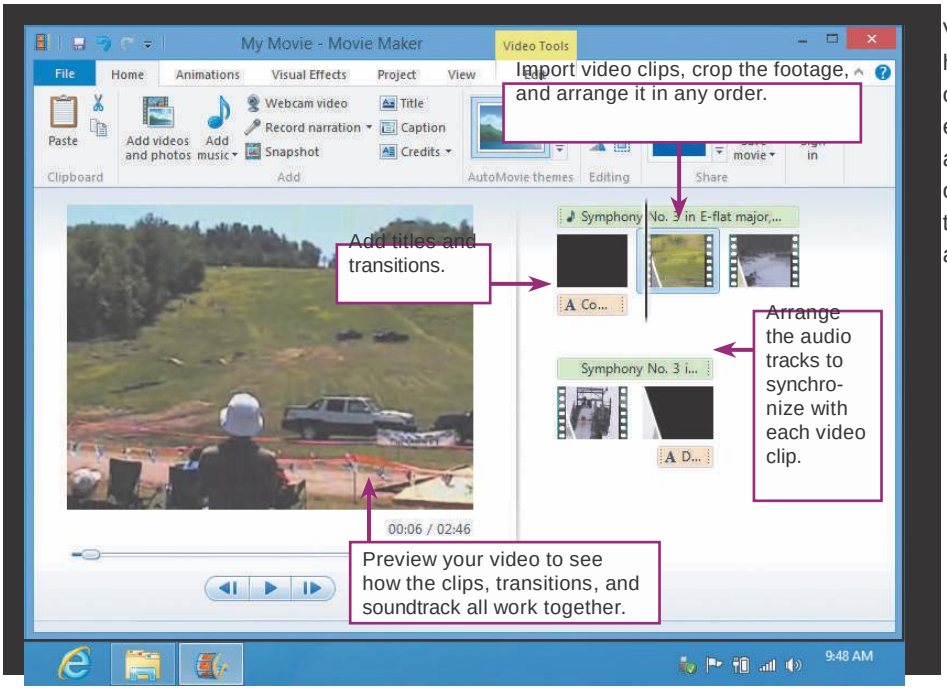


Figure 3-4
Video editing software helps you import a series of video clips from a camera or other video source, arrange the clips in the order of your choice, add transitions between clips, and add an audio track.

Can it produce discs for DVD players? After producing a video that plays on your computer, you might want to transfer it to a DVD that you can use in a standard DVD or Blu-ray player connected to a television or projector. **DVD authoring software** offers tools for creating DVDs with Hollywood-style menus. You can obtain this software as a standalone product or in a collection of video editing tools.

TRY IT!
Check the Web. What software would you use to create your own DVDs?

graphics software

What kind of software do I need to work with drawings, photos, and other pictures? In computer lingo, the term **graphics** refers to any picture, drawing, sketch, photograph, image, or icon that appears on your computer screen. **Graphics software** is designed to help you create, manipulate, and print graphics.

Some graphics software products specialize in a particular type of graphic, while others allow you to work with multiple graphics formats. If you are really interested in working with graphics, you will undoubtedly end up using more than one graphics software product.

The graphics captured by digital cameras and smartphones can be best edited using paint or photo editing software (Figure 3-5). To create graphics from scratch, you can use drawing software, 3-D graphics software, or CAD software.

Paint software (sometimes called a raster graphics editor) provides a set of electronic pens, brushes, and paints for painting images on the screen. A simple program called Microsoft Paint is included with Windows. More sophisticated paint software products are also available. Many graphic artists, Web page designers, and illustrators use paint software as their primary computer-based graphics tool.

Photo editing software, such as Adobe Photoshop, includes features specially designed to fix poor-quality photos by modifying contrast and brightness, cropping out unwanted objects, and removing red eye. Photos can also be edited using paint software, but photo editing software commonly offers tools and wizards that simplify common photo editing tasks.

Drawing software provides a set of lines, shapes, and colors that can be assembled into diagrams, corporate logos, and schematics. The drawings created with tools such as Adobe Illustrator, CorelDRAW, and Autodesk SketchBook tend to have a flat cartoon-like quality, but they are very easy to modify and look good at just about any size. Figure 3-6 illustrates a typical set of tools provided by drawing software.

Figure 3-5

Use paint or photo editing software for working with images from digital cameras, smartphones, or scanners.

Phase4Photography/Shutterstock.com

TRY IT!

Suppose that you want to create a logo for your local softball team. What kind of graphics software would give you the most flexibility for using the final design on uniforms, Web sites, and printed materials?

- ❍ Paint software
- ❍ Photo editing software
- ❍ Drawing software

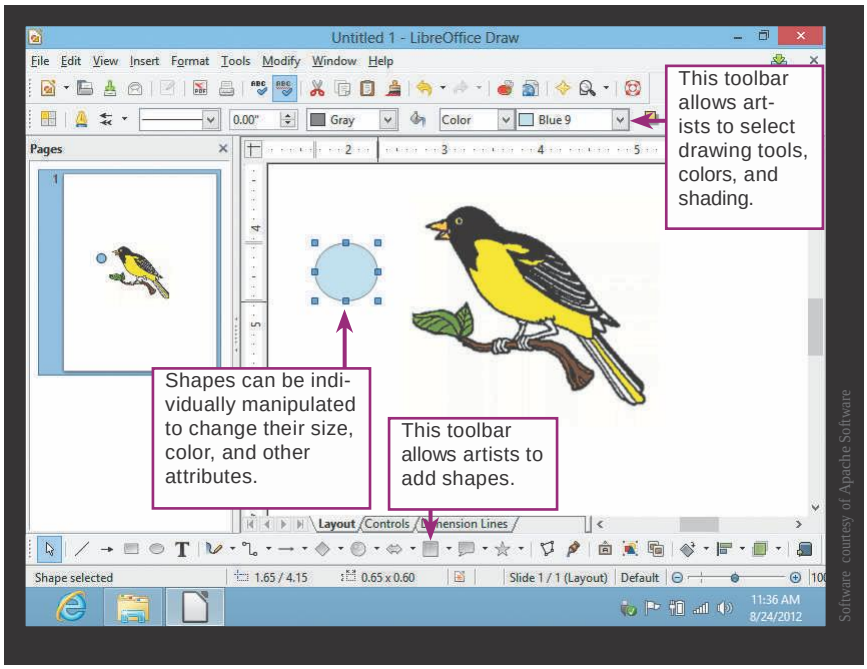


Figure 3-6

Drawing software provides tools for creating and manipulating graphics.

3-D graphics software provides a set of tools for creating wireframes that represent three-dimensional objects. A wireframe acts much like the framework for a pop-up tent. Just as you would construct the framework for the tent and then cover it with a nylon tent cover, 3-D graphics software can cover a wireframe object with surface texture and color to create a graphic of a 3-D object (Figure 3-7).

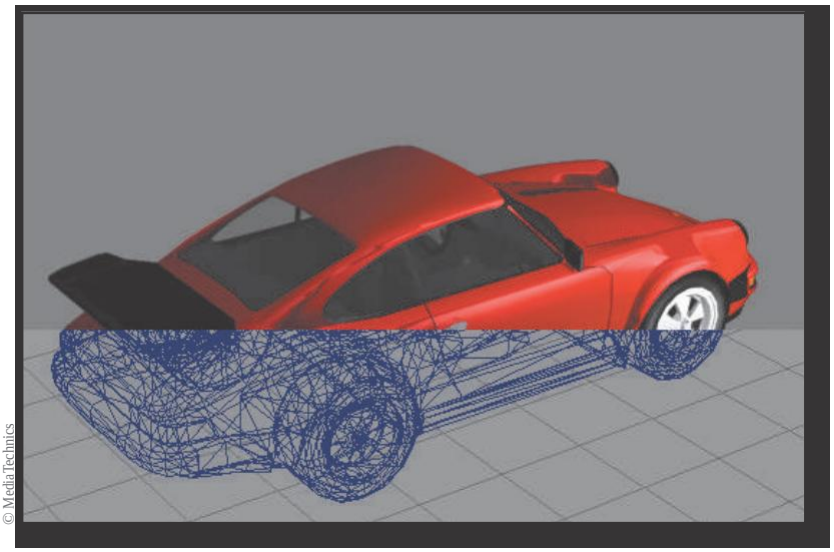


Figure 3-7

3-D graphics software provides tools for creating a wireframe that represents a 3-D object. Some 3-D software specializes in engineering-style graphics, while other 3-D software specializes in figures.

CAD software (computer-aided design software) is a special type of 3-D graphics software designed for architects and engineers who use computers to create blueprints and product specifications. AutoCAD is one of the best-selling professional CAD products. TurboCAD is a low-cost favorite. Scaled-down versions of professional CAD software provide simplified tools for homeowners who want to redesign their kitchens, examine new landscaping options, or experiment with floor plans (Figure 3-8).

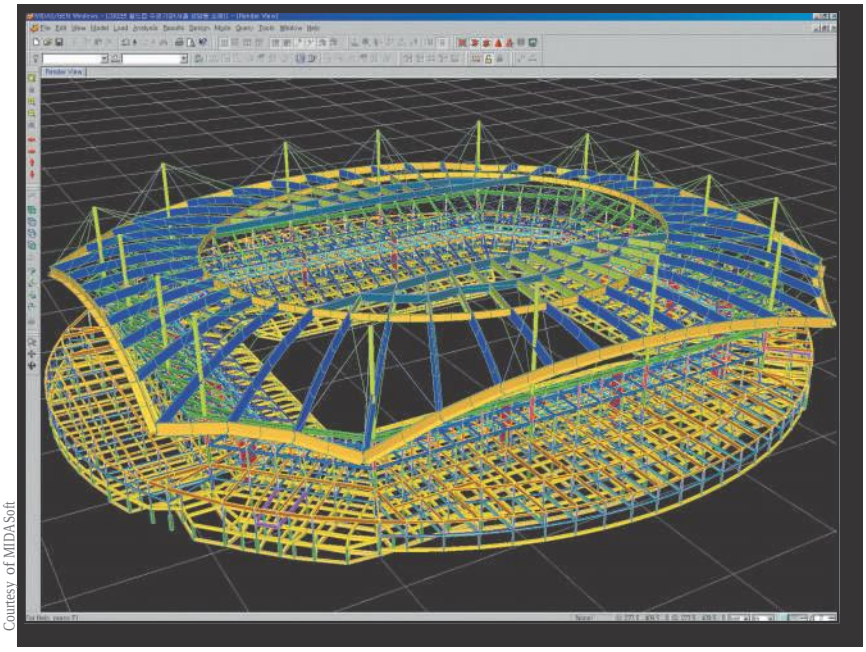


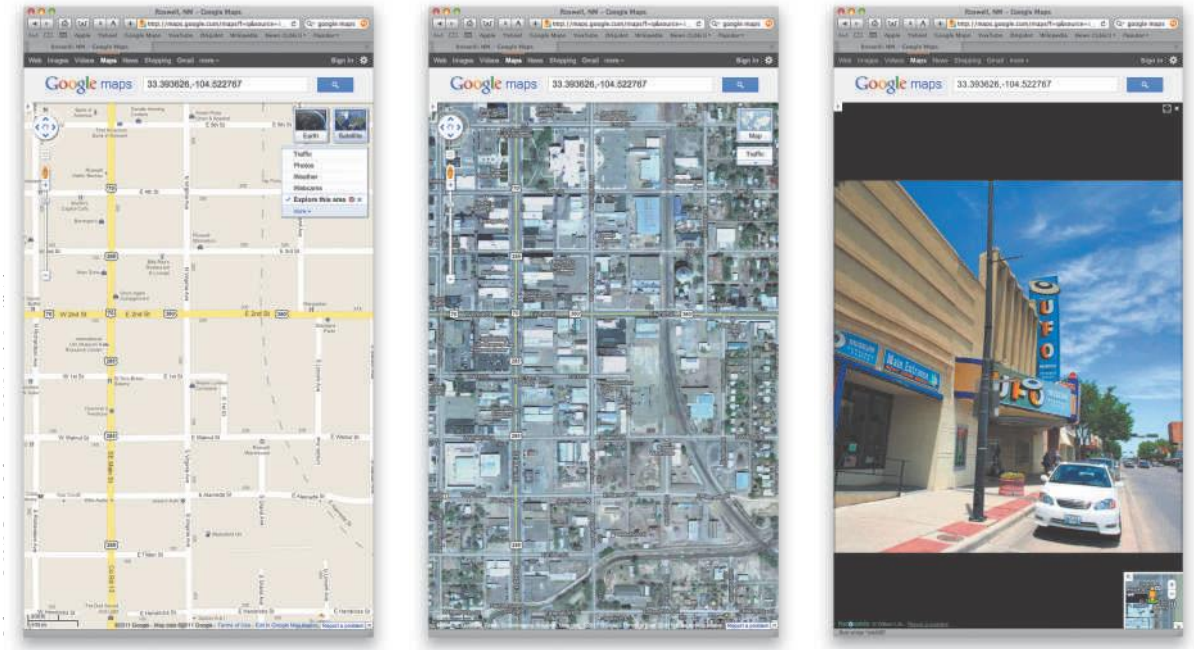
Figure 3-8

CAD software is used extensively for architectural, engineering, and mechanical drawings.

mapping and Location-based software

What are mapping applications? A **mapping application** displays satellite, aerial, or street maps used to locate places and get directions between two addresses. Google Maps is one of the most extensive mapping applications, and its core technology is the basis for many other mapping and location-based products (Figure 3-9).

Figure 3-9
With Google Maps, you can view a street map, satellite image, or street view.

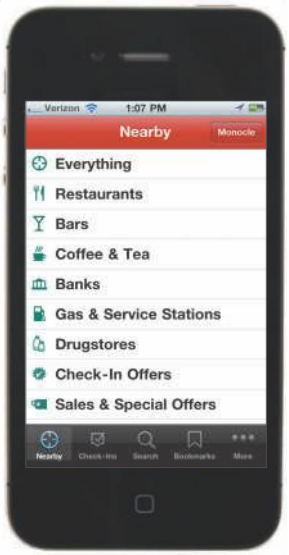


What is location-based software? **Location-based software** is able to access your current location and use it to show you the closest shops, restaurants, and theaters, as well as information about each location. Want to find the nearest ATM? Need turn-by-turn directions to the airport? Want to hook up with friends who are nearby? Would you like some user reviews about the Mexican restaurant you just spotted? There are location-based apps designed to answer those questions and more (Figure 3-10).

Location-based software is available for desktop, laptop, and handheld computers. Mobile devices can pinpoint your location using the built-in GPS (Global Positioning System) or by triangulating your distance from nearby cell towers. Desktop and laptop computers can determine your location based on your Internet service provider and nearby private computer networks.

Is it safe? When devices record your location, there is the possibility of abuse. Stay alert for devices and software applications that track your location. In some cases, you can turn tracking off temporarily or permanently. In other cases, tracking may not be under your control; you'll have to decide whether the service you receive from the device or software is worth relinquishing your privacy.

Figure 3-10
Yelp uses the GPS signal built into your mobile phone to pinpoint your position and offer suggestions for nearby restaurants, banks, museums, and other attractions.



business and "number Crunching" software

Do businesses use specialized software? *Business software* is a broad term that includes vertical and horizontal market software.

What is vertical market software? **Vertical market software** is designed to automate specialized tasks in a specific market or business. Examples include hospital patient management and billing software, construction industry job estimating software, and student record management. Today, almost every business has access to some type of specialized vertical market software designed to automate, streamline, or computerize key business activities.

What is horizontal market software? **Horizontal market software** is generic software that just about any kind of business can use. For example, many small and medium-size businesses use QuickBooks to keep track of income and expenses, pay bills, and track inventory.

Payroll software is another example of horizontal market software. Almost every business has employees and must maintain payroll records. No matter what type of business uses it, payroll software must collect similar data and make similar calculations to produce payroll checks and W-2 forms.

Accounting software and project management software are additional examples of horizontal market software. **Accounting software** helps a business keep track of the money flowing into and out of various accounts. **Project management software** is an important tool for planning large projects, scheduling project tasks, and tracking project costs.

How about other "number crunching" software? Businesses use a variety of "number crunching" software applications for planning and analysis. Spreadsheets, are an important tool that can be used to create numeric models by simply entering values, labels, and formulas.

Statistical software is designed for analyzing large sets of data to discover relationships and patterns. Products such as IBM SPSS Statistics and StatSoft STATISTICA are helpful tools for summarizing survey results, test scores, sales data, experiment results, or population data. Most statistical software includes graphing capability so that you can display and explore your data visually.

Mathematical modeling software provides tools for solving a wide range of math, science, and engineering problems. Students, teachers, mathematicians, and engineers, in particular, appreciate how products such as Mathcad and Mathematica help them recognize patterns that can be difficult to identify in columns of numbers (Figure 3-11).

TRY IT!

Retail businesses use point-of-sale software systems to keep track of transactions at checkout registers. This software would be classified as:

- ❍ vertical market software
- ❍ horizontal market software
- ❍ project management software
- ❍ CAD software

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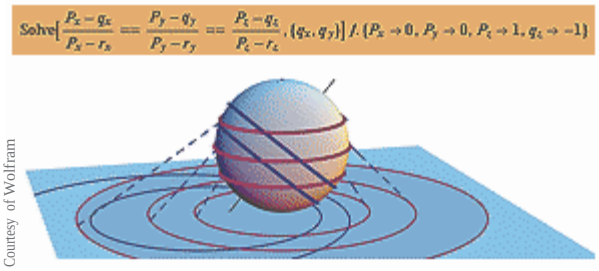


Courtesy of Wolfram

Figure 3-11

Mathematical modeling software helps you visualize complex formulas. Here the points from a sphere are graphed onto a plane to demonstrate the principles behind the Astronomical Clock of Prague.

desktop publishing software

What is desktop publishing software? **Desktop publishing software** (DTP software) takes word processing to the next level by providing professional tools for producing typeset-quality documents.

DTP software is available in consumer-level and professional-level versions. Adobe InDesign is the choice of professional layout artists, with Scribus and QuarkXPress as alternatives. Microsoft Publisher is an example of a consumer-level option.

How does DTP software differ from word processing software? The main difference is that word processing software is document-based, whereas DTP software is frame based. When you use word processing software, each page is basically one box into which you enter text and paste images. When the box becomes full, your software adds another page and the text flows onto it.

DTP software allows you to create a page using multiple frames; some frames can hold text, while other frames can hold titles, graphics, and tables. To achieve a pleasing layout, you can move, resize, and overlap frames. You can also link frames so that text flows seamlessly from one frame to another on the same page or over to a different page. Because this software maximizes the flexibility for placing elements on a page, it is sometimes referred to as page layout software.

Do I need DTP software? Today's word processing software provides an adequate feature set for the document production needs of most individuals.

DTP software is usually used in a production environment for publishing paperback and hardcover books. In a typical production environment, an author uses word processing software to create a document, edit it, and check spelling. The electronic version of the document then goes to a desktop publishing technician who imports the document into desktop publishing software, where the text can be formatted into columns and linked to flow from one page to another (Figure 3-12).

TRY IT!

How many frames are used in the layout of the Launching page shown in Figure 3-12?

- 1
- 3
- 5
- 7

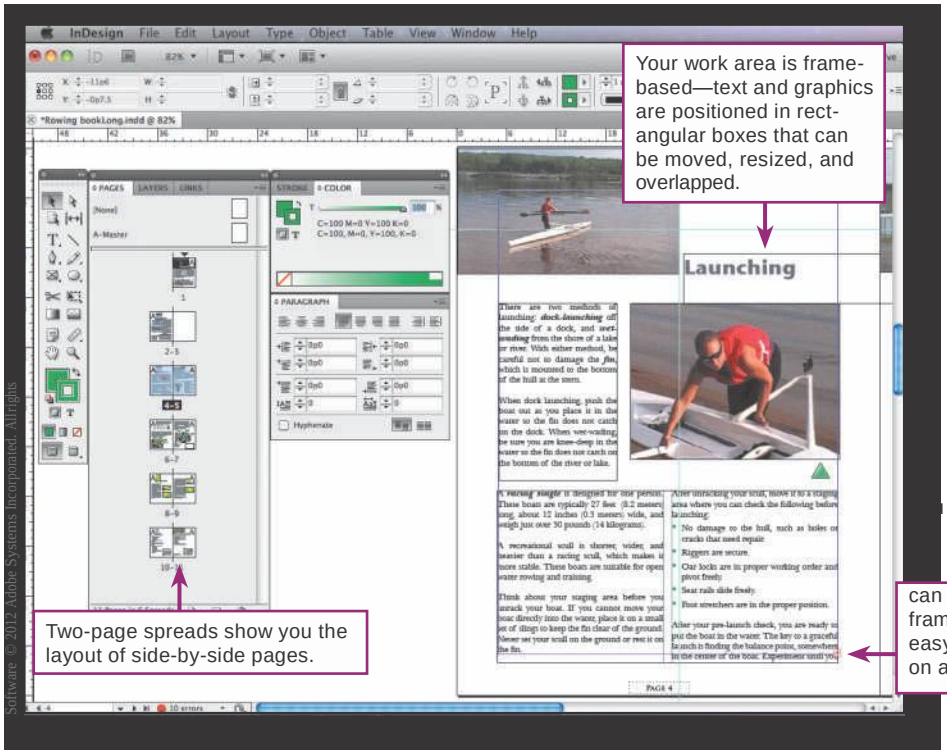


Figure 3-12

DTP frames give you exact control over the position of text and graphical elements on a page.

personal finance software

What software is available for managing my money?

Money management software offers a variety of tools for tracking cash flow and investments. In this software category, **personal finance software**, such as Intuit Quicken, is designed to keep track of income, expenses, assets, and liabilities using a simple checkbook-like user interface. Options for handhelds include Checkbook HD and PocketMoney.

Personal finance software also automates routine tasks, such as budgeting, investing, check writing, and bill paying. Many personal financial software products provide direct links to online banking services, so you can use them to check account balances, transfer funds, and pay bills.

Personal finance software produces reports and graphs that show you where your money goes. For example, you can analyze various aspects of your cash flow, such as how much you spent on entertainment last month and how that compares to previous months (Figure 3-13).

Figure 3-13

Personal finance software offers lots of tools to help you get a handle on the money that comes in and goes out.

Tax preparation software is a specialized type of personal finance software designed to help you gather your annual income and expense data, identify deductions, and calculate tax payments. Popular products, such as Intuit TurboTax, even accept data directly from personal finance software to eliminate hours of tedious data entry.

When using tax preparation software, make sure you have the current version and updates. Tax laws are constantly changing; you don't want to miss out on any changes that let you keep more of the money you earn. Before submitting your return, proofread it to make sure the numbers make sense.

Your tax preparation software includes a feature that files your return electronically. That option not only eliminates paper forms and the late night trip to the post office on April 15, but it speeds up your refund, too.

TRY IT!

Check the IRS Web site for information on e-file. What is the name of the software that individuals can use to file their U.S. tax returns online?

utility software

What is utility software? A type of system software called **utility software** is designed to help you monitor and configure settings for your digital gear, its operating system, or application software.

Like all system software, utilities focus on computer-centric tasks such as blocking viruses or diagnosing hard disk errors, rather than real-world tasks such as document production or accounting.

A set of basic utilities is included with your device's operating system. Your iPhone utilities are accessed from the Settings icon. With a Mac, click the Apple icon and select System Preferences (Figure 3-14):

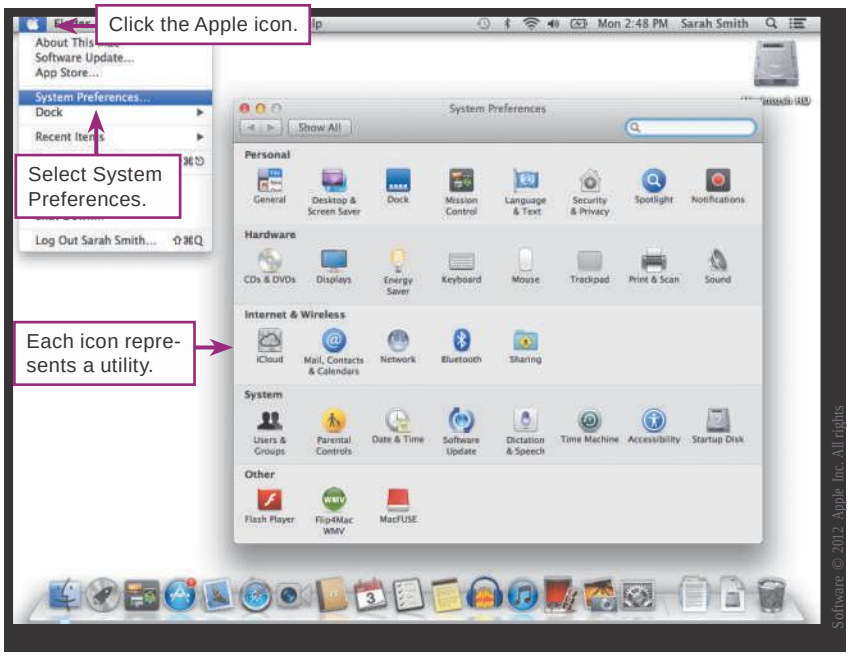


Figure 3-14

Mac utilities are listed in the System Preferences window.

In Windows, all the utilities supplied by Microsoft can be accessed from the Control Panel. To open the Control Panel from the Start screen, type "Control" and then click the Control Panel option (Figure 3-15).

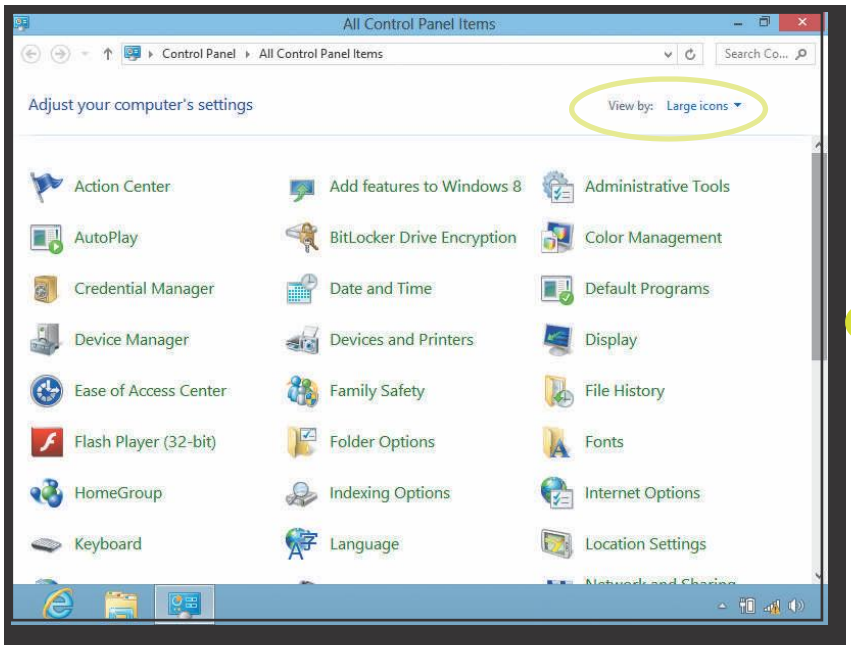


Figure 3-15

Windows utilities are listed in the Control Panel. To easily find a utility, set the view to Large icons.

The following are bundled with the Windows operating system, but which one would NOT be considered a utility?

- ❍ Disk Defragmenter
- ❍ Paint
- ❍ Sync Center
- ❍ Power Options

What are must-have utilities? Third-party software companies offer additional products that extend and improve upon those supplied by the operating system. You can download these products from the Web or from an app store. A PDF reader, such as Adobe Reader, is an essential utility that displays documents stored in standard PDF files. **PDF** (Portable Document Format) is a standard format for exchanging files, so most people will assume that your computer has PDF capability (Figure 3-16).

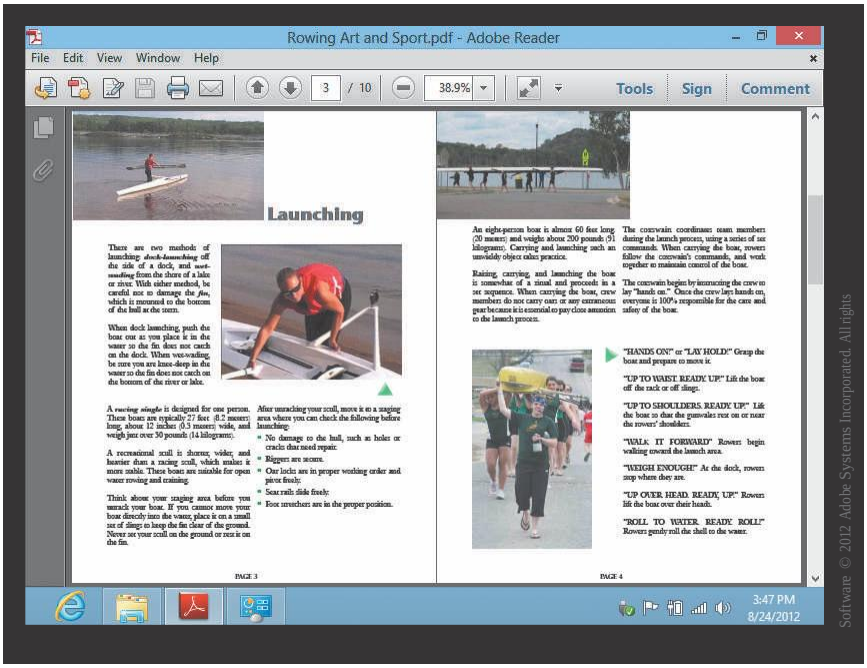


Figure 3-16

Documents from expensive DTP software and other applications can be output in PDF format. You don't have to own the DTP software to view these documents; you can simply open them using a PDF reader.

How about adaptive utilities? Computers offer opportunities for individuals with physical challenges. **Adaptive utilities** alter a device's user interface to create an accessible environment by providing closed captions, text-to-speech, speech-to-text, or large screen text. These capabilities are usually included with operating system utilities.

Individuals who cannot read the screen have the biggest challenge when it comes to computers. Screen readers that narrate the text displayed on a computer screen offer only rudimentary accessibility. Imagine the jumble of text, advertising, and sidebars displayed on a typical Web page; making sense out of a narrated version of that chaos is not easy.

Touchscreen capabilities, combined with screen readers, are a next step toward better accessibility. For example, the iPhone includes an accessibility feature for people who can't see the screen (Figure 3-17).

What else? Another popular category of utility software is **system utilities** that can track down and fix disk errors, repair corrupted files, and give your device a performance-enhancing tune-up.

System utilities for handheld computers include apps such as System Activity Monitor, which displays memory usage, available storage space, CPU usage, Wi-Fi and cellular addresses, and battery level. Similar utilities for desktops and laptops include TuneUp Utilities, System Mechanic, and Advanced System Optimizer.

Figure 3-17

The iPhone Accessibility screen includes a VoiceOver option that speaks a description of anything you touch on the screen.

device drivers

What is a device driver? A **device driver** is software that helps a peripheral device establish communication with a computer. This type of system software is used by printers, monitors, graphics cards, sound cards, network cards, modems, storage devices, mice, and scanners. Once installed, a device driver automatically starts when it is needed. Device drivers usually run in the background, without opening a window on the screen.

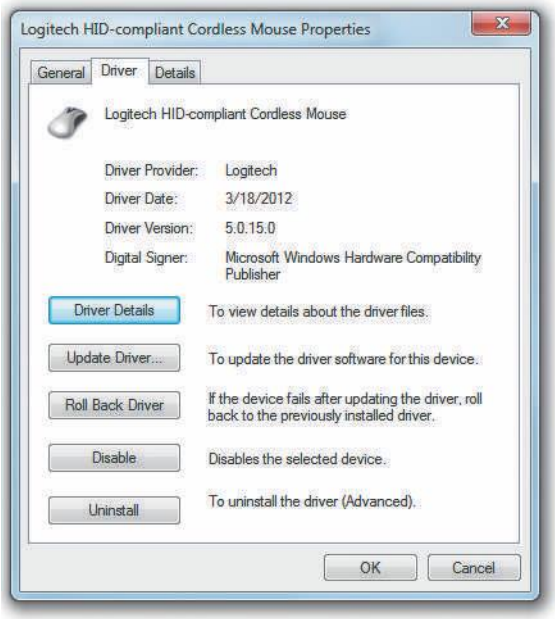
Suppose you connect a new printer to your computer. You might also have to install a printer driver or select a preinstalled driver. After the device driver is installed, it runs in the background to send data to the printer whenever you initiate a print job. The printer driver signals you only if it runs into a problem, such as if the printer is not connected or it runs out of paper.

On a Mac, you can click the Apple icon, select About this Mac, and then select More info to look at a list of devices connected to your computer. By selecting a device, you can view information about it, including the driver version number. Check the manufacturer's Web site to find out if your version is current.

On a PC, if you need to update a device driver or change its settings, you can usually view driver information by accessing the Control Panel and selecting System (or System and Security). Then use the Device Manager option to view a list of your computer system hardware and corresponding device drivers, as shown in Figure 3-18.

Figure 3-18

The Windows Device Manager offers access to device drivers. You can check if they are working and change settings. You can also check the device driver's version number and compare it with the most recent version posted online.



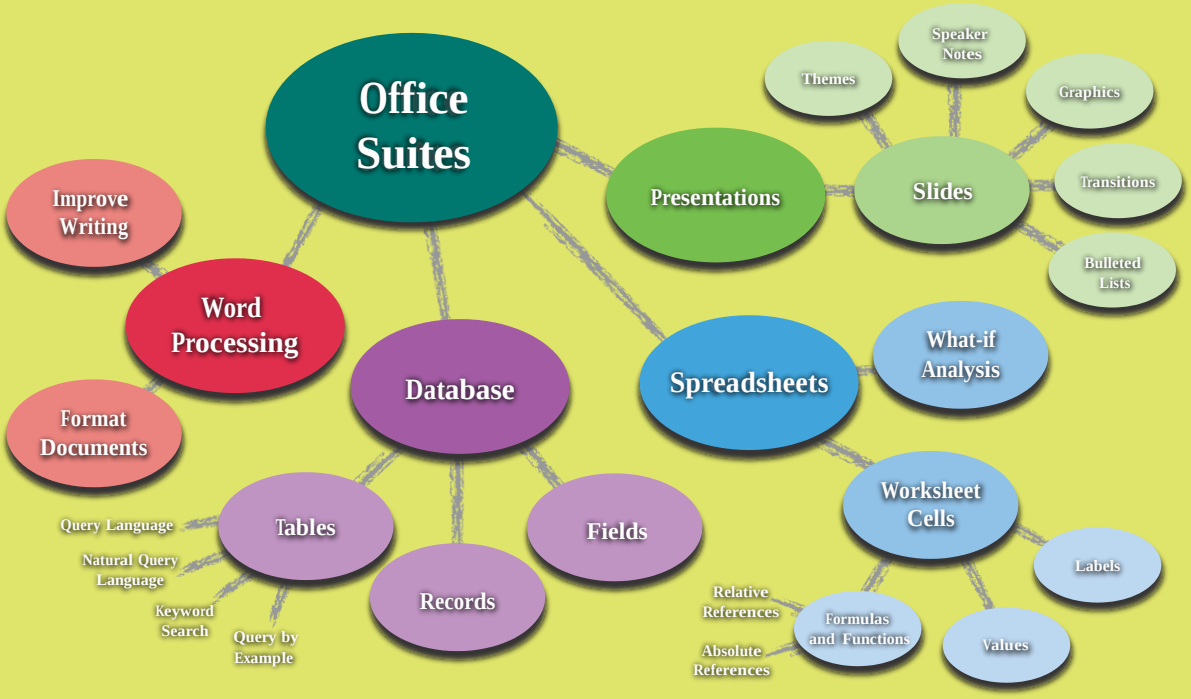
TRY IT!

System software includes all of the following EXCEPT:

- ❍ device drivers
- ❍ adaptive utilities
- ❍ system utilities
- ❍ DTP software

QuickCheck

1. The category of software that is designed for computer-centric tasks is _____ software.
2. _____ software helps you carry out tasks such as creating documents, editing graphics, and locating nearby restaurants.
3. _____ market software is designed to automate specialized business tasks, such as hospital billing.
4. System _____ software can help you track down and fix disk errors, repair corrupted files, and improve device performance.
5. A(n) _____ driver is designed to help a peripheral device establish communication with a computer.



Office Suites

, such as Microsoft Office and Google Docs, are popular with individual computer owners and in business environments. They are sometimes referred to as **productivity software** because they offer features that really help get work done. Section B highlights productivity software applications in office suites.

office suite basics

What is an office suite? An **office suite** is a collection of programs that typically include word processing, spreadsheet, presentation, and database modules. Suites may also include e-mail and contact managers, calendars, project management, and drawing modules.

In the context of office suites, the term **module** refers to a component, such as a word processing module. Modules can be run as individual programs, but all of the modules in an office suite have a standard set of controls, making it easy to transfer your expertise on one module to the others.

What are the most popular office suites? Popular office suites include Google Docs, iWork, LibreOffice, Microsoft Office, Microsoft Office 365, and Zoho Office Suite (Figure 3-19).

Figure 3-19
Popular office suites contain a similar set of modules.

Platform	Modules	Name
Online (Free)	Word processing, spreadsheet, presentation	Google Docs
Mac ($$)	Word processing, spreadsheet, presentation	iWork
Windows, Mac, Linux (Free)	Word processing, spreadsheet, presentation, database, drawing	LibreOffice
Windows, Mac, Linux ($$)	Word processing, spreadsheet, presentation, database, mail/calendar	Microsoft Office
Online (Free)	Word processing, spreadsheet, presentation	Microsoft Office 365
Online (Free)	Word processing, spreadsheet, presentation, calendar, and more	Zoho Office Suite

word processing

How can my computer help me with my writing? Whether you are writing a ten-page paper, generating software documentation, designing a brochure for your new startup company, or writing a dissertation, you will probably use the word processing module of an office suite.

Word processing software has replaced typewriters for producing many types of documents, including reports, letters, memos, papers, and book manuscripts. Word processing packages, such as Microsoft Word, iWork Pages, and LibreOffice Writer, give you the ability to create, spell-check, edit, and format a document on the screen before you commit it to paper.

A typical word processor window displays a work area, called a workspace, that represents a blank piece of paper. The window also includes controls for viewing and formatting the document (Figure 3-20).

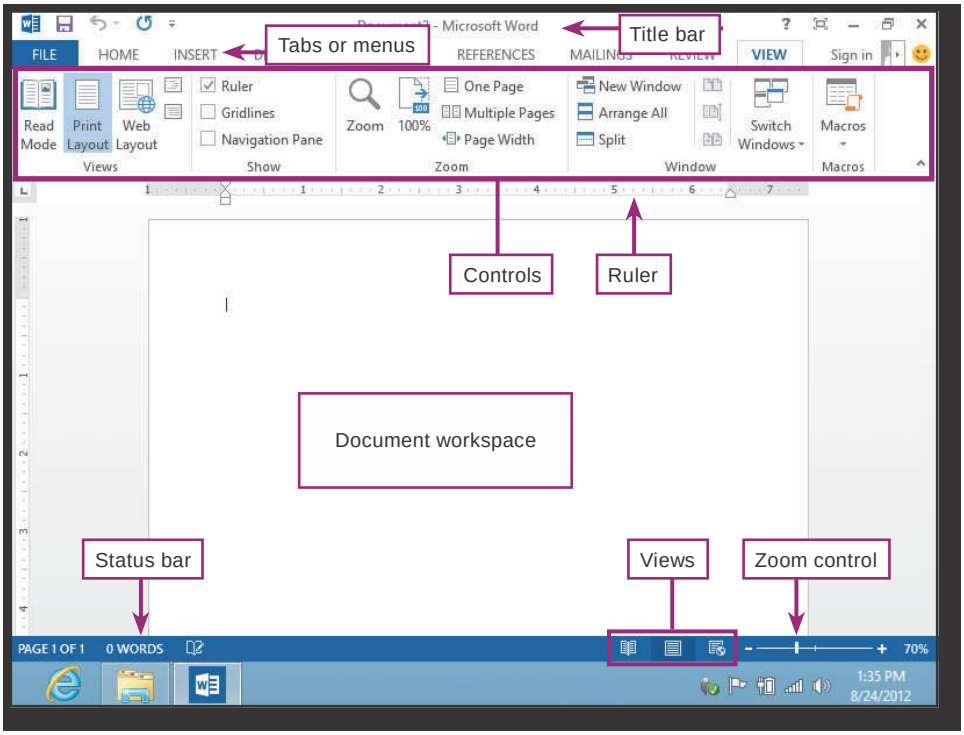


Figure 3-20

No matter which word processor you use, it includes elements similar to those shown in this Microsoft Word example.

How does word processing software help me turn my ideas into sentences and paragraphs? Word processing software makes it easy to let your ideas flow because it automatically handles many tasks that might otherwise distract you. For example, you don't need to worry about fitting words within the margins. A feature called **word wrap** determines how your text flows from line to line by automatically moving words down to the next line as you reach the right margin.

Imagine that the sentences in your document are ribbons of text; word wrap bends the ribbons. Changing the margin size just means bending the ribbon in different places. Even after you type an entire document, adjusting the size of your right, left, top, and bottom margins is simple.

Can word processing software help me break bad writing habits? You can use the **Search and Replace** feature to hunt down mistakes that you habitually make in your writing. For example, if you tend to overuse the word *typically*, you can use Search and Replace to find each occurrence of *typically*, and then decide whether you should substitute a different word, such as *usually* or *ordinarily*.

Can word processing software improve my writing?

Because word processing software tends to focus on the writing process, it offers several features that can improve the quality of your writing.

Your word processing software is likely to include a **thesaurus**, which can help you find a synonym for a word so that you can make your writing more varied and interesting. A **grammar checker** reads through your document and points out potential grammatical trouble spots, such as incomplete sentences, run-on sentences, and verbs that don't agree with nouns.

Your word processing software might also be able to analyze the reading level of your document using a standard **readability formula**, such as the Flesch-Kincaid reading level. You can use this analysis to find out if your writing matches your target audience, based on sentence length and vocabulary.

Most word processing software includes a **spelling checker** that marks misspelled words in a document. You can easily correct a misspelled word as you type, or you can run the spelling checker when you finish entering all the text. Some software even has autocorrecting capability as you type that automatically changes a typo, such as *teh*, to the correct spelling (*the*).

Although your software's spelling checker helps you correct misspellings, it cannot guarantee an error-free document. A spelling checker works by comparing each word from your document to a list of correctly spelled words stored in a data file called a **spelling dictionary**. If the word from your document is in the dictionary, the spelling checker considers the word correctly spelled. If the word is not in the dictionary, the word is counted as misspelled.

Spelling checkers can't tell if you misuse a word, such as if you use the phrase *pear of shoes* instead of *pair of shoes*. Also, spelling checkers flag many proper nouns and scientific, medical, and technical words because they are not included in the spelling checker's dictionary. Make sure you proofread, even after using a spelling checker (Figure 3-21).

TRY IT!

You can depend on your word processor's spelling checker to:

- ❍ flag words that are not in its dictionary
- ❍ catch all your misspellings
- ❍ identify words that you misuse
- ❍ correct grammar errors

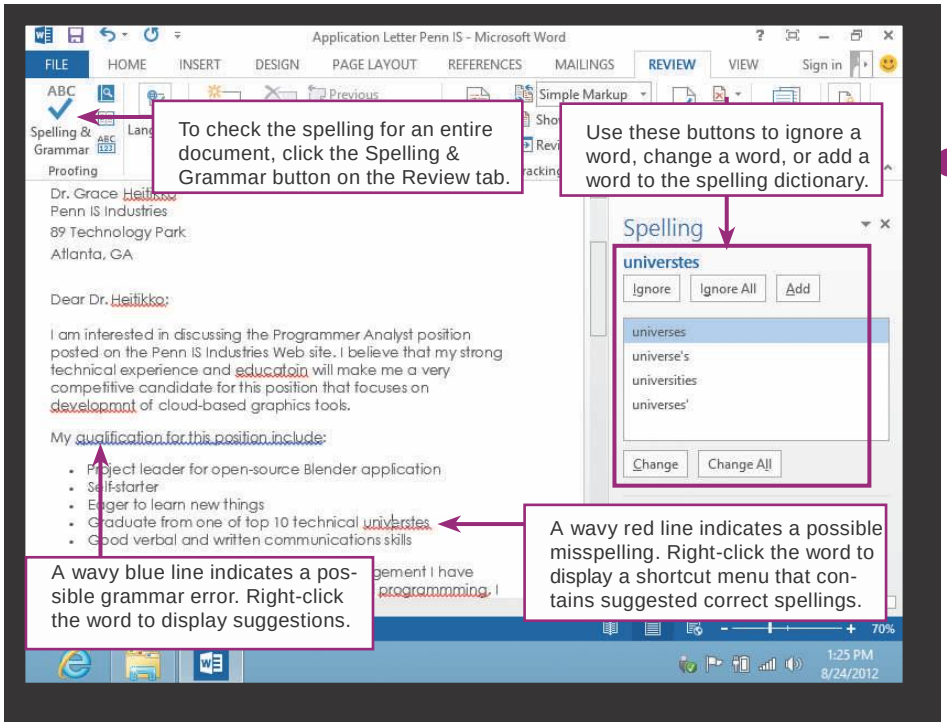


figure 3-21

How do I get my documents to look good? The term **document formatting** refers to the way that all the elements of a document—text, pictures, titles, and page numbers—are arranged on the page.

The final format of your document depends on how and where you intend to use it. A school paper, for example, simply needs to be printed in standard paragraph format—perhaps double spaced and with numbered pages. A brochure, newsletter, or corporate report, on the other hand, might require more ambitious formatting, such as columns, headers, and graphics.

The look of your final document depends on several formatting factors, such as page layout, paragraph style, and font.

- **Page layout** refers to the physical position of each element on a page. In addition to paragraphs of text, these elements might include margins, page numbers, **header** text that you specify to automatically appear in the top margin of every page, and **footer** text that you specify to automatically appear in the bottom margin of every page.
- **Paragraph style** includes the alignment of text within the margins and the space between each line of text. The spacing between lines of text is called **leading** (pronounced "LED ding"). Most documents are single spaced or double spaced, but you can adjust line spacing in 1 pt. increments. **Paragraph alignment** refers to the horizontal position of text—whether it is aligned at the left margin, aligned at the right margin, or **fully justified** so that the text is aligned evenly on both the right and left margins (Figure 3-22).
- A **font** is a set of letters that share a unified design. Font size is measured as **point size**, abbreviated pt. One point is about 1/72 of an inch.

Instead of individually selecting font and paragraph style elements, word processing software allows you to select a **style** that lets you apply several font and paragraph characteristics with a single click (Figure 3-23).

Figure 3-22

Your document looks more formal if it is fully justified than if it has an uneven, ragged-right margin.

The study in question produced results that appear consistent with the findings from earlier research, with the exception of Miller and Candlewood's classic experiment with digital and genetic markers.

Fully justified text

Once upon a time, very long ago, a motley crew of pirates sailed into a sheltered Caribbean harbor ringed with jagged rocks and scrubby vegetation.

Left-aligned text

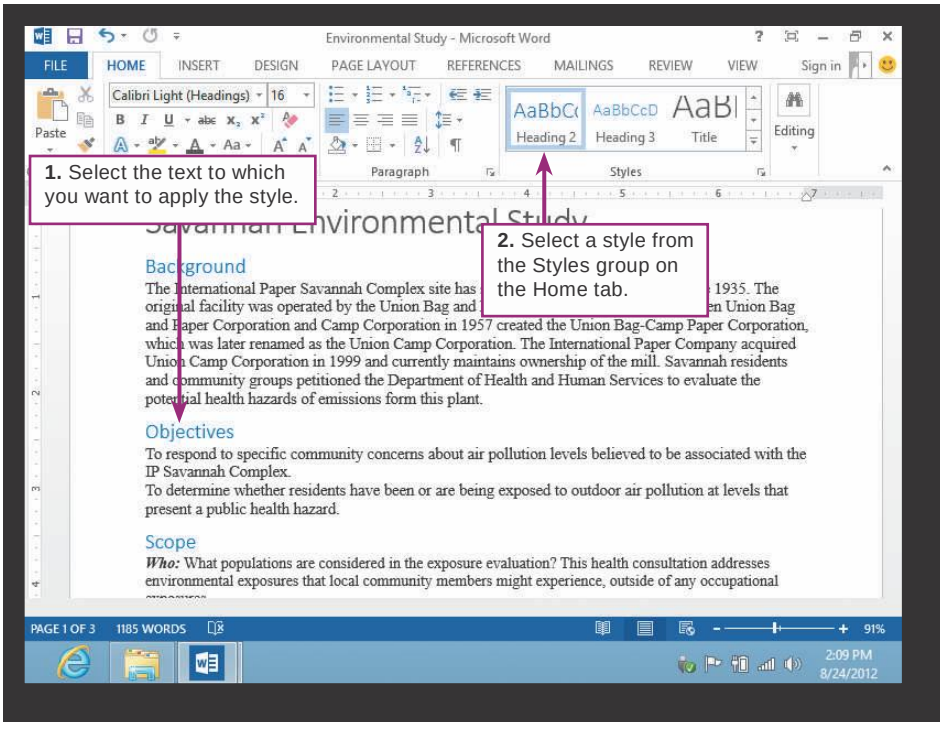


Figure 3-23

In this document, headings were formatted by selecting a style with a single click instead of individually selecting a font color, font size, and font style. Now if the Heading style is changed to green, for example, all the headings will automatically change from black to green.

spreadsheets

What is a spreadsheet? A **spreadsheet** uses rows and columns of numbers to create a model or representation of a real situation. For example, your bank statement is a type of spreadsheet because it is a numerical representation of cash flowing into and out of your bank account.

Spreadsheet software, such as Microsoft Excel, iWork Numbers, Google Docs Spreadsheets, or LibreOffice Calc, provides tools to create electronic spreadsheets. It is similar to a smart piece of paper that automatically adds up columns of numbers written on it.

You can make other calculations, too, based on simple equations that you create or more complex, built-in formulas. As an added bonus, spreadsheet software can turn your data into colorful graphs. It also includes special data-handling features that allow you to sort data, search for data that meets specific criteria, and print reports.

Spreadsheet software was initially popular with accountants who dealt with paper-based spreadsheets, but found the electronic version far easier to use and less prone to errors than manual calculations. Other people soon discovered the benefits of spreadsheets for projects that require repetitive calculations, such as budgeting, computing grades, tracking investments, calculating loan payments, and estimating project costs.

Because it is so easy to experiment with different numbers, spreadsheet software is particularly useful for **what-if analysis**. You can use what-if analyses to answer questions such as "What if I get an A on my next two economics exams? But what if I get only Bs?" or "What if I invest $100 a month in my retirement plan? But what if I invest $200 a month?"

TRY IT!

Is the worksheet in Figure 3-24 an example of a what-if analysis?

- ❍ Yes
- ❍ No

What does a computerized spreadsheet look like? You use spreadsheet software to create an on-screen **worksheet**. A worksheet is based on a grid of columns and rows. Each **cell** in the grid can contain a value, label, or formula. A **value** is a number that you want to use in a calculation. A **label** is any text used to describe data (Figure 3-24).

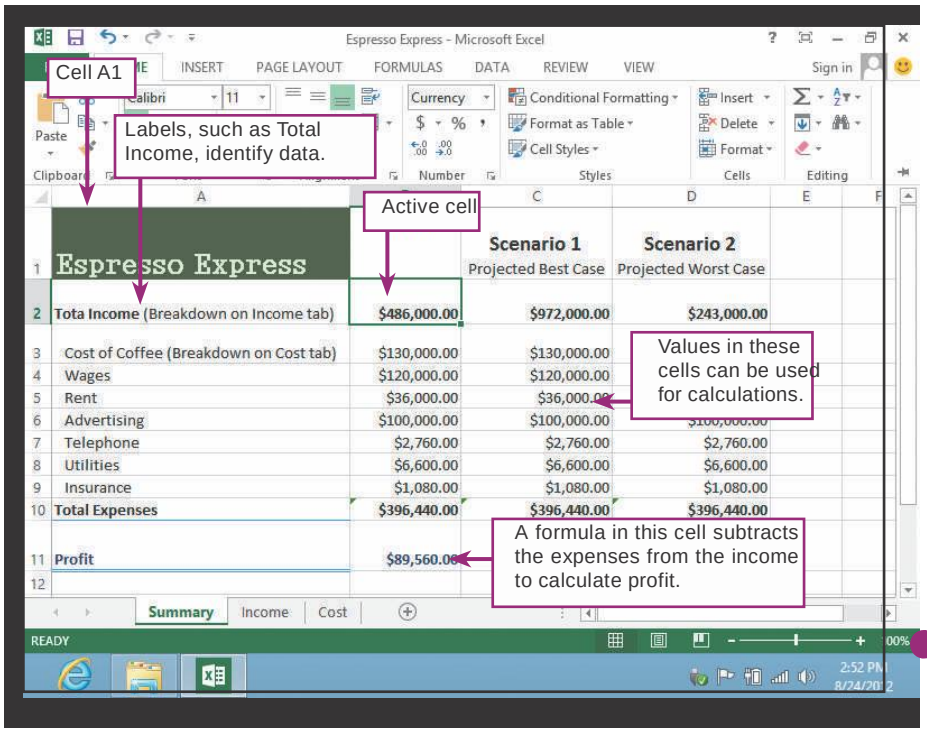


Figure 3-24

In a worksheet, each column is lettered and each row is numbered. The intersection of a column and a row is called a cell. Each cell has a unique cell reference, or address, derived from its column and row location. For example, A1 is the cell reference for the upper-left cell in a worksheet because it is in column A and row 1. You can designate the active cell by clicking it. Once a cell is active, you can enter data into it.

Are there formatting options? You can format the labels and values on a worksheet in much the same way as you would format text in a word processing document. You can change fonts and font size, select a font color, and select font styles, such as bold, italics, and underline.

How does spreadsheet software work? The values contained in a cell can be manipulated by formulas placed in other cells. A **formula** works behind the scenes to tell the computer how to use the contents of cells in calculations. You can enter a simple formula in a cell to add, subtract, multiply, or divide numbers. More complex formulas can be designed to perform just about any calculation you can imagine. Figure 3-25 illustrates how a formula might be used in a simple spreadsheet to calculate savings.

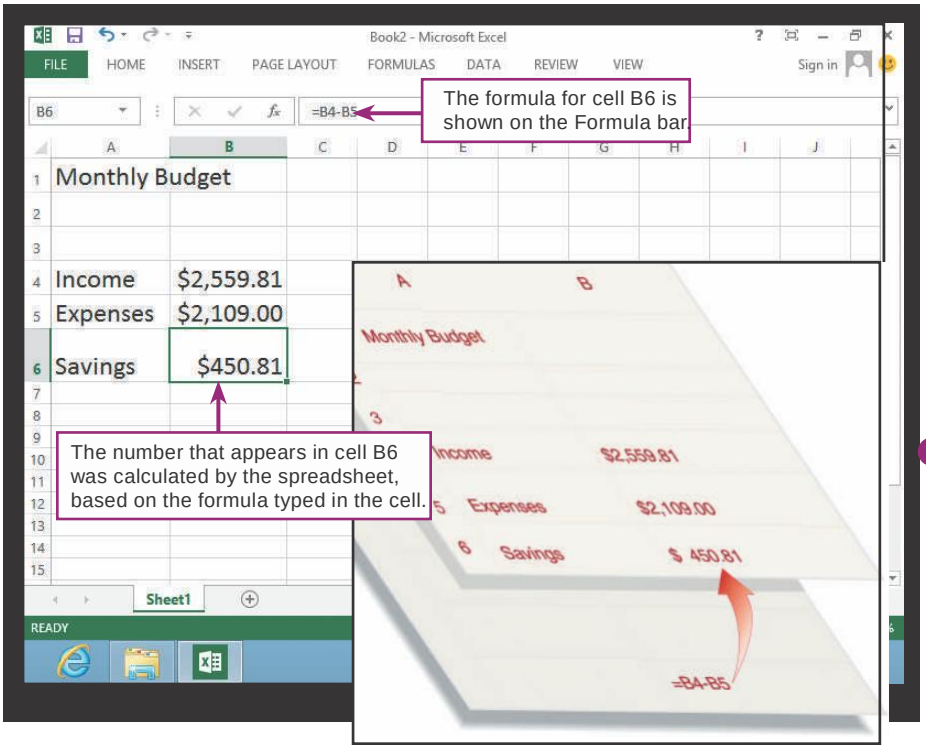


Figure 3-25

When a cell contains a formula, it displays the result of the formula rather than the formula itself. To view and edit the formula, you use the Formula bar. You can think of the formula as working behind the scenes to perform calculations and then to display the result.

A formula, such as =D4-D5+((D8/B2)*110), can contain **cell references** (like D4 and D5), numbers (like 110), and **mathematical operators**, such as the multiplication symbol (*), the division symbol (/), the addition symbol, and the subtraction symbol. Parts of a formula can be enclosed in parentheses to indicate the order in which the mathematical operations should be performed. The operation in the innermost set of parentheses—in this case, (D8/B2)—should be performed first.

You can enter a formula from scratch by typing it into a cell, or you can use a built-in preset formula called a **function**, provided by the spreadsheet software. To use a function, you simply select one from a list, as shown in Figure 3-26, and then indicate the cell references of any values you want to include in the calculation.

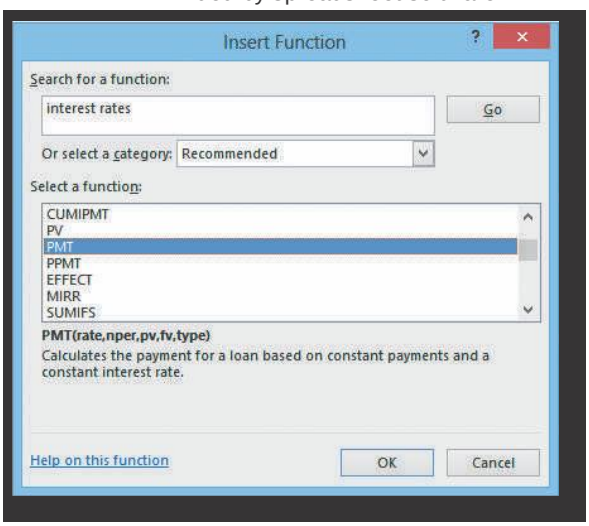


Figure 3-26

Functions are special formulas provided by spreadsheet software.

What happens when I modify a worksheet? When you change the contents of any cell in a worksheet, all the formulas are recalculated. This **automatic recalculation** feature ensures that the results in every cell are accurate for the information currently entered in the worksheet.

Your worksheet is also automatically updated to reflect any rows or columns that you add, delete, or copy within the worksheet. Unless you specify otherwise, a cell reference is a **relative reference**—that is, a reference that can change from B4 to B3, for example, if row 3 is deleted and all the data moves up one row.

If you don't want a cell reference to change, you can use an absolute reference. An **absolute reference** never changes when you insert rows, or copy or move formulas. Understanding when to use absolute references is one of the key aspects of developing spreadsheet design expertise. Figure 3-27 and its associated tour provide additional information about relative and absolute references.

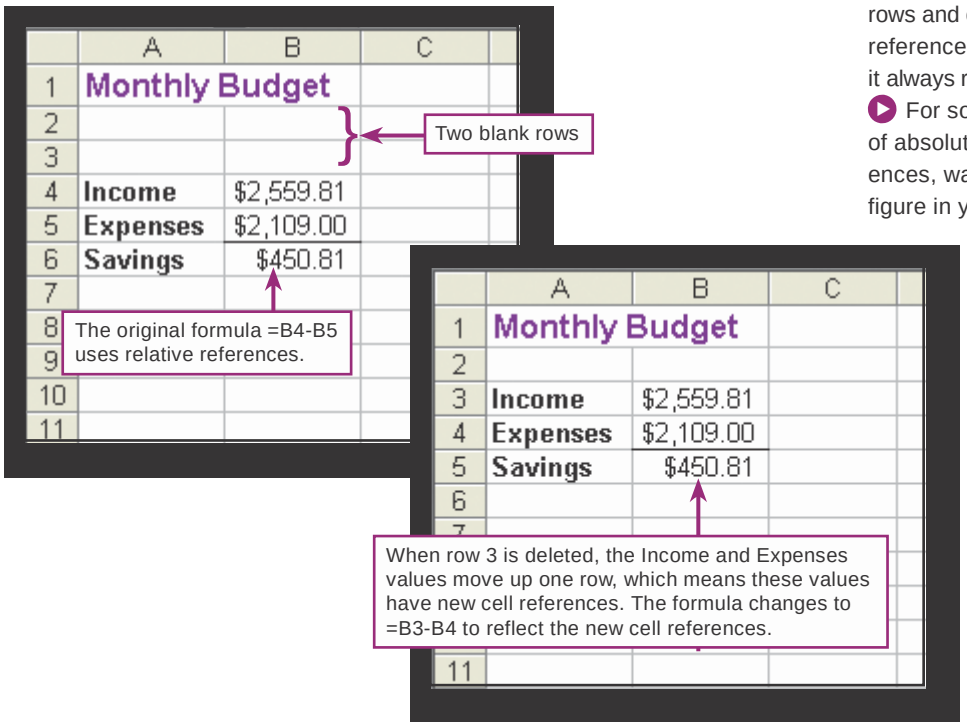


Figure 3-27

As shown in the examples, a relative reference within a formula can change when you change the sequence of a worksheet's rows and columns. An absolute reference is anchored so that it always refers to a specific cell. For some dynamic examples of absolute and relative references, watch the tour for this figure in your digital textbook.

How will I know which formulas and functions to use when I create a worksheet? To create an effective and accurate worksheet, you must understand the calculations and formulas that are involved. If, for example, you want to create a worksheet that calculates your final grade in a course, you need to know the grading scale and understand how your instructor plans to weight each assignment and test.

Most spreadsheet software includes a few templates or wizards for predesigned worksheets, such as invoices, income-expense reports, balance sheets, and loan payment schedules. Additional templates are available on the Web. These templates are designed by professionals and contain all the necessary labels and formulas. To use a template, you simply plug in the values for your calculation.

TRY IT!

In Figure 3-27, the formula in cell B5 is =B3-B4. Are B3 and B4 relative references or absolute references?

- ❍ Relative
- ❍ Absolute

databases

What is a database? The term *database* has evolved from a specialized technical term into a part of our everyday vocabulary. In the context of modern usage, a **database** is simply a collection of data that is stored on one or more computers.

A database can contain any sort of data, such as a university's student records, a library's card catalog, a store's inventory, an individual's address book, or a utility company's customers. Databases can be stored on personal computers, network servers, Web servers, mainframes, and even handheld computers.

What is database software? **Database software** helps you enter, find, organize, update, and report information stored in a database. Microsoft Access, FileMaker Pro, and LibreOffice Base are three examples of popular database software for personal computers. Oracle and MySQL are popular server database software packages.

How does a database store data? Database software stores data as a series of records, which are composed of fields that hold data. A **record** holds data for a single entity—a person, place, thing, or event. A **field** holds one item of data relevant to a record. You can envision a record as a Rolodex card or an index card. A series of records is often presented as a table arranged in rows and columns (Figure 3-28).

TERMINOLOGY NOTE

Database software is also referred to as database management software (DBMS).

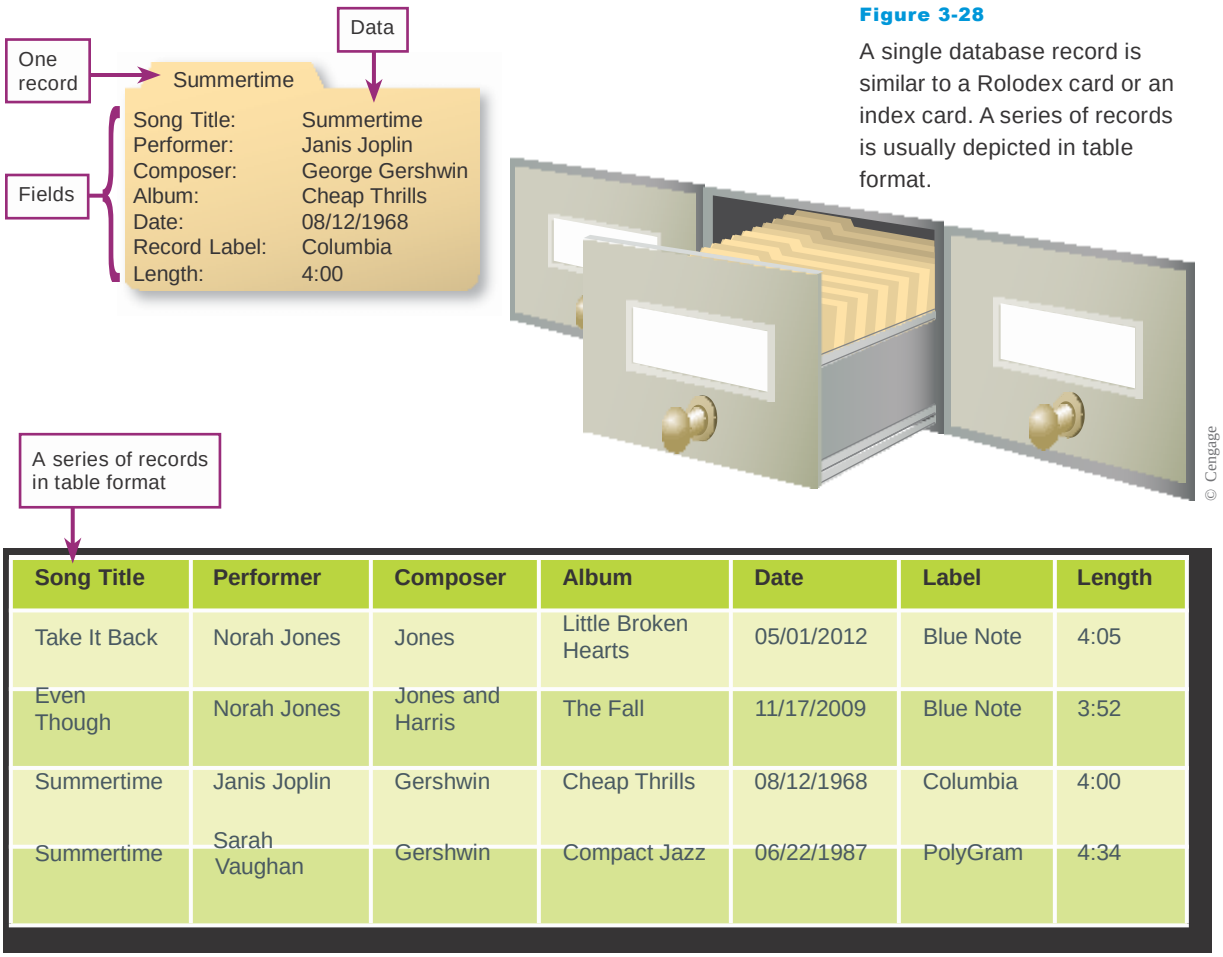


Figure 3-28

A single database record is similar to a Rolodex card or an index card. A series of records is usually depicted in table format.

Song Title	Performer	Composer	Album	Date	Label	Length
Take It Back	Norah Jones	Jones	Little Broken Hearts	05/01/2012	Blue Note	4:05
Even Though	Norah Jones	Jones and Harris	The Fall	11/17/2009	Blue Note	3:52
Summertime	Janis Joplin	Gershwin	Cheap Thrills	08/12/1968	Columbia	4:00
Summertime	Sarah Vaughan	Gershwin	Compact Jazz	06/22/1987	PolyGram	4:34

Can a database hold different kinds of records? Some database software provides tools to work with more than one collection of records, as long as the records are somehow related to each other.

For example, suppose MTV maintains a database pertaining to jazz music. One series of database records might contain data about jazz songs. It could contain fields such as song title, performer, and length. Another series of records might contain biographical data about jazz performers, including the performer's name, birth date, and hometown. It might even include a field for the performer's photo.

These two sets of records can be related by the name of the performing artist, as shown in Figure 3-29.

TRY IT!

Figure 3-28 shows a table of jazz performers and a table of jazz songs. How many databases do these tables represent?

- ❍ 1
- ❍ 2
- ❍ 4
- ❍ 8

Figure 3-29

The two sets of records are related by the Performer field. The relationship allows you to select Norah Jones from the Jazz Performers table and locate two of her songs in the Jazz Songs table.

Newport News, VA	04/25/1917	Ella Fitzgerald
New York, NY	03/30/1979	Norah Jones
Baltimore, MD	04/07/1915	Billie Holiday
Brooklyn, NY	06/30/1917	Lena Horne

Length	Label	Date	Album	Composer	Performer	JAZZ SONGS Song Title
4:05	Blue Note	05/01/2012	Little Broken Hearts	Jones	Norah Jones	Take It Back
3:52	Blue Note	11/17/2009	The Fall	Jones and Harris	Norah Jones	Even Though
4:00	Columbia	08/12/1968	Cheap Thrills	Gershwin	Janis Joplin	Summertime
4:34	PolyGram	06/22/1987	Compact Jazz	Gershwin	Sarah Vaughan	Summertime

How do I create a database? Database software provides the tools you need to define fields for a series of records. Figure 3-30 shows a simple form you might use to specify the fields for a database.

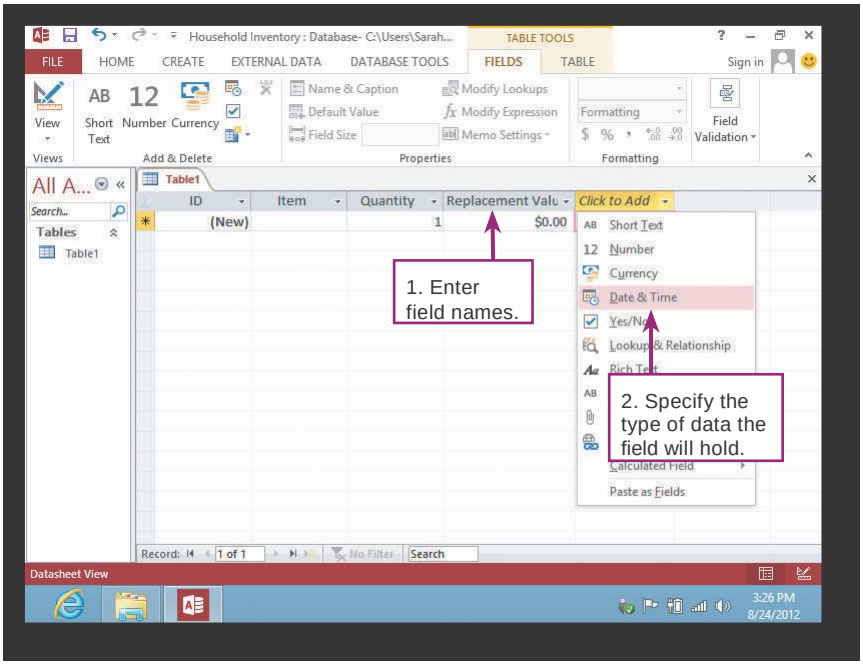


Figure 3-30

Database software provides tools for specifying fields for a series of records.

When can I enter data? After you've defined fields for a series of records, you can enter the data for each record. Your database software provides a simple-to-use data entry form that allows you to easily fill in the data for each field.

Instead of typing data into a database, you can also import data from a commercial database, such as a customer mailing list. You can even download databases from the Web, and then import the data into fields you have defined with your database software.

How do I locate specific data? Many databases contain hundreds or thousands of records. If you want to find a particular record or a group of records, scrolling through every record would take a very long time. Instead, you can enter a **query** that describes the information you want to find. Queries can take several forms:

- A **query language**, such as SQL (Structured Query Language), provides a set of commands for locating and manipulating data. To locate all performances of *Summertime* before 1990 from a Jazz Songs database, you might enter a query such as:

  Select * from JazzSongs where SongTitle = 'Summertime' and Date < '1990'

- A **natural language query** is a question stated in a language such as English, rather than an esoteric query language.

  Who performed Summertime before 1990?

- A **keyword search**, popular with search engines such as Google, is simply a collection of words relevant to your search:

  Summertime song performer <1990

- A **query by example** (QBE) simply requires you to fill out a form with the type of data you want to locate. Figure 3-31 illustrates a query by example for *Summertime* performances before 1990.

How can I use database search results? Your database software can help you print reports, export data to other programs (such as to a spreadsheet where you can graph the data), convert the data to other formats (such as HTML so that you can post the data on the Web), and transmit data to other computers.

Whether you print, import, copy, save, or transmit the data you find in databases, it is your responsibility to use it appropriately. Never introduce inaccurate information into a database.

Respect copyrights, giving credit to the person or organization that compiled the data. You should also respect the privacy of the people who are the subject of the data. Unless you have permission to do so, do not divulge names, Social Security numbers, or other identifying information that might compromise someone's privacy.

TRY IT!

What kind of query do most people use when searching for data on the Web?

- ❍ A query language
- ❍ A natural language query
- ❍ A keyword search
- ❍ A query by example

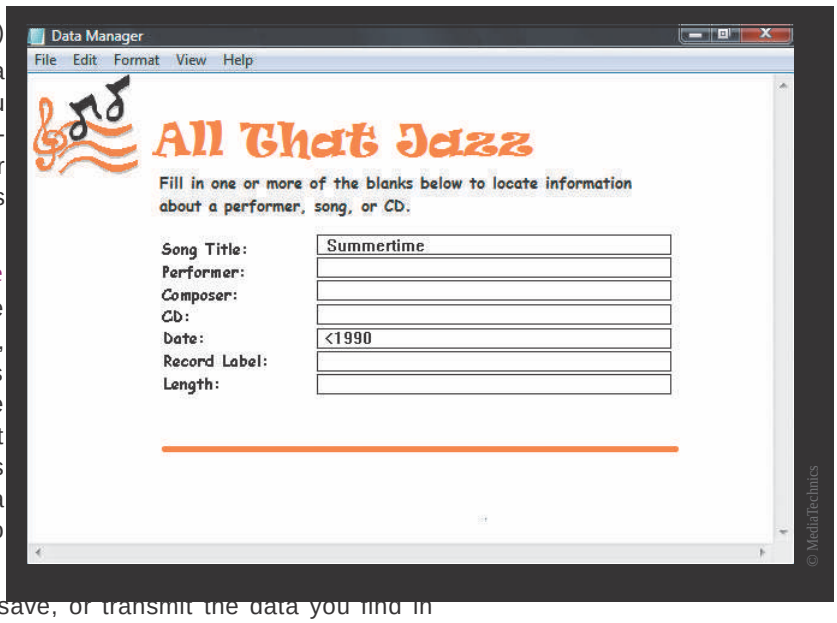


Figure 3-31

When you query by example, your database software displays a blank form on the screen, and you enter examples of the data that you want to find.

presentations

What is presentation software? **Presentation software** supplies the tools for combining text, photos, clip art, graphs, animations, and sound into a series of electronic slides that can be shown on a computer screen or projector (Figure 3-32).

Popular presentation software products include Microsoft PowerPoint, iWork Keynote, LibreOffice Impress, and Google Docs Presentations.

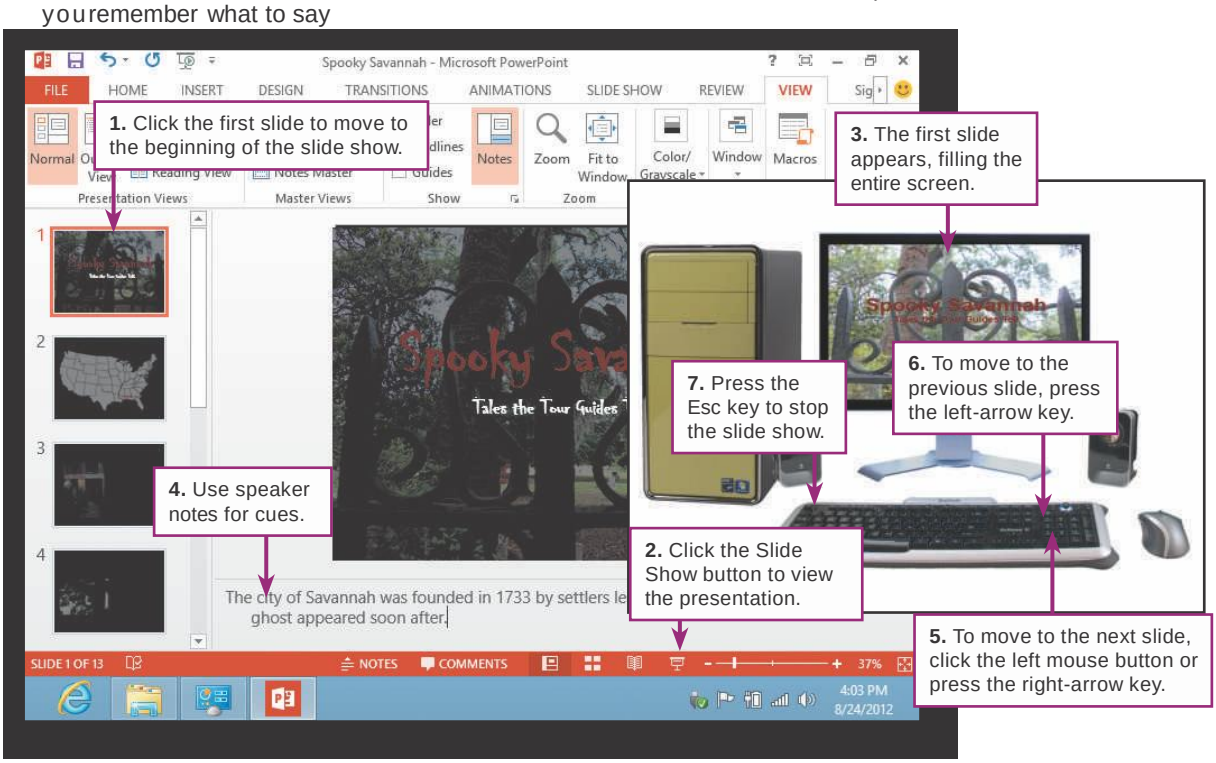
What are the best features of presentation software?

Presentation software highlights include:

- Bulleted lists to summarize the points in your presentation
- Graphics to make your presentation visually interesting
- Transitions between slides to keep your audience's attention
- Speaker notes to help youremember what to say
- Themes and templates to give your slides a professional appear- ance
- Conversion routines to package presentations as PDF files and YouTube videos

Figure 3-32

A computer-based presentation consists of a series of slides created with presentation software. Click to find out how to use presentation software.



QuickCheck

1. Word processing applications offer _____ style options including margins, leading, and alignment.
2. _____ software is useful for performing "what-if" analyses.
3. When entering formulas, you can use relative references and _____ references.
4. When using database software, you can search for data by entering a keyword or natural language _____.
5. Each database record is composed of many _____.