

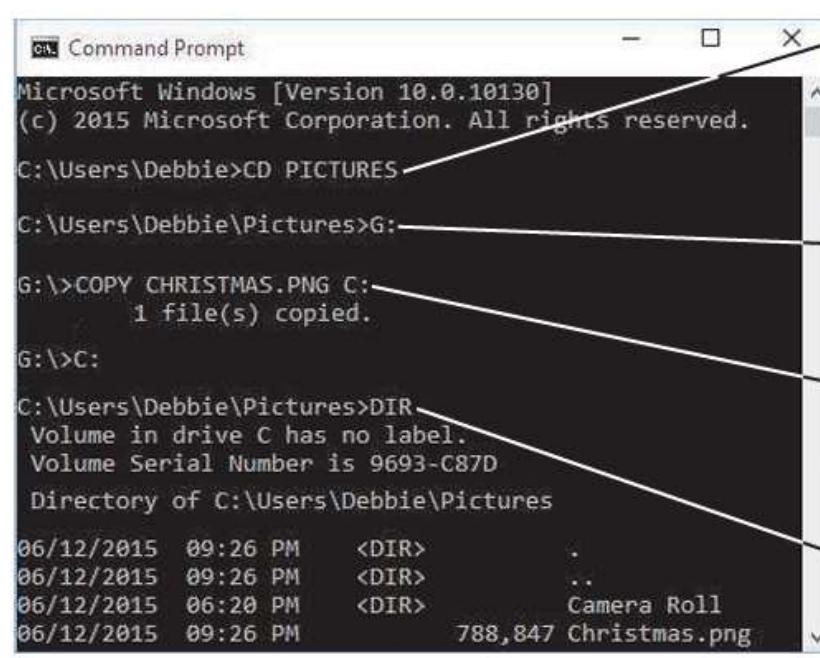
OPERATING SYSTEMS FOR PERSONAL COMPUTERS AND SERVERS

DOS

During the 1980s and early 1990s, DOS (Disk Operating System) was the dominant operating system for microcomputers. DOS traditionally used a command line interface, although later versions of DOS supported a menu-driven interface. There are two primary forms of DOS:

PC-DOS and MS-DOS. PC-DOS was created originally for IBM PCs (and is owned by IBM), whereas MS-DOS was created for use with IBM-compatible PCs. Both versions were originally developed by Microsoft Corporation, but neither version is updated any longer.

DOS is considered obsolete today because it does not utilize a graphical user interface and does not support modern processors and processing techniques. However, computers running the Windows operating system can still execute DOS commands via the Command Prompt window.



The screenshot shows a Windows Command Prompt window with the following text:

```
Command Prompt
Microsoft Windows [Version 10.0.10130]
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C:\Users\Debbie>CD PICTURES

C:\Users\Debbie\Pictures>G:

G:\>COPY CHRISTMAS.PNG C:-
    1 file(s) copied.

G:\>C:

C:\Users\Debbie\Pictures>DIR
Volume in drive C has no label.
Volume Serial Number is 9693-C87D
Directory of C:\Users\Debbie\Pictures

06/12/2015  09:26 PM    <DIR>          .
06/12/2015  09:26 PM    <DIR>          ..
06/12/2015  06:20 PM    <DIR>          Camera Roll
06/12/2015  09:26 PM        788,847 Christmas.png
```

Annotations on the right side explain the commands:

- CHANGE DIRECTORY (CD) COMMAND**
Changes to a different folder on the current drive.
- DRIVE COMMAND**
Changes to a new drive.
- COPY COMMAND**
Copies files from one location to another.
- DIRECTORY (DIR) COMMAND**
Displays the files and folders in the current location.

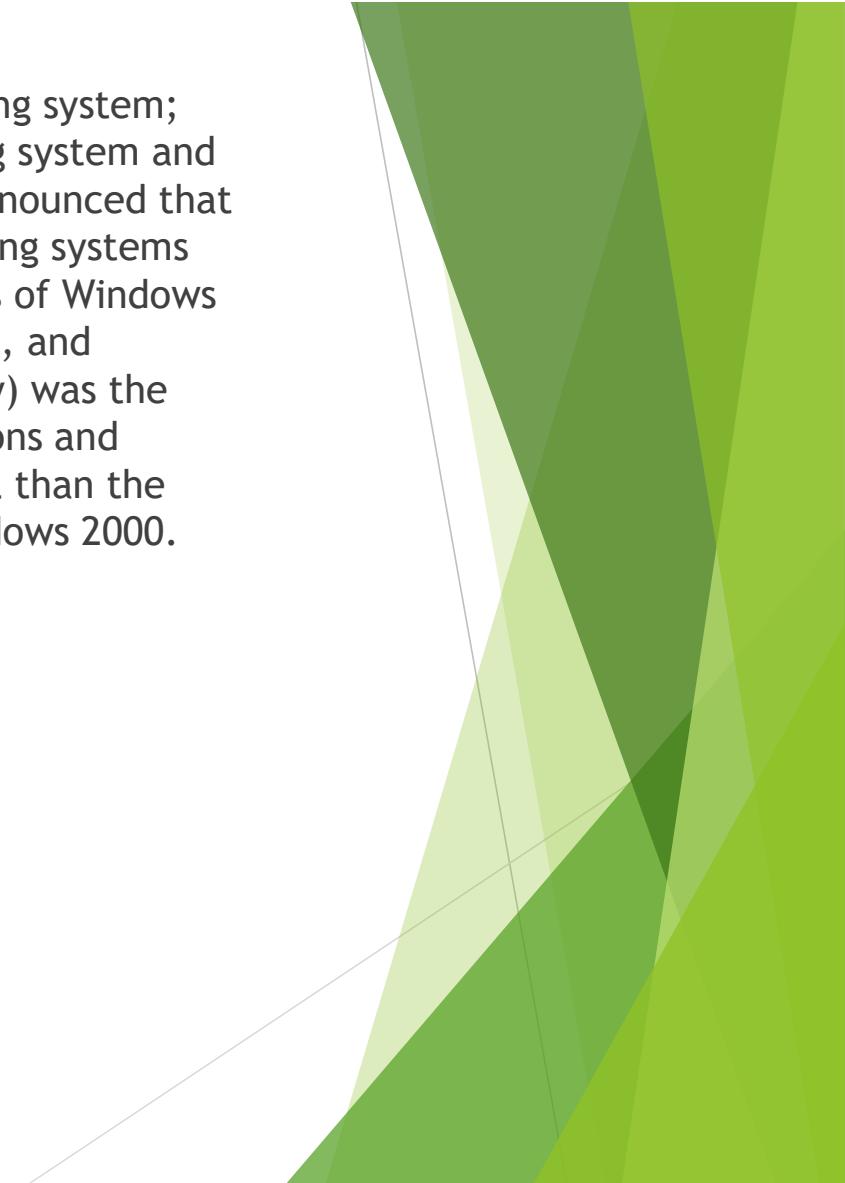
WINDOWS

Microsoft Windows has been the predominant personal operating system for many years and still holds about 90% of the market. There have been many different versions of Windows over the years.

Windows 1.0 Through Windows 7

Microsoft created the original version of Windows—Windows 1.0—in 1985 in an effort to meet the needs of users frustrated by having to learn and use DOS commands. Windows 1.0 through Windows 3.x (x stands for the version number of the software, such as Windows 3.0, 3.1, or 3.11) were not, however, full-fledged operating systems.

Instead, they were operating environments for the DOS operating system; that is, graphical shells that operated around the DOS operating system and were designed to make DOS easier to use. In 1994, Microsoft announced that all versions of Windows after 3.11 would be full fledged operating systems instead of just operating environments. The next three versions of Windows designed for personal computers were Windows 95, Windows 98, and Windows Me (Millennium Edition). Windows NT (New Technology) was the first 32-bit version of Windows designed for high-end workstations and servers. It was built from the ground up using a different kernel than the other versions of Windows and was eventually replaced by Windows 2000.



Windows XP replaced both Windows 2000 (for business use) and Windows Me (for home use). Throughout this progression of Windows releases, support for new hardware (such as DVD drives and USB devices), networking and the Internet, multimedia applications, and voice and pen input were included. Support for all of these early versions of Windows has been discontinued.

Windows Vista replaced Windows XP. One of the most obvious initial changes in Windows Vista was the Aero interface, a visual graphical user interface that uses transparent windows and dynamic elements. Windows Vista also introduced the Sidebar feature that contained gadgets—small applications that are used to perform a variety of tasks, such as displaying weather information, a calendar, and news headlines. Other features new to Vista included the Windows Media Center and Windows Speech Recognition. Support for Windows Vista is scheduled to end in 2017.

Windows 7 was released next. It required less memory and processing power than previous versions of Windows, and it was designed to start up and respond faster than Vista so it could run well on netbooks and tablets. Windows 7 also added jump lists that show your most recent documents, live thumb nails of open programs that can be displayed by pointing to the taskbar buttons, and virtual folders called Libraries that display together in one location the files that the user specifies, regardless of where those files are physically located on the hard drive. In addition, Windows 7 included a HomeGroup feature for improved home networking; one-click Wi-Fi connections; support for multi-touch, voice, and pen input; and improved accessory programs (such as a more versatile Calculator and a Paint program that uses the Ribbon interface found in recent versions of Microsoft Office).

Windows 8

Windows 8 was released in 2012. According to Microsoft, it is a “reimaging of Windows, from the chip to the interface.” It is designed to be used with a wide range of devices, from smartphones to desktop computers, as well as with or without a keyboard or mouse because it supports multi-touch input. The new Windows 8 Start screen (the initial screen you see when you boot your computer, though if you have a password you’ll see the lock screen until you enter your password) uses tiles to represent apps, folders, Web sites, and more; tiles are selected with the mouse or finger to launch the corresponding content.

WINDOWS 8 START SCREEN



TILES

Click to launch an app, folder, Web site, or other item.

DESKTOP TILE

Click to display the desktop.

NAVIGATING THE START SCREEN

Scroll to see more apps; start typing to search for an app; [Ctrl]+[scroll] to see more apps at one time.

DESKTOP

Contains icons, windows, and the taskbar.

START SCREEN PREVIEW

Point here to display it; click to open the Start screen.



CHARMS

Point to the upper or lower right corner to display the charms bar; click a charm to use it.

Windows 10

The latest version of Windows is Windows 10. The most significant change from previous versions of Windows is that Windows 10 is a universal operating system that will run on any device, from smartphones to tablets to personal computers to servers. Consequently, Windows 10 replaces all previous versions of Windows. The look and features of Windows 10 are consistent regardless of the devices used, although the experience is automatically adjusted to be optimized for each device and screen size, such as working with a keyboard and mouse when a notebook is used or working with pen and touch input when a tablet is used. In addition, apps developed for Windows 10 can run on any device that has Windows 10 installed.

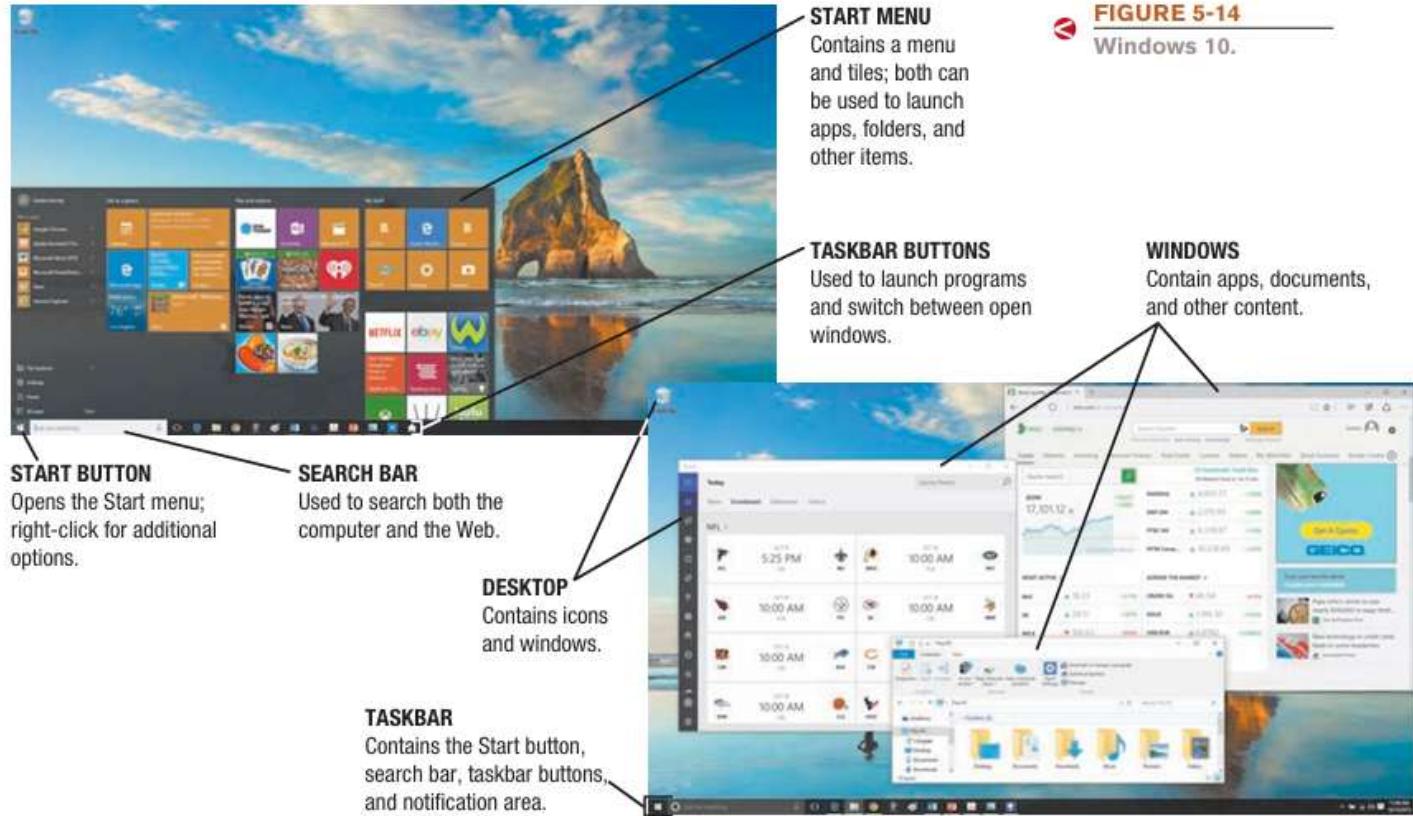


FIGURE 5-14
Windows 10.

OS X

The proprietary operating system for Mac computers made by Apple Corporation was Mac OS. It was based on the UNIX operating system (discussed shortly) and originally set the standard for graphical user interfaces. Many of today's operating systems follow the trend that Mac OS started and, in fact, use GUIs that highly resemble the one used with Mac OS.

Starting with version 10 of Mac OS, the operating system was renamed OS X and includes a release name instead of a release number (such as OS X El Capitan and OS X Yosemite). Similar to Windows, OS X supports multithreading, multitasking, multiprocessing, and 64-bit processors, and has a high level of multimedia functions and connectivity. It includes the Safari Web browser and a Dock, which you can use to launch programs and open frequently used files and folders. New features include a cleaner look and a new Notification Center that displays and lets you interact with notifications such as e-mail, messages, and calendar items. In addition, with the new Continuity feature, you can place iPhone calls or send and receive texts via your Mac.



MENU BAR

Provides access to the Apple menu, app menus, and other options.

WINDOWS

Contain apps, documents, and so forth.

CONTINUITY

Allows you to make phone calls, as well as switch between Apple devices.

DOCK

Used to launch commonly used programs, folders, and files.

ICONS

Represent programs, folders, documents, or other items that can be opened with the mouse.

UNIX

UNIX was originally developed in the late 1960s at AT&T Bell Laboratories as an operating system for midrange servers. UNIX is a multiuser, multitasking operating system. Computer systems ranging from microcomputers to mainframes can run UNIX, and it can support a variety of devices from different manufacturers. This flexibility gives UNIX an advantage over competing operating systems in some situations. However, UNIX is more expensive, requires a higher level of technical knowledge, and tends to be harder to install, maintain, and upgrade than most other commonly used operating systems.

LINUX

Linux is an operating system developed by Linus Torvalds in 1991 when he was a student at the University of Helsinki in Finland. The operating system resembles UNIX but was developed independently from it. Linux was released to the public as open source software; that is, a program whose source code is available to the public and can be modified to improve it or to customize. Over the years, the number of Linux users has grown, and volunteer programmers from all over the world have collaborated to improve it, sharing their modified code with others over the Internet. Although Linux originally used a command line interface, most recent versions of Linux programs use a graphical user interface and operate similarly to other desktop operating systems, such as Windows and OS X. Linux is widely available as a free download via the Internet; companies are also permitted to customize Linux and sell it as a retail product. Commercial Linux distributions come with maintenance and support materials (something that many of the free versions do not offer), making the commercial versions more attractive for corporate users.

Over the years, Linux has become a widely accepted operating system with strong support from mainstream companies, such as IBM, NVIDIA, HP, and Dell. Versions of Linux are available for a wide variety of devices, from personal computers to servers to mobile devices and smart TVs. One reason individuals and organizations are switching to Linux and other open source software is cost. Typically, using the Linux operating system and a free or low-cost office suite, Web browser, and e-mail program can save several hundreds of dollars per computer. Other reasons include the ability to customize the user interface and to directly control the computer much more than is possible with Windows and OS X. In addition, Linux computers can run faster than Windows and OS X, due to Linux's much lower hardware requirements. For example, the Ubuntu version of Linux shown in Figure 5-16 requires only 512 MB of RAM and 5 GB of hard drive space versus the 1 GB of RAM and 16 GB of hard drive space required by recent versions of Windows.



When a software program is purchased, the buyer is not actually buying the software. Instead, the buyer is acquiring a software license that permits him or her to use the software. This license, also called an end user license agreement (EULA), specifies the conditions under which a buyer can use the software, such as the number of devices on which it may be installed. Mobile apps may instead display a terms of use agreement that lists what smartphone resources the app will access. In either case, the licensing agreement or terms of use agreement is usually displayed and must be agreed to by the end user at the beginning of the software installation process.

NETWORK

A computer network is a collection of computers and other hardware devices connected together so that network users can share hardware, software, and data, as well as communicate with each other electronically. Today, computer networks are converging with telephone networks and other communications networks, with both data and voice being sent over these networks. Computer networks range from small private networks to the Internet and are widely used by individuals and businesses today.

USES FOR COMPUTER NETWORKS

Sharing an Internet connection among several users.

Sharing application software, printers, and other resources.

Facilitating Voice over IP (VoIP), e-mail, videoconferencing, messaging, and other communications applications.

Working collaboratively; for example, sharing a company database or using collaboration tools to create or review documents.

Exchanging files among network users and over the Internet.

Connecting the computers and the entertainment devices (such as TVs, gaming consoles, and stereo systems) located within a home.

NETWORKING APPLICATIONS

Today, there are a wide variety of important networking applications used by businesses and individuals for communications, information retrieval, and other applications.

The internet

The Internet is the largest computer network in the world. Many networking applications today (such as information retrieval, shopping, entertainment, and e-mail) take place via the Internet.

Telephone service

The original telephone network, sometimes called the plain old telephone service (POTS), was one of the first communications networks. This network is still used today to provide telephone service to conventional landline phones, and is used for some types of Internet connections.

Mobile phones (also called wireless phones) are phones that use a wireless network for communications instead of the regular telephone network.

Television and radio Broadcasting

Two other original communications networks are broadcast television networks and radio networks. These networks are still used to deliver TV and radio content to the public, though some of this content is also available via the Internet today.

Global positioning system (GPS)

The global positioning system (GPS) network consists of 24 Department of Defense GPS satellites (in orbit approximately 12,000 miles above the earth) that are used for location and navigation purposes. A GPS receiver measures the distance between the receiver and four GPS satellites simultaneously.

NETWORK CHARACTERISTICS

Networks can be identified by a variety of characteristics, including whether they are designed for wired or wireless access, their topology, their architecture, and their size or coverage area.

Wired vs. Wireless networks

Networks can be designed for access via wired and/or wireless connections. With a wired network connection, the computers and other devices on the network are physically connected (via cabling) to the network. With a wireless network connection, wire less (usually radio) signals are used to send data through the air between devices, instead of using physical cables. Wired networks include conventional telephone networks, cable TV networks, and the wired networks commonly found in schools, businesses, and government facilities. Wireless networks include conventional television and radio networks, cellular telephone networks, satellite TV networks, and the wireless networks commonly found in homes, schools, and businesses.

Network Topologies

The physical topology of a computer network indicates how the devices in the network are arranged. Three of the most common physical topologies are star, bus, and mesh.

Star network—uses a central device to which all network devices connect and through which all network data is sent. If the central device fails, then the network cannot function.



STAR NETWORKS

Use a central device to connect each device directly to the network.

Bus network—uses a central cable to which all network devices connect. All data is transmitted down the bus line from one device to another so, if the bus line fails, then the network cannot function.



BUS NETWORKS

Use a central cable to connect each device in a linear fashion.

Mesh network—uses a number of different connections between network devices so that data can take any of several possible paths from source to destination. With a full mesh topology ,each device on the network is connected to every other device on the network. With a partial mesh topology, some devices are connected to all other devices, but some are connected only to those devices with which they exchange the most data. Consequently, if one device on a mesh network fails, the network can still function, assuming there is an alternate path available. Mesh networks are used most often with wireless networks.



MESH NETWORKS

Each computer or device is connected to multiple (sometimes all of the other) devices on the network.

Network size and Coverage area

Networks are also frequently classified by their size and their coverage area. This classification impacts the types of users the network is designed to service.

Personal area Networks (PANs) A personal area network (PAN) is a small network of two or more personal devices for one individual (such as a personal computer, smartphone, headset, tablet, portable speaker, smart watch, and/or printer) that is designed to enable those devices to communicate and share data. PANs can be set up on demand or set up to work together automatically as soon as the devices get within a certain physical distance of each other.

Local area networks (LANs) A local area network (LAN) is a network that covers a relatively small geographical area, such as a home, an office building, or a school. LANs allow users on the network to exchange files and e-mail, share printers and other hardware, and access the Internet.

Metropolitan area Networks (MANs)

A metropolitan area network (MAN) is a network designed to service a metropolitan area, typically a city or county. Most MANs are owned and operated by a city or by a network provider in order to provide individuals in that location access to the MAN. Some wireless MANs are created by cities or large organizations (such as Google in downtown Mountain View, California) to provide free or low-cost Internet access to area residents; these are often referred to as municipal Wi-Fi projects. In addition, some Internet service providers have free wireless MANs or hotspots in selected metropolitan areas for their subscribers to use for Internet access when they are on the go.

Wide area Networks (WANs)

A wide area network (WAN) is a network that covers a large geographical area. Typically, a WAN consists of two or more LANs that are connected together using communications technology. The Internet, by this definition, is the world's largest WAN. WANs may be publicly accessible, like the Internet, or they may be privately owned and operated. For instance, a company may have a private WAN to transfer data from one location to another, such as from each retail store to the corporate headquarters.

Intranets and extranets

An intranet is a private network (such as a company LAN) that is designed to be used by an organization's employees and is set up like the Internet (with data posted on Web pages that are accessed with a Web browser).

Consequently, little or no employee training is required to use an intranet, and intranet content can be accessed using a variety of devices. Intranets today are used for many purposes, including coordinating internal e-mail and communications, making company publications (such as contact information, manuals, forms, job announcements, and so forth) available to employees, facilitating collaborative computing and providing access to shared calendars and schedules. A company network that is accessible to authorized outsiders is called an extranet. Extranets are usually accessed via the Internet, and they can be used to provide customers and business partners with access to the data they need. Access to intranets and extranets is typically restricted to employees and other authorized users, similar to other company networks.

Virtual Private Networks (VPNs)

A virtual private network (VPN) is a private, secure path across a public network (usually the Internet) that is set up to allow authorized users private, secure access to a network. For instance, a VPN can allow a traveling employee, business partner, or employee located at a satellite office or public wireless hotspot to connect securely to the company network via the Internet. It can also be used by individuals to secure their connection to a public hotspot and can protect any device that connects to a hotspot via Wi-Fi, including notebook computers, tablets, and smartphones. VPNs typically use a process called tunneling to carry the data over the Internet and special encryption technology to protect the data so it cannot be understood if it is intercepted during transit . Without a VPN, passwords, credit card numbers, and other sensitive data sent to or from a hotspot could be intercepted.