



Lesson 1

Computers and Operating Systems

**Computer Literacy
BASICS: A
Comprehensive Guide
to IC³, 5th Edition**

About the Presentations

- The presentations cover the objectives found in the opening of each lesson.
- All lesson objectives are listed in the beginning of each presentation.
- You may customize the presentations to fit your class needs.
- Some figures from the lessons are included. A complete set of images from the book can be found on the Instructor Resources disc.

Objectives

- Describe the importance of computers in daily life.
- Explain the difference between system software and application software.
- Describe the four major types of operating systems.
- Identify the tasks an operating system performs.
- Start a computer.
- Use an operating system and start an application.
- Lock and shut down a computer.

Words to Know

- application software
- boot process
- buffer
- command-line interface
- data
- driver
- embedded operating system
- graphical user interface (GUI)
- hardware
- icon
- information processing cycle

Words to Know (continued)

- multiuser operating system
- open-source software
- operating system
- random access memory (RAM)
- server operating system
- software
- swapping
- system software
- utility program
- virtual memory

Understanding the Importance of Computers

- Computers are everywhere.
- Computers are used in your cell phone, in ATMs, in your home thermostat, and in your car's cruise control.
- Computers assist you in most parts of your daily life and play a central role in worldwide communications, entertainment, education, commerce, and other business activities.

Understanding the Importance of Computers (continued)

- Computers have been around since the late 1940s.
- Then, they were massive, special-purpose machines with names such as UNIVAC and ENIAC and were designed for use by the military and government.
- They took hours to complete a calculation, occupied small buildings or entire city blocks, and cost millions of dollars.

Understanding the Importance of Computers (continued)

- Today's smartphones have more processing power than a UNIVAC, cost less than any of its components, and fit in the palm of your hand.
- The future promises innovations such as wearable computers, using human thought as input, and computer-controlled, micro-controlled robots that treat and possibly cure cancer.

Understanding the Importance of Computers (continued)

- Understanding what a computer is and how it works can help you appreciate and use it more effectively.
- A **computer** is an electronic device that receives data (input), processes data, stores data, and produces a result (output).
- **Data** is a collection of raw unprocessed facts, including text, numbers, sound, images, and video.

Understanding the Importance of Computers (continued)

- The actual machine—wires, transistors, and circuits—is called **hardware**.
- **Software** consists of instructions or programs for controlling the computer.
- **Data** is text, numbers, sound, images, or video.
- The computer receives data through an input device, processes the data, produces the output information on an output device, and stores the information on a storage device.

Understanding the Importance of Computers (continued)

- The input and output devices, such as keyboards and monitors, are types of hardware called *peripherals*.
- Data transformed into meaningful form becomes *information*.



FIGURE 1-3

Understanding the Importance of Computers (continued)

- Input, processing, output, and storage (IPOS) is called the *information processing cycle*.

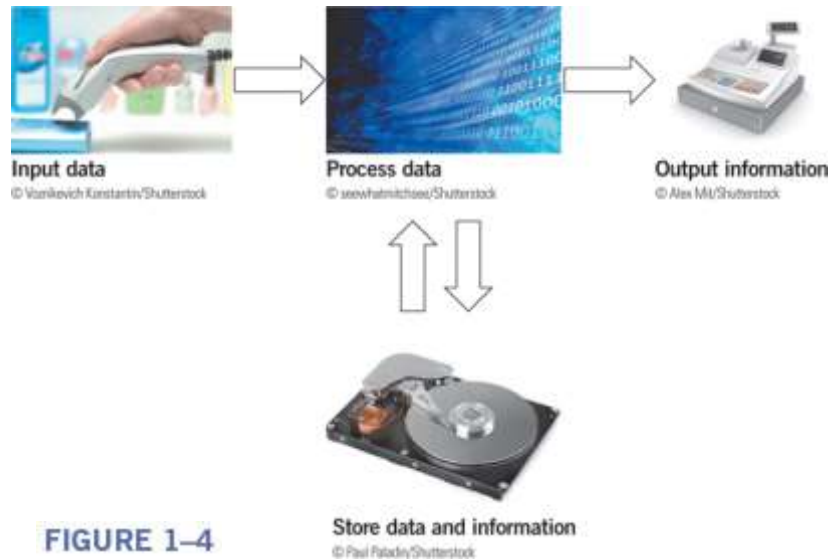


FIGURE 1-4

Understanding the Importance of Computers (continued)

- **Computer Literacy**
- To be ***computer literate*** means that you can use today's computers efficiently to enhance your life and the lives of those around you.
- Computer literacy also means you understand a wide range of information about current technology and how it is used to solve problems.
- A ***digital divide*** is an economic gap between those who are computer literate and have access to computer technology, and those who do not.

Types of Software

- Software provides the means for you to interact with the computer's hardware.
- A **graphical user interface (GUI)** displays pictures called **icons** that allow you to interact with data and execute commands.

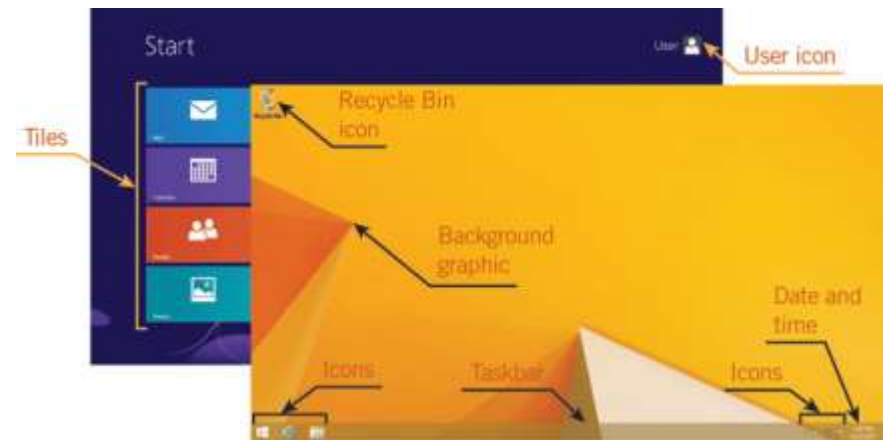


FIGURE 1-5

Types of Software (continued)

- Some software uses a **command-line interface**, which requires you to type text commands to interact with the computer.

```
Microsoft Windows [Version 6.2.9200]
(c) 2012 Microsoft Corporation. All rights reserved.

C:\Users\Lisa>DIR
Volume in drive C has no label.
Volume Serial Number is 1229-4EFF

Directory of C:\Users\Lisa

07/27/2017  09:14 AM  <DIR>          .
07/27/2017  09:14 AM  <DIR>          ..
05/17/2017  07:47 AM  <DIR>          Contacts
07/28/2017  08:39 AM  <DIR>          Desktop
07/13/2017  02:49 PM  <DIR>          Documents
07/28/2017  08:39 AM  <DIR>          Downloads
07/28/2017  08:39 AM  <DIR>          Dropbox
07/28/2017  08:39 AM  <DIR>          Favorites
05/17/2017  07:47 AM  <DIR>          Links
05/17/2017  07:47 AM  <DIR>          Music
07/12/2017  11:23 AM  <DIR>          Pictures
05/17/2017  07:47 AM  <DIR>          Saved Games
05/17/2017  07:47 AM  <DIR>          Searches
07/24/2017  10:45 AM  <DIR>          Videos
               0 File(s)                0 bytes
               14 Dir(s)  543,649,009,664 bytes free

C:\Users\Lisa>
```

DIR command typed

Command results

Enter another command here

FIGURE 1-6

Types of Software (continued)

- **System Software and Application Software**
- A computer relies on two types of software: system software and application software.
- **System software** runs a computer and includes the operating system and utility programs.
 - An **operating system** is software that coordinates the resources and activities on a computer.
 - A **utility program** helps the operating system set up, maintain, and protect a computer.

Types of Software (continued)

- **System Software and Application Software (continued)**
- ***Application software*** is the software used to directly complete a specific task or to create something electronically.
- Application software helps you perform tasks such as writing a report, creating a video, viewing a Web page, or sending photos to a friend.

Types of Software (continued)

- **System Software and Application Software (continued)**

TABLE 1-1

| | OPERATING SYSTEM | APPLICATIONS SOFTWARE |
|---------------------------|---|---|
| Purpose | Operates and controls computer hardware and runs application software | Provides services and information directly to users |
| Role in a computer system | Coordinates the activities of users, application software, and hardware | Performs tasks based upon user input |
| Typical tasks | Monitors hardware Manages resources Controls input and output Processes data | Creates documents such as reports and charts Provides entertainment Displays photos |
| Examples | Windows 8 Mac OS X Android | Microsoft Word (word-processing) Adobe Photoshop (graphics editing) Mozilla Firefox (Web browser) |

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Types of Operating Systems

- Operating systems fall into four major categories depending on the type of device for which they are designed:
 - Personal computers
 - Mobile computing devices
 - Servers
 - Devices other than computers

Types of Operating Systems (continued)

- **Personal Computer Operating Systems**
- Personal or desktop operating systems are installed on a single computer and are called single-user operating systems because one user interacts with the operating system at a time.
- They are ***multitasking*** operating systems, which means they let you work with more than one program at a time.
- The three most popular personal computer operating systems are Windows, Mac OS, and Linux.

Types of Operating Systems (continued)

- **Personal Computer Operating Systems (continued)**
- Windows XP (2001) and Windows 7 (2009) were both widely used Windows versions. Windows 8 (2012) is the most recent version of Windows.
- Windows became widespread because it ran on inexpensive personal computers created by a variety of computer manufacturers.
- Windows is easy to use and to personalize, and it runs more types of applications than other operating systems.

Types of Operating Systems (continued)

- **Personal Computer Operating Systems (continued)**
- Mac OS runs only on Apple Macintosh computers.
- **Mac OS X** is the current version of the operating system.
- Mac OS set the standard for GUI operating systems and is liked by its users for being a very secure, reliable, and easy-to-maintain operating system.

Types of Operating Systems (continued)

- **Personal Computer Operating Systems (continued)**
- **Linux** is a personal computer operating system related to UNIX, which is an operating system developed in the late 1960s that is frequently used by scientists and programmers.
- Linux is released to the public as **open-source software**, meaning anyone can use, modify, and distribute it.
- Linux is available in versions called distributions, including commercial and noncommercial distributions.

Types of Operating Systems (continued)

- **Mobile Operating Systems**
- A mobile operating system is designed for small handheld computing devices.
- It includes features similar to a personal operating system but is simpler and smaller.
- A **smartphone** is a cell phone that includes many features of a computer.
- **Tablets** are one-piece mobile computers that usually include a **touchscreen**, which is a screen you touch to interact with the GUI.

Types of Operating Systems (continued)

- **Mobile Operating Systems (continued)**
- **iOS** is a version of Mac OS X written for Apple's mobile devices, including iPhones and iPads.
- Google's **Android** is an open-source operating system designed to run on many types of smartphones and tablets, and is derived from Linux.
- **Windows Phone** and **Windows RT** are similar to Windows 8.
- Mobile operating systems primarily work as single-user, single-tasking operating systems.

Types of Operating Systems (continued)

- **Embedded Operating Systems**
- ***Embedded operating systems*** run devices such as ATMs, navigation systems, portable media players, and digital recorders.
- They are designed to meet a specific purpose and perform a single task, such as providing maps and directions.



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FIGURE 1-10

Types of Operating Systems (continued)

- **Server Operating Systems**
- A **server operating system** resides on a server and is used to manage a **network** (a group of two or more computers linked together).
- A **server** is a computer that provides network services such as e-mail to other computers, or clients.



FIGURE 1-11

Types of Operating Systems (continued)

- **Server Operating Systems (continued)**
- Server operating systems are sometimes called network operating systems.
- Each client on a network has its own personal operating system.
- The server operating system manages the requests for services from the client computers.
- An expert called the network administrator uses the server operating system to manage the network and its users.

Types of Operating Systems (continued)

- **Server Operating Systems (continued)**
- Server operating systems are *multiuser operating systems* because they allow many users to run programs and use the server's resources at the same time.
- Windows, Mac OS, Linux, and UNIX all have server versions of their operating systems.
- UNIX is used for many servers that handle e-mail and Internet access.

Operating System Tasks

- The operating system controls your computer from the time you turn on the power to the time you turn it off.
- It takes care of technical tasks such as start-up steps, managing memory, processing input and output, controlling hardware, and ending a computer session.

Operating System Tasks (continued)

- **Completing Start-Up Steps**
- The ***boot process*** is a series of steps the operating system must complete before you can interact with the operating system.

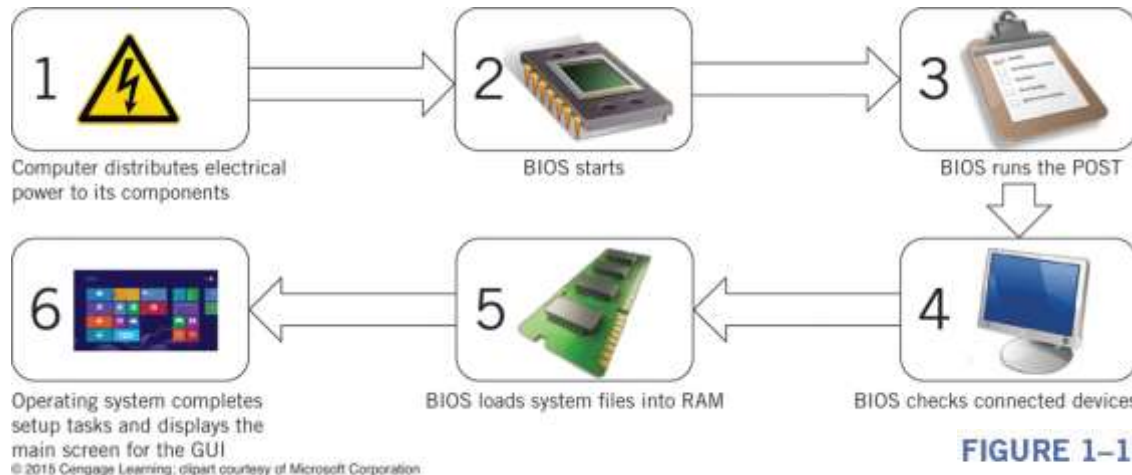


FIGURE 1-12

Operating System Tasks (continued)

- **Managing Memory**
- After starting up, the operating system manages computer resources.
- A **resource** is any component the system requires to do work.
- The main resources are memory, processing components, storage space, and peripherals.

Operating System Tasks (continued)

- **Managing Memory (continued)**
- The operating system manages *random access memory (RAM)* efficiently.
- All programs need space in RAM to run.
- When you start an application, the operating system allocates RAM to the program. When you close the application, the operating system reclaims the RAM.

Operating System Tasks (continued)

- **Managing Memory (continued)**
- If you run too many applications at a time, the computer can run out of RAM.
- In that case, the operating system might close an application or shut down the computer unexpectedly (called a *crash*).
- Operating systems can take advantage of ***virtual memory***, a part of a computer's hard disk that can work as additional RAM.

Operating System Tasks (continued)

- **Managing Memory (continued)**
- To gain memory, Windows moves data from one running application out of RAM and into virtual memory, a process called **swapping**.

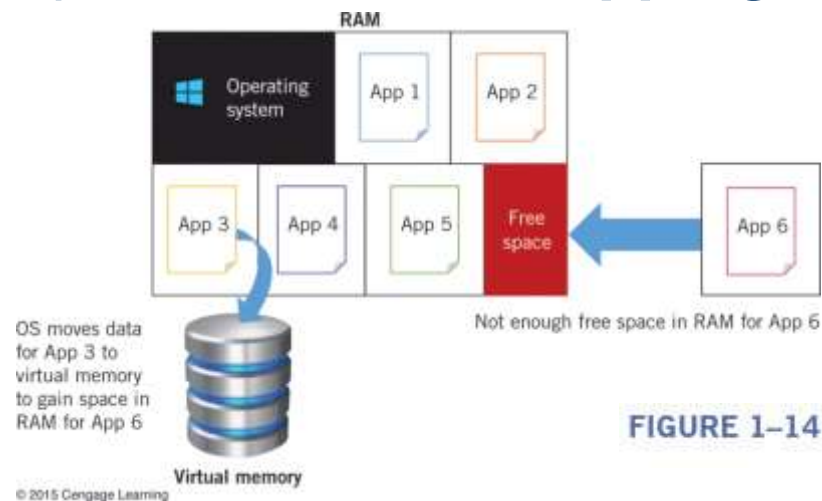


FIGURE 1-14

Operating System Tasks (continued)

- **Processing Input and Output**
- Another major task of the operating system is processing input and output.
- Often, the operating system must handle many input and output tasks at the same time.
- To keep your computer running smoothly, the operating system sets a sequence for processing input and output tasks.
- The operating system places data into a **buffer**, which is part of memory or storage where data waits until it can be transferred to a device.

Operating System Tasks (continued)

- **Controlling Hardware**
- The operating system considers every hardware device connected to the computer as an input or output device.
- The operating system communicates with a ***driver*** (aka device driver), which is a small program that enables the operating system to interact with the device.
- Each device must have a driver and is typically provided by the device manufacturer.

Operating System Tasks (continued)

- **Controlling Hardware (continued)**
- The operating system includes drivers for common devices.
- When you install new hardware, the operating system searches for the correct driver and installs it so you can use the new hardware right away. This feature is called ***Plug and Play***.

Operating System Tasks (continued)

- **Ending a Computer Session**
- When you end a session, the operating system takes care of the tasks to shut down, restart, sign out, switch users, or lock the computer.

TABLE 1-2

| OPTION | DESCRIPTION | WHEN TO USE |
|-----------------|--|---|
| Shut down | Completely turns off the computer | You plan to be away from the computer for more than a day or your computer is vulnerable to electrical damage (such as during a lightning storm). |
| Restart | Closes applications and resets the operating system | You need to reboot the operating system, such as when you install new applications or hardware. |
| Sign out | Closes applications but keeps the operating system running so another user can sign in without restarting the computer | You share your computer with someone else who wants to use it when you are finished and you are planning to be away for an hour or more. |
| Switch users | Applications and the operating system continue to run while another user signs in; the other user is not allowed to access your applications or data | You share your computer with someone else who wants to use it briefly. |
| Lock | Applications and the operating system continue to run, though you cannot access them until you sign in | You are leaving the computer but plan to return to it soon, and want to keep your work and data private. |
| Sleep/Hibernate | Applications and the operating system continue to run, though in a low-power state | You are leaving the computer but want it to quickly resume working when you return. |

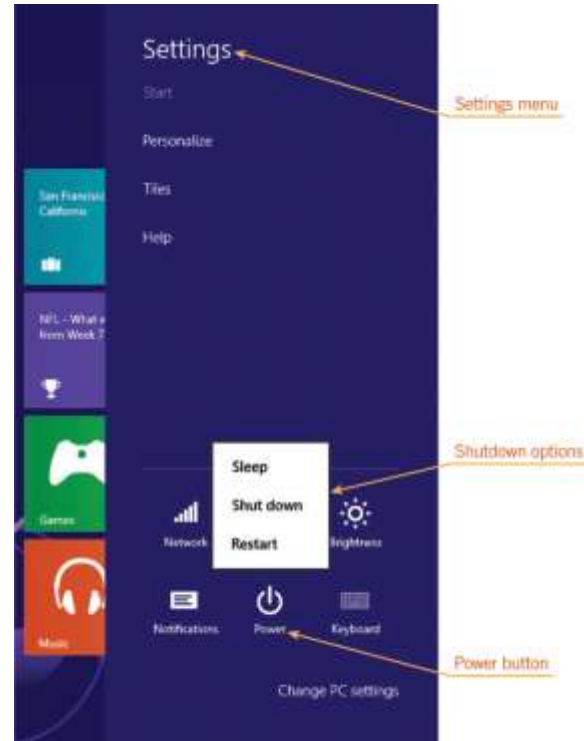
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Operating System Tasks (continued)

Lesson 1

- **Ending a Computer Session (continued)**
- To shut down a computer (aka log off), the operating system follows a series of steps:
 - Checks users
 - Closes applications
 - Closes system software
 - Turns off the power

FIGURE 1-21



Summary

In this lesson, you learned:

- A computer is an electronic device that receives data (input), processes data, stores data, and produces a result (output).
- A computer includes hardware (physical equipment such as wires and circuits) and software (instructions or programs for controlling the computer).

Summary (continued)

- To keep up with the changes in computer technology, you need to be computer literate, which means that you can use today's computer hardware and software efficiently to enhance your life and the lives of those around you.

Summary (continued)

- You interact with software through its user interface, which allows you to enter and receive information.
- Most contemporary software has a graphical user interface (GUI), which uses icons and other graphics to accept data and commands.
- Other software uses a command-line interface, which requires you to type text commands to interact with the computer.

Summary (continued)

- A computer runs two main types of software: system software and application software.
- System software is the software that runs a computer, and includes the operating system and utility programs.
- A utility program helps the operating system set up, maintain, and protect a computer.

Summary (continued)

- An operating system is software that coordinates the resources and activities on a computer.
- Application software is software you use to carry out your work or personal tasks.

Summary (continued)

- Personal computer operating systems run on personal computers.
- Mobile operating systems are designed for handheld computers such as tablets and smartphones.
- Embedded operating systems are part of an electronic device or system other than a computer. Server operating systems run servers, which are the computers that coordinate networks.

Summary (continued)

- Single-user, single-tasking operating systems let only one user perform a single task at one time. Most mobile and embedded operating systems fall into this category.
- Single-user multitasking operating systems let one user run many programs at the same time, and include all personal computer operating systems.
- Multiuser operating systems, such as server operating systems, let many users run programs and take advantage of the computer's resources at the same time.

Summary (continued)

- The technical tasks an operating system performs include completing start-up steps, managing memory, processing input and output, controlling hardware, and ending a computer session.
- The boot process is a series of steps the computer and operating system must complete before you can interact with the operating system.

Summary (continued)

- The resources an operating system manages include memory (RAM), processing components, storage space, and peripheral devices.
- To supplement RAM, operating systems take advantage of virtual memory, which is part of a computer's storage space that can work as additional memory.

Summary (continued)

- To keep your computer running smoothly, the operating system sets a sequence for processing input and output tasks and uses buffers, which are parts of memory or storage where data waits until it can be transferred to a device.
- To control a hardware resource, the operating system communicates with a device driver, a small program that tells the operating system how to interact with the device.

Summary (continued)

- A personal operating system needs to know when you're finished working with a computer so it can protect itself and other software, and keep your information private while you are away.
- Although you select an option to end a session, the operating system takes care of the tasks, which range from shutting down, to restarting, signing out (also called logging off), switching users, and locking the computer.