GLOBAL EDITION

Technology in Action

EIGHTEENTH EDITION

Alan Evans
Kendall Martin
Mary Anne Poatsy

18th Edition
Global Edition

Technology in Action

Alan Evans • Kendall Martin • Mary Anne Poatsy

Pearson

Solve This with Excel

MyLab IT Grader

Computer and Information Technology Jobs Outlook

You are considering pursuing a career as a software developer. In your research, you compare the job growth outlook of that career versus other jobs in the computer and information technology industry.

You will use the following skills as you complete this activity:

- Create Formula and Auto Fill Data
- Format Numerical Data
- Add Borders
- Merge and Center Text
- Apply Cell Styles
- Create Bar Chart

Instructions:

1. Open *TIA18e_Ch4_SolveThis_Start* and save as **TIA18e_Ch4_SolveThis_LastFirst**.
2. In cell E4, enter **Est. Jobs 2030.**
3. In cell E5, enter the formula = **B5*(1+D5)**.
4. Use the **Fill Handle** to copy the formula in cell E5 to **cells E6:E9**.

   Hint: Double-click on the Fill Handle to automatically fill the cells.
5. Select cells B5:C9 and apply the **Comma Number Format with 0 decimals**. Use **Format Painter** to apply that format to cells E5:E9.

   Hint: With B5:C9 selected, select Format Painter in the Clipboard group on the Home tab and then select E5:E9.
6. Select D5:D9. Apply **Percent Number Format with 0 decimals**.
7. Select cells A1:E1 and apply **Merge & Center** alignment and **Title** cell style.
8. Select A3:E3. Apply **Accent 1** cell style, **Bold**, and **Center** alignment. Increase font size to **16**.
9. Select A4:E4. Apply **60%-Accent 1** cell style, **Center** alignment, and **Bold** format. Apply **Wrap Text**. Apply **Top and Thick Bottom Border**.

   Hint: Borders are in the Font group on the Home tab.
10. Select A4:C9. Create a **Stacked Bar Chart**. Add **Estimated 10-Year Job Growth** as the chart title. Position the chart so the top left corner is in cell H1 and lower left corner is in cell S20.
11. **Save** and submit for grading.

Chapter

5 System Software: The Operating System, Utility Programs, and File Management

For a chapter overview, explore the **Chapter Overview Videos**.

PART 1

Understanding System Software

Learning Outcome 5.1 **You will be able to explain the types and functions of operating systems and explain the steps in the boot process.**

PART 2

Using System Software

Learning Outcome 5.2 **You will be able to describe how to use system software, including the user interface, file management capabilities, and utility programs.**

MyLab IT All media accompanying this chapter can be found here.

Make This A Notification Alert on **page 207**

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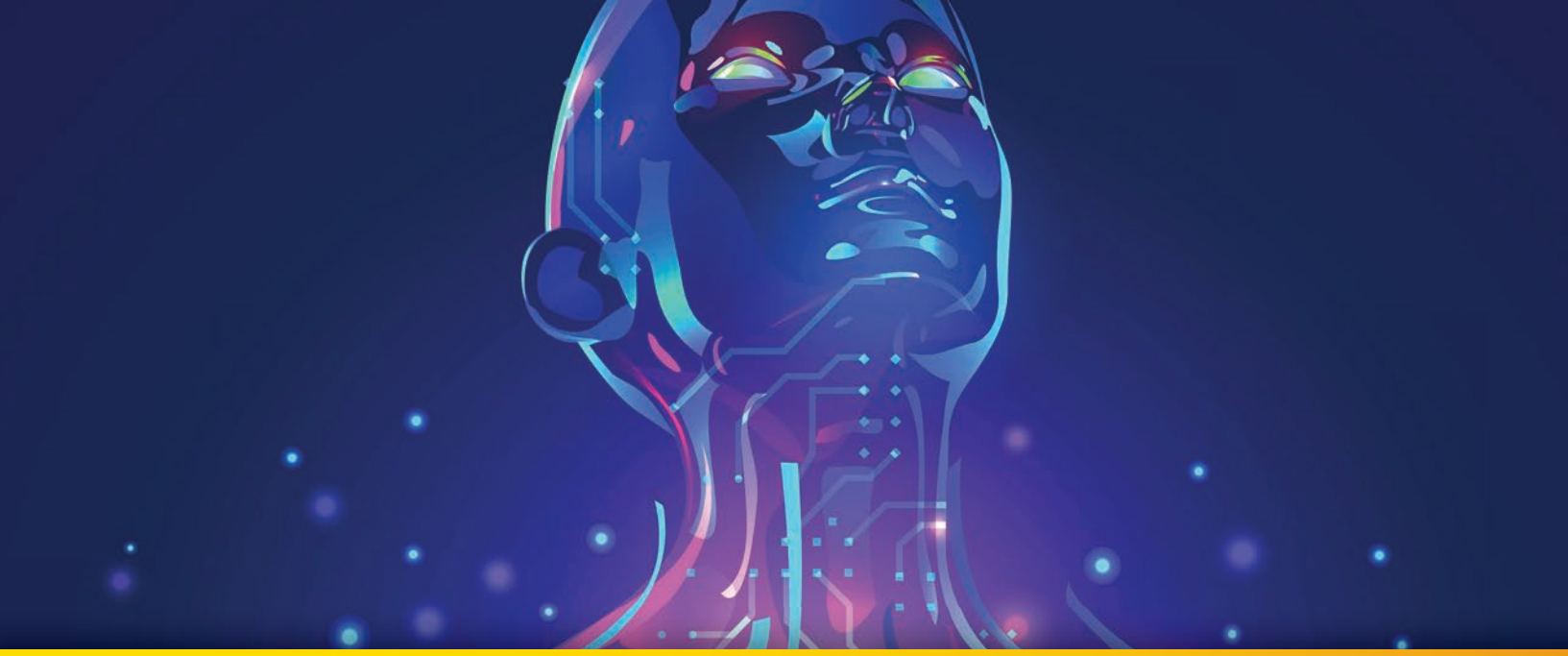


What do you think?

Robots have been doing human tasks for a while, especially in industries such as manufacturing and automotive, where **repetitive tasks** are the norm. Robots can work tirelessly without introducing human error due to fatigue or distraction. But having robots that look and act like humans is a relatively new concept. Hanson Robotics introduced Sophia, a **social robot**, in 2016. Sophia is remarkably **lifelike** in appearance and can **interact with people** in an amazingly human-like manner.

Since her debut, Sophia has spoken to audiences across the globe in their native languages, has appeared with Jimmy Fallon and on other TV shows, and even has accepted citizenship from Saudi Arabia.

The pandemic emphasized many potential applications for social robots, some of which had been in use pre-pandemic. For example, Milo the robot **helps children with autism**, and Aflac has developed a social robot duck that **comforts kids with cancer**. Social robots were used throughout the pandemic to **interact with high-risk groups**, such as residents in nursing homes and long-term care facilities, to combat loneliness.

Social robots, such as Pepper, are also used to **welcome, inform, and guide** customers and visitors in many businesses and schools. The use of social robots as a means to interact in a socially safe manner is expected to increase in a post-pandemic world.

While social robots have added value in certain situations, do you envision them having greater roles in society?

- *What other applications do you think social robots will assume?*
- *Is there a downside to introducing more social robots into our society?*

Go to the end of the chapter for a follow-up question.

(Andrush/Shutterstock)

Part 1

For an overview of this part of the chapter, explore **Chapter Overview Video 5.1**.

Understanding System Software

Learning Outcome 5.1 **You will be able to explain the types and functions of operating systems and explain the steps in the boot process.**

Your computer uses two basic types of software: application software and system software. *Application software* is the software you use to do everyday tasks at home and at work. *System software* is the set of programs that helps run the computer and coordinates instructions between application software and the computer's hardware devices. From the moment you turn on your computer to the time you shut it down, you're interacting with system software.

Operating System Fundamentals

Every computer, from smartphones to supercomputers, has an operating system. Even game consoles, cars, and some appliances have operating systems. The role of the operating system is critical; a computer can't operate without it.

Operating System Basics

Objective 5.1 *Discuss the functions of the operating system.*

What does the operating system do? System software consists of two primary types of programs: the *operating system* and *utility programs*. The operating system (OS) is a group of programs that controls how your computer functions. The operating system has three primary functions:

- *Managing hardware,* including the processor, memory, and storage devices as well as peripheral devices such as the printer.
- *Managing software,* which allows application software to work with the central processing unit (CPU).
- *Managing tasks,* such as scheduling and coordinating processes (like reading strokes from the keyboard) and managing network resources.

You interact with your OS through the user interface—the *desktop*, *icons*, and *menus* that enable you to communicate with your computer.

How are operating systems categorized? Early operating systems were designed for one person performing one task at a time. These are named *single-user, single-task operating systems*. Modern operating systems allow a single user to multitask—to perform more than one process at a time. And operating systems such as Windows and macOS provide networking capabilities as well, essentially making them *multiuser, multitasking operating systems*.

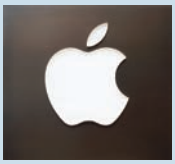
Operating systems can also be categorized by the type of device in which they are installed, such as mobile devices, personal computers, robots or mainframes, and network computers.

Operating Systems for Personal Use

Objective 5.2 *Explain the most popular operating systems for personal use.*

What are the most popular operating systems for personal computers and mobile devices? Table 5.1 lists the most common operating systems. Microsoft Windows, Apple macOS, and Linux (an open source OS) are popular operating systems for personal computers. Google's Chrome OS is used on the Chromebook series of devices. Smartphones and tablets use a mobile operating system. Android is the mobile OS for devices designed by Google, Samsung, and other companies. Apple has developed different operating systems for different mobile devices: iOS for iPhone, and iPadOS for iPad, tvOS for Apple TV units, and watchOS for the Apple watch. Although each OS has unique features, they share many features as well.

Table 5.1 Popular Operating Systems

Operating System Name	Windows	macOS	Android	Linux	Chrome OS
					
Developed By	Microsoft	Apple	Google	Open source	Google
Available On	Laptops, tablets, desktops, all-in-ones	Laptops, desktops, all-in-ones, iPhones, iPads	Smartphones, tablets	Laptops, desktops, tablets	Chromebooks

(Used with Permission from Microsoft; Nazar Skladanyi/Shutterstock; Mtkang/YAY Media AS/Alamy Stock Photo; Tae Mi/Shutterstock; Rose Carson/Shutterstock)

What common features are found in personal computer operating systems? All personal computer operating systems include a window-based interface with icons and other graphics that facilitate point-and-select commands. They also include many utility programs. A utility program is a small program that performs many of the general housekeeping tasks for the computer, to help the computer run more efficiently. Utilities include such things as virus protection, backup and restore software, and system management tools. A set of utility programs is bundled with each OS, but you can also buy stand-alone utility programs that often provide more features.

Other features operating systems incorporate include natural language search capability as well as virtual desktops. They support Bluetooth and Wi-Fi connectivity. iOS, iPadOS, and Android support devices like cameras, the sensors built into mobile devices, touch-screen displays, and multiple types of connectivity (e.g., Wi-Fi, Bluetooth, and near-field communication [NFC]). They also support mobile payment systems, on-screen note-taking, and voice recognition. macOS features a tight integration between the desktop and portable devices running iOS and iPadOS. With the macOS desktop, you can take and make phone calls, receive and send text messages, and easily transfer files with Apple mobile devices.

How is Google Chrome OS different from other operating systems? Chrome OS (Figure 5.1) is a web-based OS developed by Google. The main functionality of Chrome OS is provided through a web browser. Chrome OS is only available on certain devices called *Chromebooks* from Google and Google's manufacturing partners. Unlike devices running Windows or macOS, the operating system as well as applications and files in Chromebooks are stored in and accessed from the cloud and not from an installed storage drive found in most other computers. Chrome OS should not be confused with the Google Chrome browser. The browser is application software that can run on many operating systems.

How do other operating systems use the cloud? Windows uses your Microsoft account to store your settings in the cloud so you can access your familiar desktop and applications on any device you log on to. You can access and store files online from OneDrive, Windows' cloud-based storage system. Similarly, macOS allows you to sign in to any Apple device with your Apple ID, which provides access to Apple's iCloud system. Both systems store your content online and automatically push it out to all your associated devices. There are third-party products that do the same thing (for example, Dropbox) but a product built into the OS by the manufacturer might be more tightly integrated into the operating system.

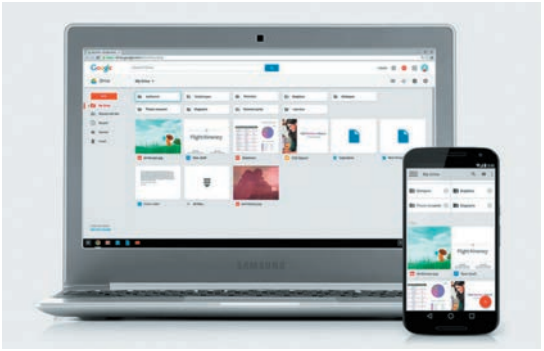


Figure 5.1 Google's Chrome OS is web-based and has a very minimalist look. *(Courtesy of Google, Inc.)*

What is Linux? Linux is a free, open source OS designed for use on personal computers and web servers. Open source software is available for anyone to use or

Bits&Bytes Taking Control Remotely

Have you ever been asked to help someone with their computer or a program but you were too far away to help in person? Windows has a feature called Quick Assist that enables a user to have remote control of another's system. After initiating Quick Assist, you can take any steps you would have if you were right in the room with them. To use Quick Assist, enter Quick Assist in Search on the taskbar, select *Assist Another Person*, and send them the code provided. Once the other person enters the code, you are able to control their machine as if you were there in person.

There are also other ways to obtain remote access of another's screen. If you're on a Zoom call, for example, you can ask to take control of another's screen while they are sharing their screen. Other remote options require specific software such as GoTo Resolve and LogMeIn Rescue.

modify. Linux began in 1991 as a project of Finnish university student Linus Torvalds. It has since been tweaked by scores of programmers as part of the Free Software Foundation GNU Project (*gnu.org*).

Linux has a reputation as a stable OS, one that is not subject to crashes. Because the code is available to anyone, Linux can be updated quickly by programmers around the world.

Where can I get Linux? Linux is available for download in various packages known as distributions or distros. Distros include the underlying Linux kernel (the code that provides an operating system's basic functionality) and special modifications to the OS, and may also include additional open source software (such as LibreOffice). A good place to start researching distros is *distrowatch.com*. This site tracks Linux distros and provides helpful tips for beginners on choosing one.

Does it matter what OS is on my computer? Most application software is OS-dependent. You need to make sure you get the correct version of software, matched to your OS. Although you might find the same app in Google Play, the Windows store, or the Apple store, you must download and install the app from the specific store that works with your OS.

Can I have more than one OS on my computer? Devices running macOS can also run Windows and Linux. So, if you have a macOS device and want to run a program specifically designed for Windows, you can use the Bootcamp utility or install software such as Parallels or VMware Fusion to run Windows and any Windows-based program on your Mac. Windows devices cannot run macOS, but they can run Linux. To run Linux along with Windows, you can create a separate section of your hard drive (called a partition) and install Linux. You are then given the choice when your computer starts as to which OS you want to use.

How do I update my OS? Microsoft Windows and macOS (as well as their mobile device operating systems) deliver automatic OS updates, including new features, apps, and patches, as necessary. You can manage your update settings and choose to download updates automatically or defer a feature update for a certain amount of time.

Updates to the mobile Android OS are pushed to users but at the discretion of the device manufacturer. For example, when a new version of Android is released, Samsung may release it immediately for the Galaxy smartphone but may not release it for another Samsung device, whereas LG may choose to delay the release for all its smartphones.

Operating Systems for Machinery, Networks, and Business

Objective 5.3 *Explain the different kinds of operating systems for machines, networks, and business.*

Why do machines with built-in computers need an OS? Machinery that performs a repetitive series of specific tasks in an exact amount of time requires a real-time operating system (RTOS). Also referred to as *embedded systems*, RTOSs require minimal user interaction. This type of OS is a program with a specific purpose, and it must guarantee certain response times for certain computing tasks; otherwise, the machine is useless. The programs are written specifically for the needs of the devices and their functions. Devices that must perform regimented tasks or record precise results require RTOSs. Examples include a pacemaker or the anti-lock braking system in your car.