The Internet, the Web, and Electronic Commerce

Introduction

- The Internet
  - Interconnected mesh of computers and data lines
  - Connecting millions of people and organizations
- Foundation of the digital revolution
- The web
  - Provides an easy-to-use interface to Internet resources
- To be effective and efficient
  - End user awareness of the resources available on the Internet and the web

The Internet and the Web

- The Internet
  - Large global network connecting smaller networks all over the globe
- The Internet launched in 1969
  - The United States funded a project to develop a national computer network
  - ARPANET (Advanced Research Project Agency Network)
- World Wide Web or WWW was introduced in 1991
- The Internet and the web are NOT the same
  - The Internet is the physical network
  - The web is a multimedia interface to the resources available on the Internet

Web

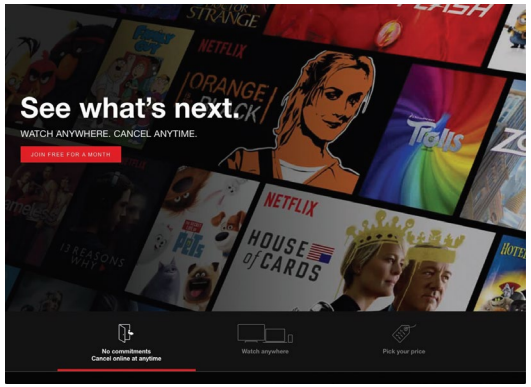
- Web 1.0
  - 1st generation
  - Linking existing information focus
  - Search programs were created
    - Provide links to websites with specific words or phrases
- Web 2.0
  - Dynamic content creation
  - Facebook is most common in Web 2.0
- Web 3.0
  - Identifies relationships between data
  - Personalized content creation for users

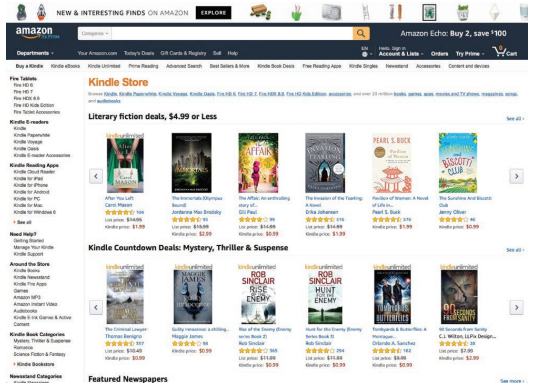
Common Internet Uses

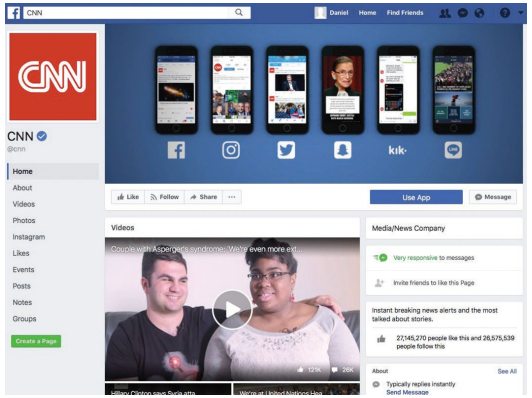
- Communicating
  - E-mail, photos, videos
  - Discussions
- Shopping
- Searching
  - Virtual libraries
- Education or e-learning
- Online Entertainment

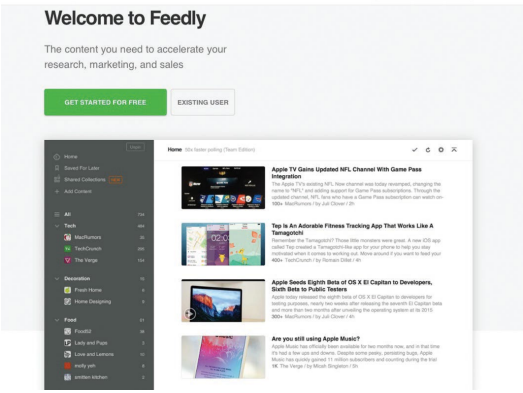
Making IT Work for You
Online Entertainment

- Online options for TV, movies, music, books, social media, news feeds
  - Hulu, Amazon Prime, Netflix, Amazon Kindle, CNN, Facebook, Twitter







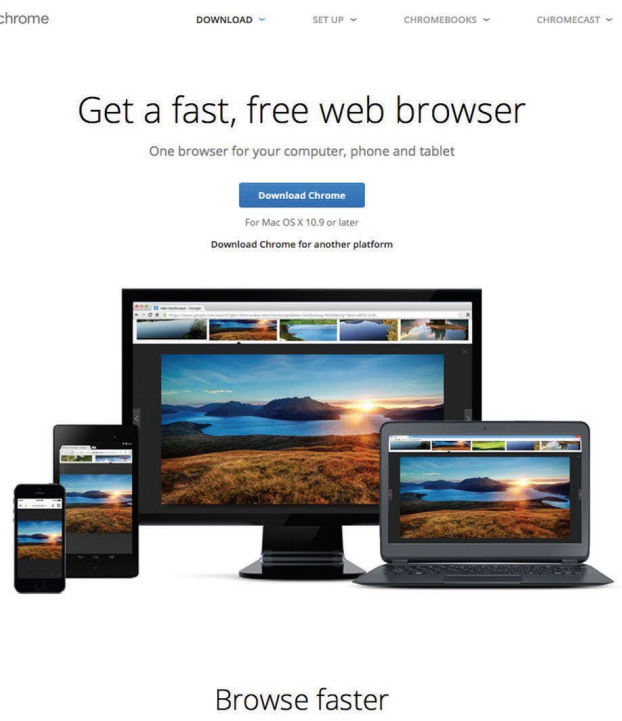


Internet Access Providers

- Internet Service Provider (ISP)
  - Common way to access the Internet
  - Provide a path to access the Internet
  - Use telephone lines, cable, and/or wireless connections
- Most common providers
  - Verizon, Comcast, Sprint, T-Mobile, AT&T

Browsers

- Provide access to web resources
- Allow you to explore the web
  - Connect to remote computers
  - Uncomplicated interface to the Internet
  - File transfer
  - Display many varieties of multimedia
- Popular Web browsers include:
  - Mozilla Firefox
  - Apple Safari
  - Microsoft Edge
  - Google Chrome



URLs

- Uniform Resource Locator
  - Location or address of resource
  - https is the most common for web traffic
- Two parts
  - Protocol
    - Rules for exchanging data
  - Domain name
    - Where resource is located

Top-Level Doman (TLD)

- Top-level domain (TLD) or Web Suffix
  - Identifies the type of organization
  - .com Commercial
  - .edu Educational
  - .gov Government
  - .mil U.S. military
  - .net Network
  - .org Organization

HTML and Hyperlinks

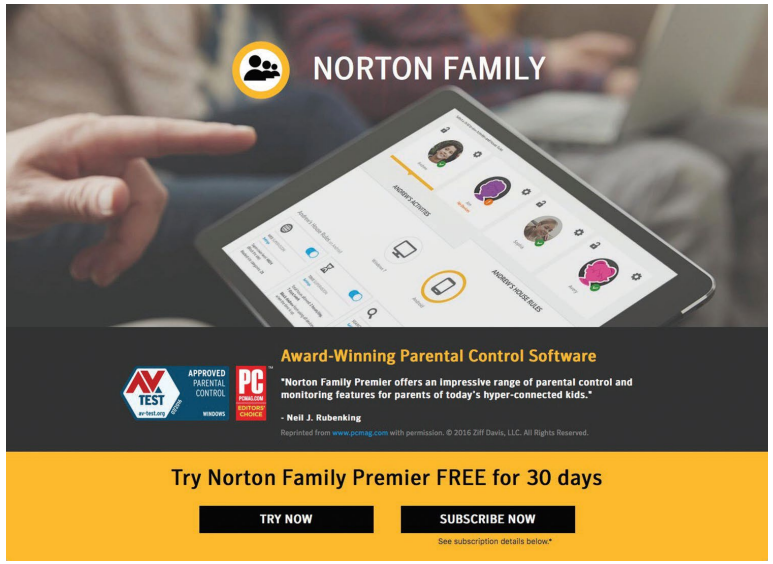
- Hypertext Markup Language
  - Markup language for displaying web pages
- Browsers interpret HTML commands
  - Display document as a web page
- Hyperlinks or links
  - Connect to other web pages
    - Text files
    - Graphic images
    - Audio and Video Clips

Interactive Web Sites

- Technologies used to provide highly interactive and animated websites
  - Cascading Style Sheets (CSS)
  - JavaScript
  - PHP
- Mobile Browsers
  - Designed to run on portable devices

Web Utilities

- Specialized utility programs that make using the Internet and web safer and easier
  - Filters
  - File Transfer Utilities
  - Internet Security Suites



Filters

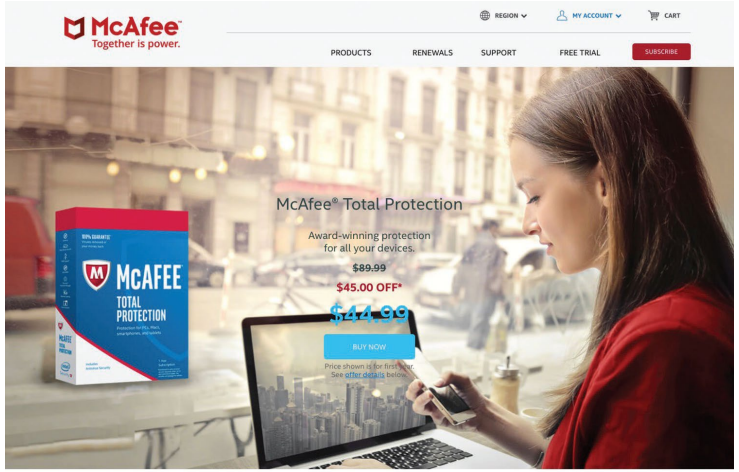
- Block access to selected sites
- Set time limits
- Monitor total time spent on the Internet and at individual web sites
  - Net Nanny
  - Qustodio Parental Control
  - Circle with Disney
  - Norton Online Family
  - McAfee Family Protection

File Transfer Utilities

- Upload and download files to and from the Internet
  - Downloading
  - Uploading
- Three popular types of programs
  - Web-based file transfer services
  - Bit-Torrent
  - File transfer protocol (FTP) / Secure file transfer protocol (SFTP)

Internet Security Suites

- Designed to maintain your security and privacy while on the web
- Two best known suites
  - McAfee Internet Security
  - Symantec Norton Internet Security



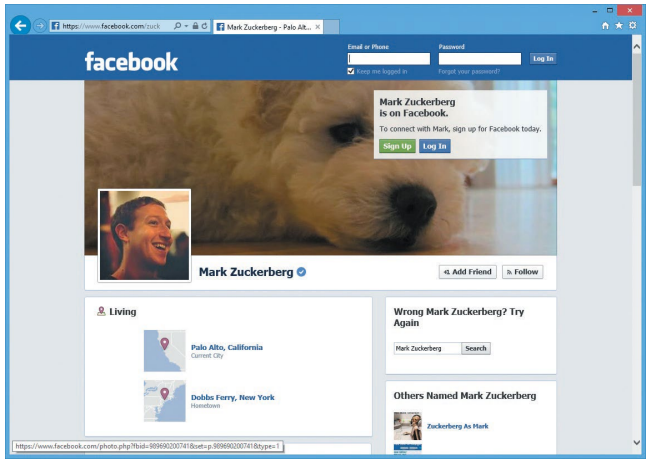
Virus Protection Pledge

Communication

- Communication is the most popular Internet activity
  - Social Networking
  - Blogs and Microblogs
  - Webcasts, Podcasts, and Wikis
  - E-mail and Messaging

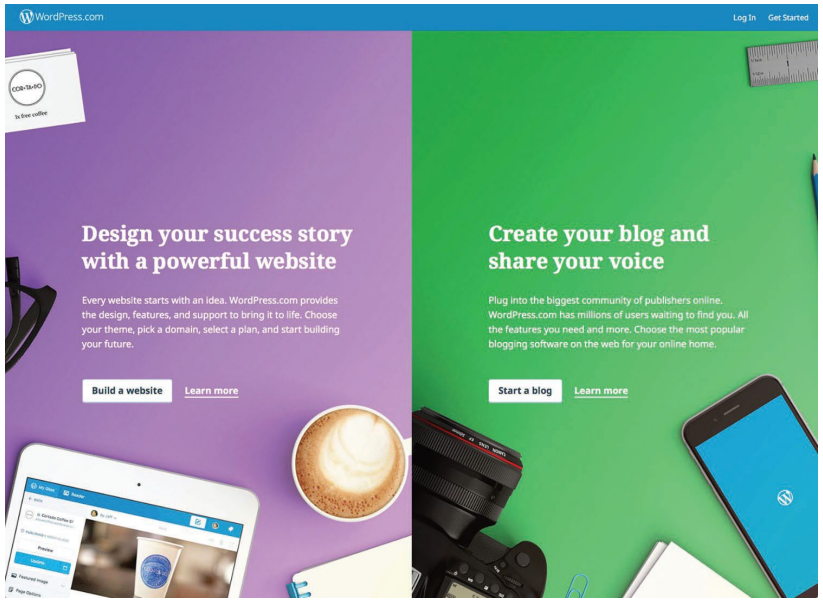
Social Networking

- Connecting people and organizations that share a common interest or activity
  - Common features
    - Profiles
    - Pages
    - Groups
    - Friends
    - News feed
    - Share settings



Blogs, Microblogs

- Blogs
  - Personal websites
  - Date/time-stamped
  - Arranged with the most recent items shown first
- Microblogs
  - Short status updates
  - Most common is Twitter
    - Tweets are Twitter messages

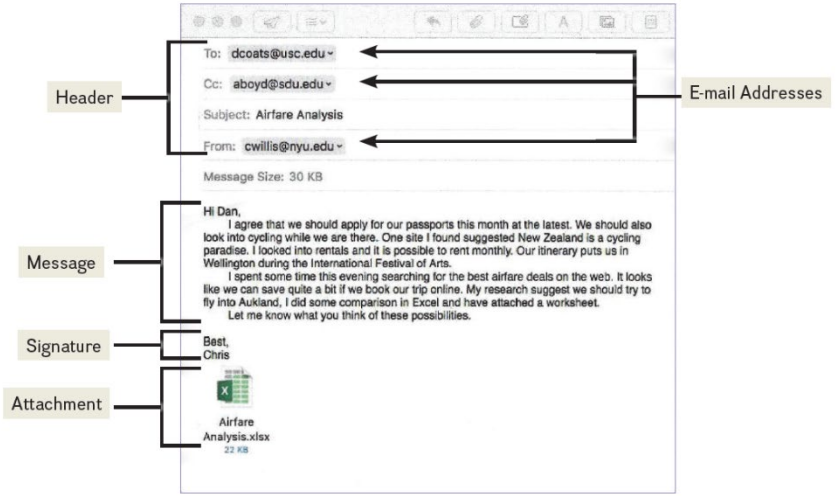


Webcasts, Podcasts, Wikis

- Webcast
  - Streaming technology for live broadcast of audio and video
  - No files after streaming ends
- Podcast
  - Must download files to use
  - Can transfer to media player
- Wiki
  - Specially designed Web site
  - Allows visitors to edit the contents
  - Supports collaborative writing

E-Mail

- E-mail
  - Transmission of electronic messages over the Internet
  - Three elements
    - Header
      - Address
      - Subject
      - Attachments
    - Message
    - Signature



E-mail Systems

- Client-based
  - E-mail client
    - Must be installed on computer
      - Apple Mail
      - Microsoft Outlook
- Web-based
  - Webmail client
    - No installation necessary -- free
      - Google's Gmail
      - Microsoft's Hotmail
      - Yahoo!'s Yahoo!mail

E-mail

- SPAM
  - Unwelcome-mail
- Computer viruses
  - Destructive programs
    - Attached to unsolicited email
- CAN-SPAM Act
  - Created antispam laws for control
    - Every marketing related e-mail must provide an opt-out option
- Spam blockers / spam filters
  - Identify and control spam

Messaging

- Text messaging / texting
  - SMS (short message service)
    - Short electronic message
- Multimedia Messaging Service (MMS)
  - Send
    - Images
    - Videos
    - Sounds

Instant Messaging

- Instant messaging (IM)
  - Extension of email that provides direct, live communication between two or more people
    - Most programs include video conferencing features, file sharing and remote assistance
    - Facebook Messenger
    - Google Hangouts

Search Tools

- Search Services
  - Operate websites
  - Spiders
    - Look for new information and update websites
- Search Engines
  - Assist in locating specific information
- Specialized Search Engines
  - Focus on subject specific websites

Search Service	Site
Bing	www.bing.com
Duckduckgo	www.duckduckgo.com
Google	www.google.com
Yahoo!	www.yahoo.com

Topic	Site
Cooking	www.recipebridge.com
Fashion	www.shopstyle.com
Images	www.picsearch.com
People	pipl.com
Research	scholar.google.com

Content Evaluation

- Content Evaluation
  - Not everything on the Internet is accurate
    - Authority
    - Accuracy
    - Objectivity
    - Currency

Electronic Commerce

- E-commerce
  - Buying and selling of goods over the Internet
  - Three basic types
    - Business-to-consumer (B2C)
    - Consumer-to consumer (C2C)
    - Business-to-business (B2B)

Business to Consumer (B2C)

- Sale of product or service to general public
- Fastest growing type of e-commerce
- Three most widely used B2C applications:
  - Online banking
  - Financial trading
  - Shopping
    - Amazon.com is one of the most widely use B2C sites

Consumer to Consumer C2C

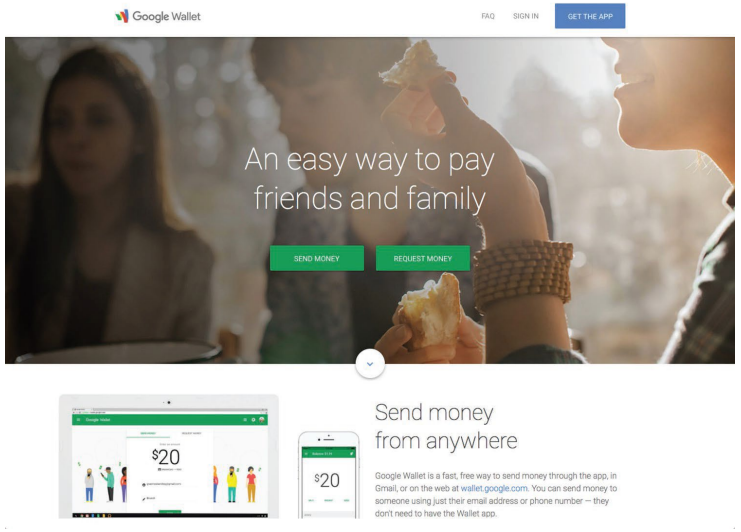
- Consumer-to-consumer e-commerce (C2C)
  - Individual to individual
- Web auctions
  - Buyers and sellers seldom meet
  - Bids are submitted electronically
  - Person-to-person auction sites

Business to Business B2B

- Sale of a product or service from one business to another
- Primarily a manufacturer supplier relationship

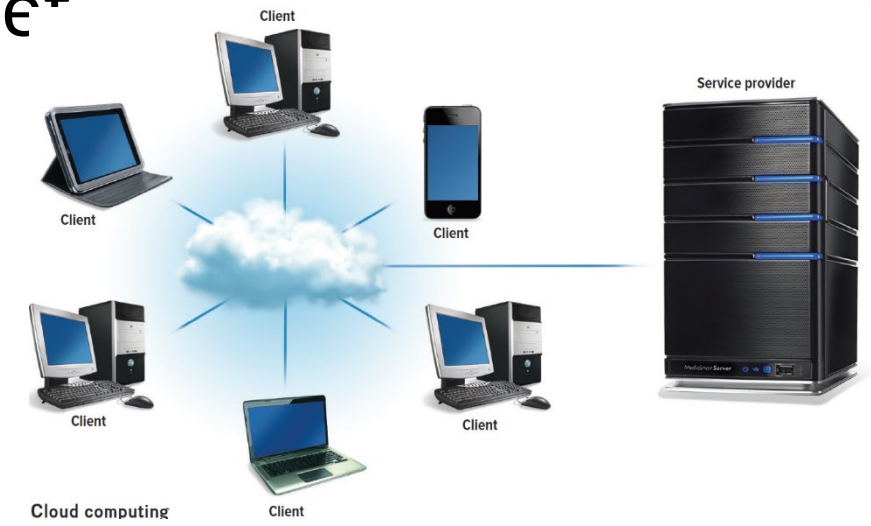
Security

- Payment methods must be fast, reliable, and secure
  - Provide a convenient way to submit buyers information
- Two options
  - Credit card
    - Fast and convenient
  - Digital cash
    - Internet's equivalent to traditional cash
    - Converts digital cash to currency through 3rd party



Cloud Computing

- Shifts computing activities from users' computers to computers on the Internet
- Frees end-users from owning, maintaining, and storing software programs and data
- Three basic components:
  - Clients (end-users)
  - The Internet
  - Service providers



Internet of Things (IoT)

- Continuing development of the Internet
- Allows objects embedded with electronic devices to send and receive data
  - Smartphones
  - Wearable devices
- Uses Web 3.0 Applications

Basic Application Software

Introduction

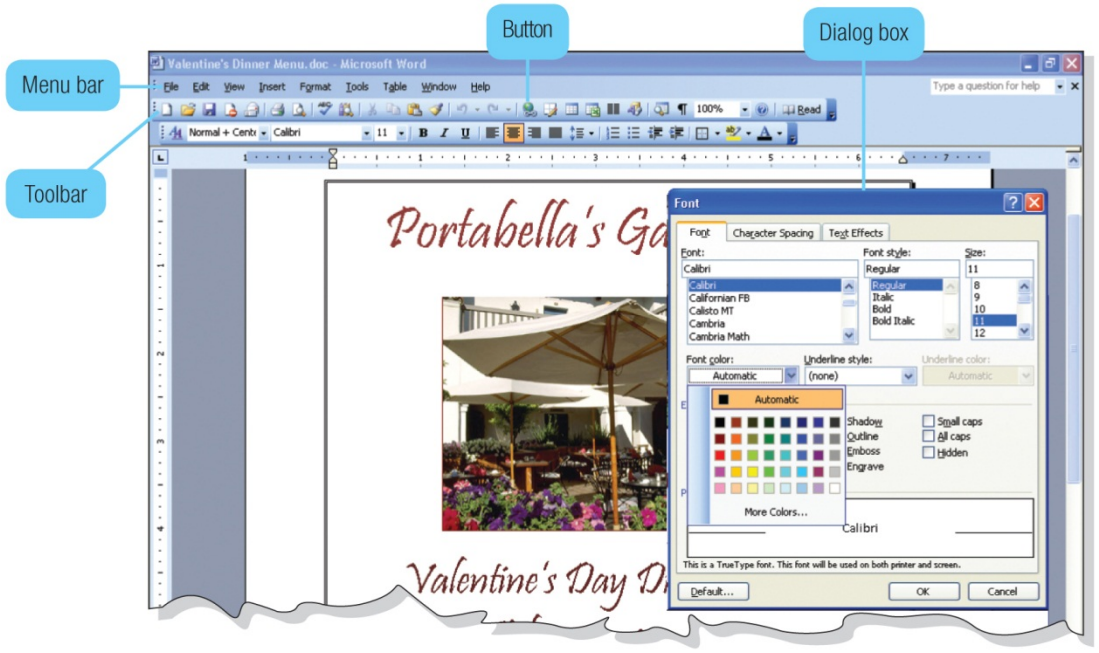
- Not long ago, trained specialists were required to perform many of the operations you can now do with a personal computer.
- Competent end users need to understand the capabilities of basic application software including:
  - Word processors
  - Spreadsheets
  - Presentation programs
  - Database management systems

Application Software

- Application software
  - End-user software
  - Accomplish a variety of tasks
- Three categories
  - General Purpose Applications
  - Specialized Applications
  - Mobile Apps

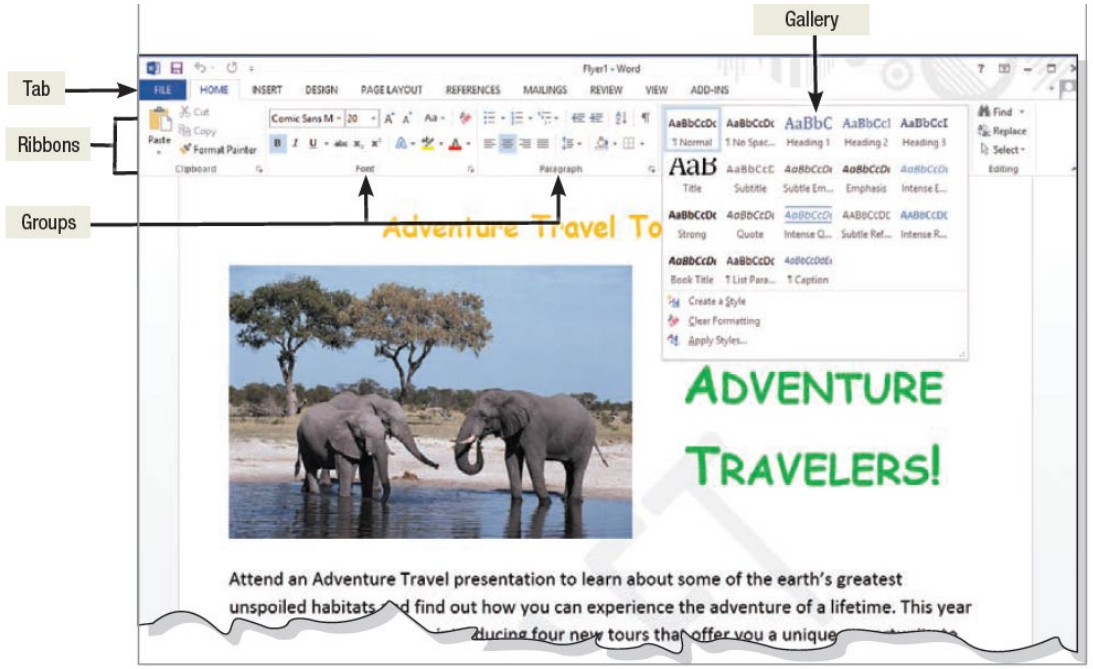
User Interface

- Graphical User Interface (GUI) consists of:
  - Icons
  - Pointer
  - Windows
  - Menus
    - Menu bar
  - Toolbars
    - Buttons
  - Dialog Boxes



Common Features in Microsoft

- Ribbon GUI
  - Ribbons
  - Tabs
    - Groups
    - Contextual tabs
  - Galleries
- Spell checkers
- Alignment
- Font and Font Sizes
- Tables
- Reports



General Purpose Applications

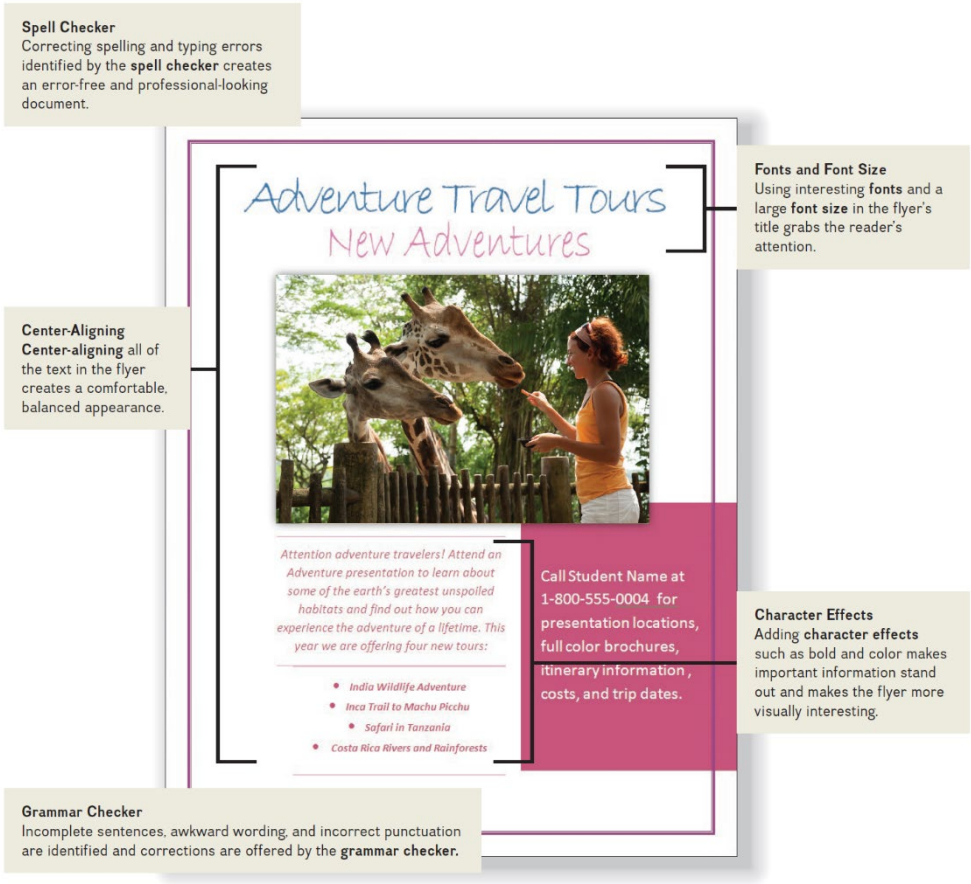
- General purpose applications include:
  - Word processor programs
  - Spreadsheet programs
  - Presentation graphics programs
  - Database management systems

Word Processor Programs

- Create text-based documents
  - Memos, letters, and reports
  - Newsletters, manuals, and brochures
- Word processing programs
  - Microsoft Word
    - Most popular
  - Apple Pages
  - Google Docs
  - OpenOffice Writer

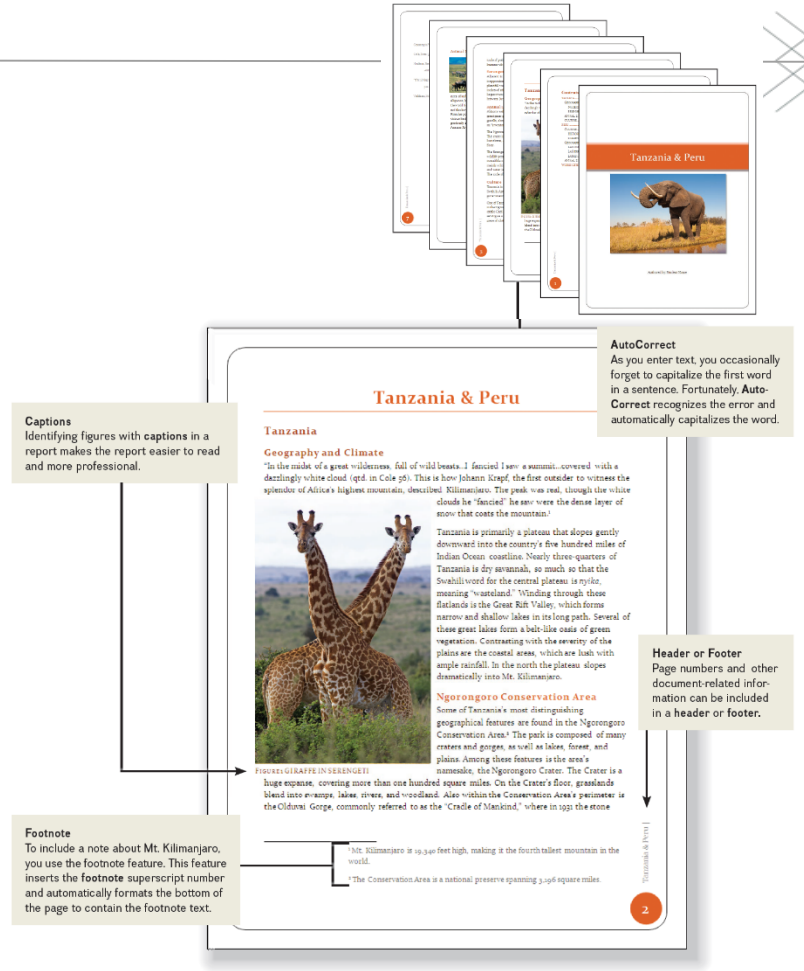
Creating a Flyer

- Flyer Features
  - Spell Checker
  - Center-alignment
  - Grammar Checker
  - Fonts
  - Font Sizes
  - Word Wrap
  - Character Effects



Creating a Report

- Report Features
  - AutoCorrect
  - Footnote
  - Header or Footer
  - Captions and Cross References
  - Tables

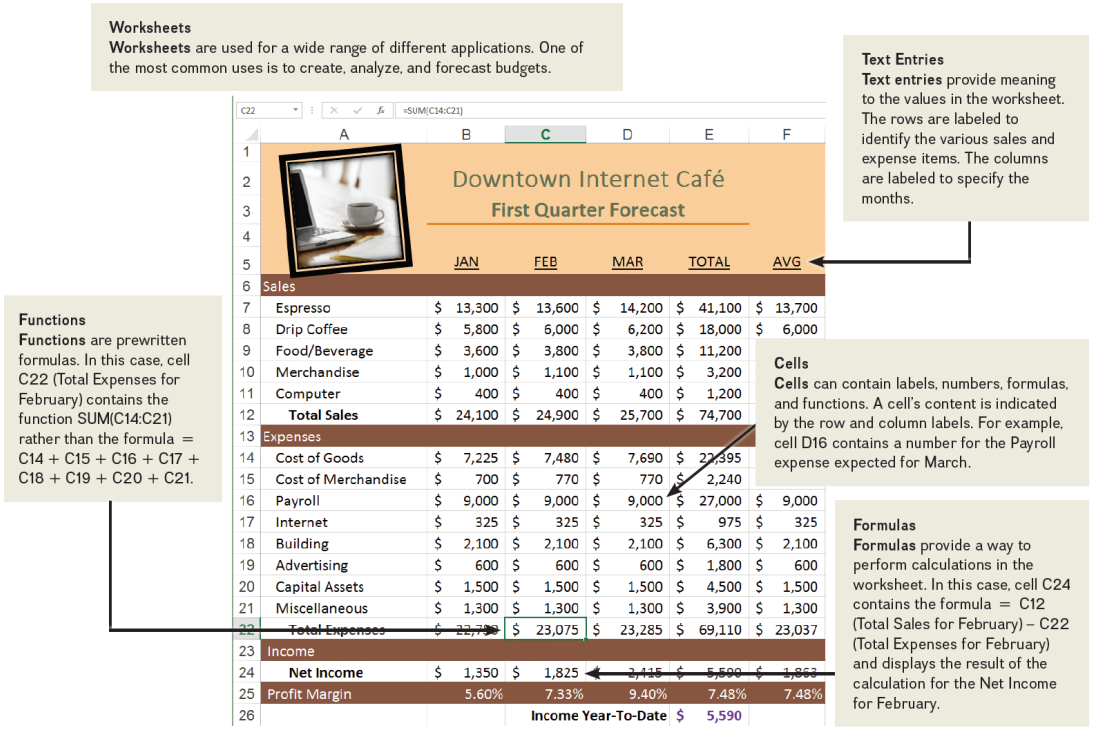


Spreadsheet Programs

- Organize, analyze, and graph numeric data
  - Budgets and Financial Reports
- Spreadsheet programs
  - Microsoft Excel
    - Most widely used
  - Apple Numbers
  - Google Sheets
  - OpenOffice Calc

Creating a Sales Forecast

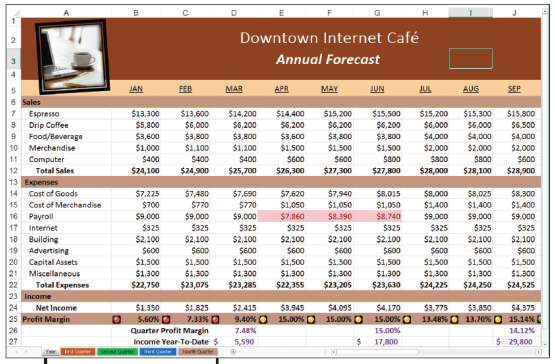
- Features
  - Worksheets
  - Text entries
  - Functions
  - Cells
  - Formulas



Analyzing Your Data

- Analysis Features
  - Workbook and worksheets
  - What-if Analysis

Workbook
The first worksheet in a **workbook** is often a summary of the following worksheets. In this case, the first worksheet presents the entire year's forecast. The subsequent worksheets provide the details.



Sheet Name
Each worksheet has a unique **sheet name.** To make the workbook easy to navigate, it is a good practice to always use simple yet descriptive names for each worksheet.

What-If Analysis
What-if analysis is a very powerful and simple tool to test the effects of different assumptions in a spreadsheet.

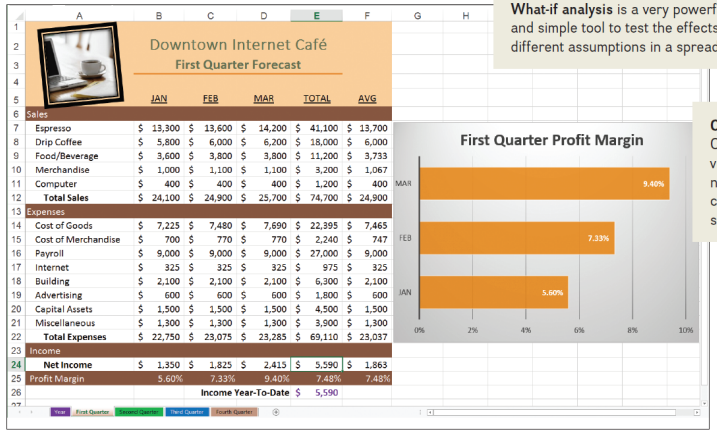


Chart
Once data is in the worksheet, it is very easy to **chart** the data. All you need to do is to select the data to chart, select the chart type, and add some descriptive text.

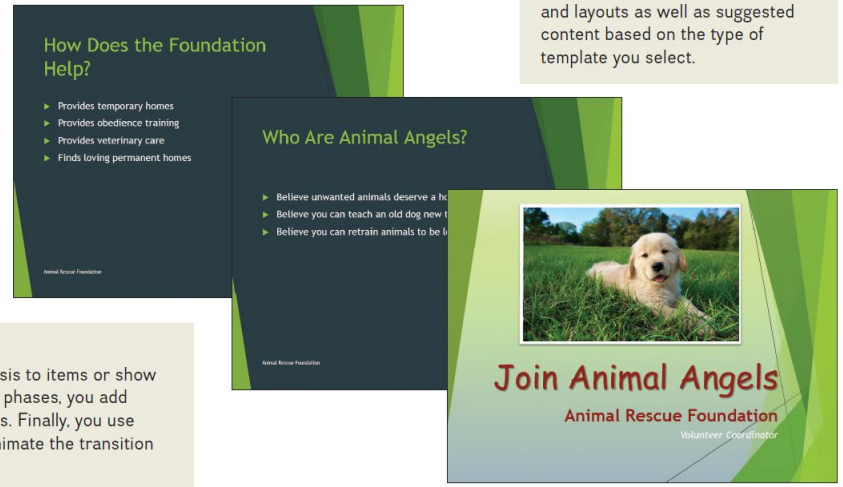
Presentation Graphics Programs

- Combine a variety of visual objects to create visually interesting presentations
- Presentation programs
  - Microsoft PowerPoint
  - OpenOffice Impress
  - Apple Keynote
  - Google Slides
  - Prezi

Creating a Presentation

- Presentation Features
  - Document Theme
  - Animation
  - Templates

Document Theme
To make your presentation more professional and eye-catching, you select a **document theme**, built-in sets of colors, fonts, and effects that can be quickly applied to your entire presentation.



Templates
Templates provide an excellent way to quickly create a presentation by providing predesigned styles and layouts as well as suggested content based on the type of template you select.

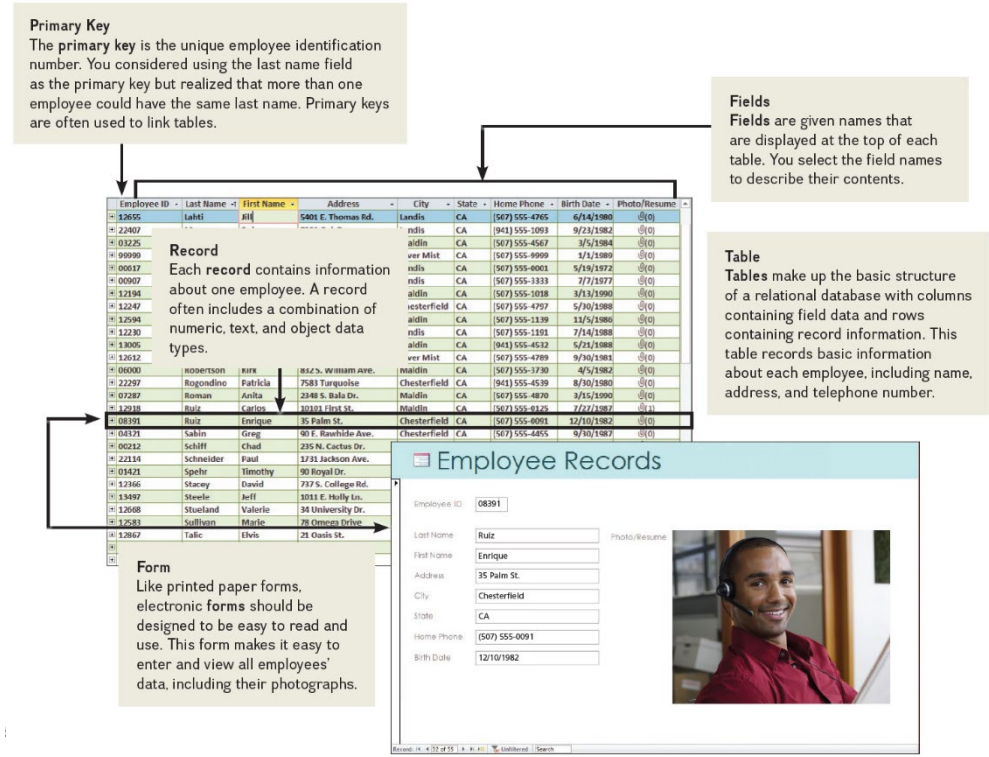
Animation
To provide additional emphasis to items or show the information on a slide in phases, you add **animation** to text and objects. Finally, you use slide **transition** effects to animate the transition from one slide to the next.

Database Management Systems (DBMS)

- A collection of related data
- Electronic equivalent of a file cabinet
- Two most widely used systems
  - Microsoft Access
  - OpenOffice Base
  - Apple FileMaker
  - Google Obvibase

Creating a Database

- First steps is to plan
- Database Features
  - Primary Key
  - Fields
  - Record
  - Table
  - Form



Specialized Applications

- Programs that more narrowly focused on specific disciplines and occupations
- Includes:
  - Graphics Programs
  - Web Authoring Programs

Graphics Programs

- Widely used in graphic arts
- Types of graphics programs are:
  - Desktop Publishing Programs
  - Image Editing Programs
  - Illustration Programs
  - Video Editors

Desktop Publishing Programs

- Also known as Page Layout Programs
- Mix text and graphics to create publications
- Popular programs:
  - Adobe InDesign
  - Microsoft Publisher
  - QuarkXPress

Image Editors

- Also know as Photo Editors
- Editing or modifying digital photographs
- Photographs consist of thousands of pixels that form images known as bitmaps
- Popular image editors
  - Adobe Photoshop
  - Corel PaintShop Pro
  - GIMP (GNU Manipulation Program)
  - Windows Live Photo Gallery

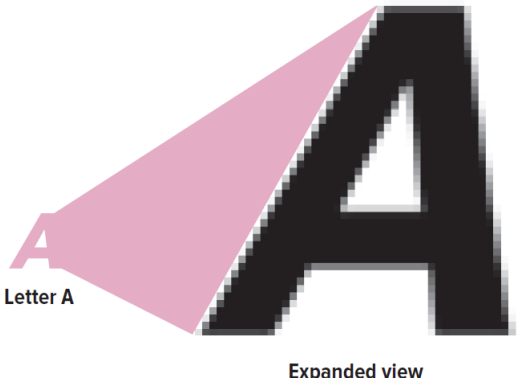
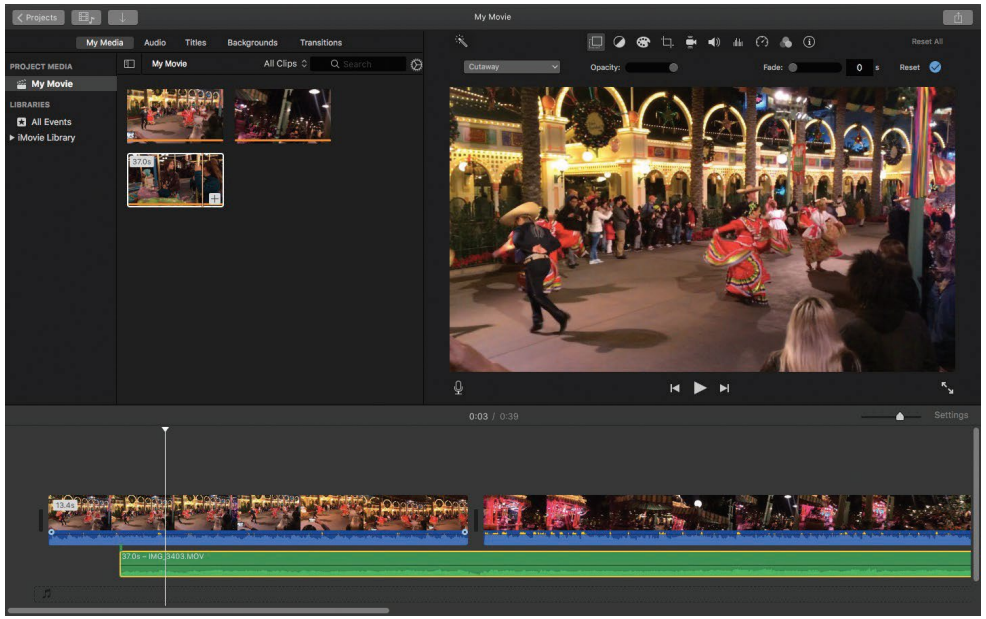


Illustration Programs

- Drawing programs
- Create and edit vector images
  - Vector illustrations
- Geometric shapes or objects
- Created by connecting lines and curves
- Defined by mathematical equations
- Popular Illustration Programs
  - Adobe Illustrator
  - CorelDRAW
  - Inkscape

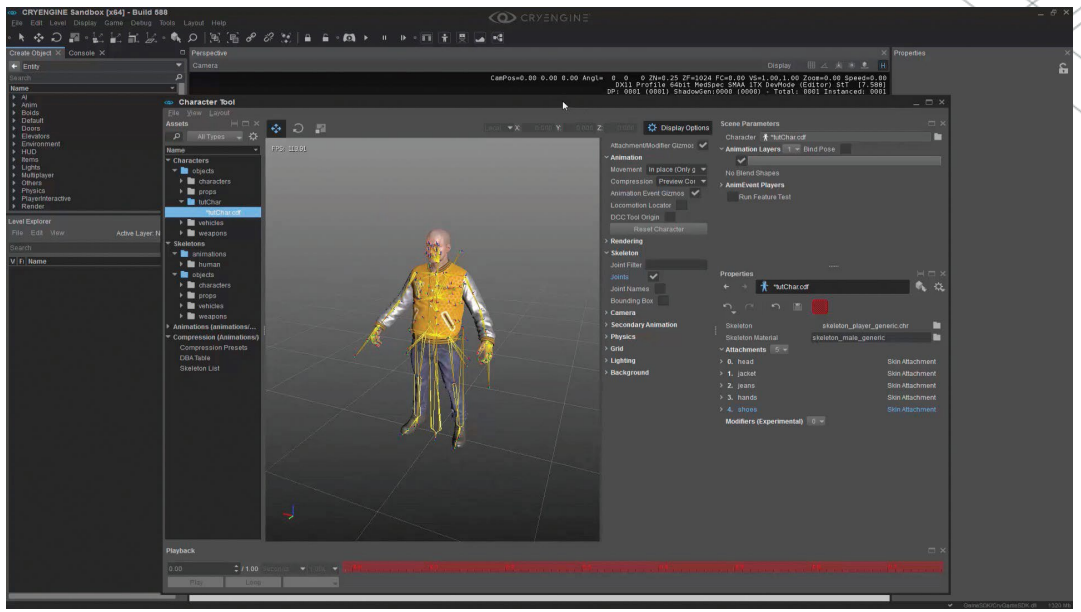
Video Editors

- Edit videos to enhance quality and appearance
  - Can now use your smartphone to edit videos
- Well-known programs
  - Microsoft's Story Remix
  - Apple iMovie
  - Adobe Premier



Video Game Design Software

- Video Game Design Software
  - Organize thoughts
  - Guide user through game design process
    - Character development
    - Environmental design
  - Free / inexpensive video game design software
    - Unreal Game Engine 4
    - Unity Development Kit
    - CryEngine SDK



Web Authoring Programs

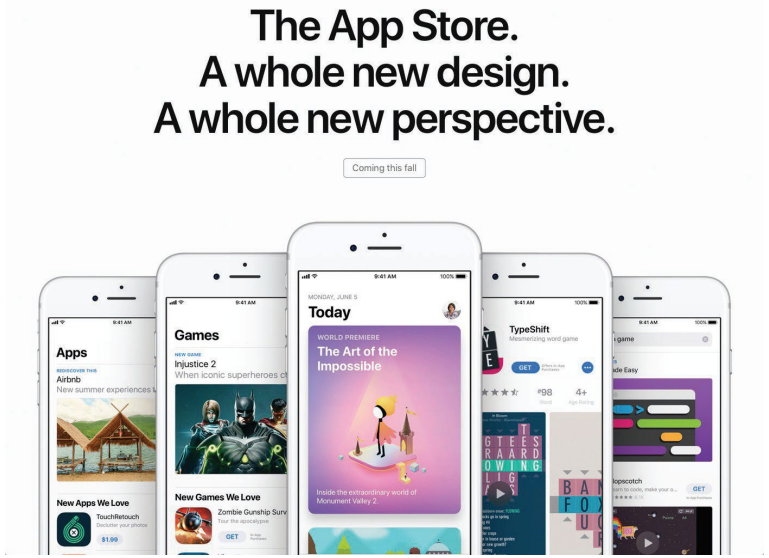
- Web authoring is the creation of a site
  - Design
  - Document file displaying website's content
- Blog
  - Online diary/commentaries
- Web Authoring Programs
  - Typically used to create commercial sites
  - Web page editors or HTML editors
  - WYSIWYG (what you see is what you get)
- Most widely used programs
  - Adobe Dreamweaver
  - Microsoft Expression Web

Mobile Apps

- Mobile Applications or Mobile Apps
  - Add-on programs for a variety of mobile devices
  - Smartphones or tablets
- Apps
  - Breadth and scope are ever-expanding
  - 500,000 just for iPhone
  - Music, videos, social networking, shopping, games

App Stores

- App Stores
  - Provides access to mobile apps for downloads
    - Apple's App Store
      - Apple Devices
      - www.apple.com/itunes/charts
    - Google Play
      - Andriod Devices
      - Play.google.com/store/apps



Software Suites

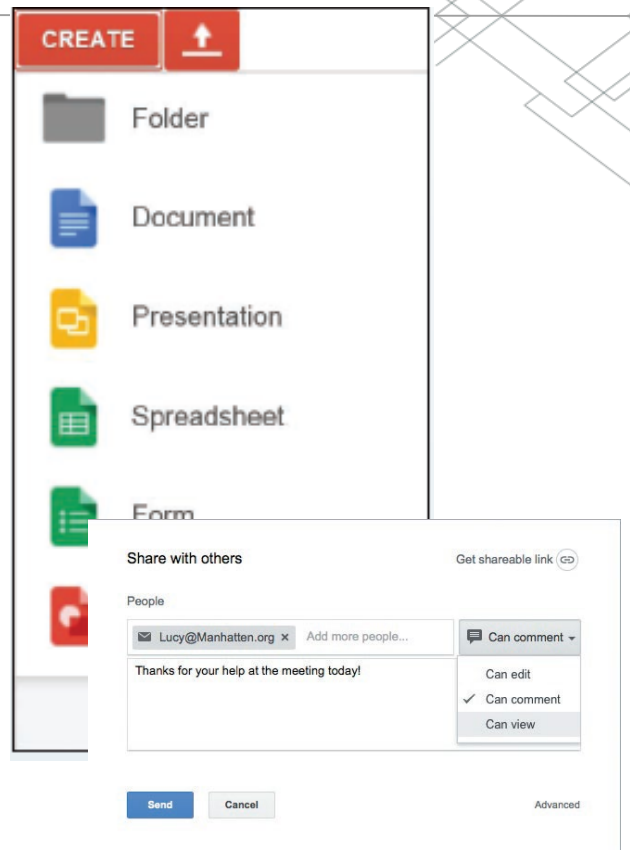
- Collection of separate application programs
  - Bundled together – sold as group
- Four types of suites
  - Office suites or office software suite / productivity suites
    - Microsoft Office
    - Apple iWork, OpenOffice
  - Cloud suites or online office suites
    - Google Docs (Making IT Work for You), Zoho, Microsoft Office 365

Suites continued

- Specialized suites
  - Focus on specific applications
    - Corel Draw Graphics Suite X6
    - Moneyfree Software TOTAL Planning Suite
- Utility suites
  - Designed to make computing easier and safer
    - Norton Systems Works
    - Norton Internet Security suite

Making IT Work for You - Google Docs

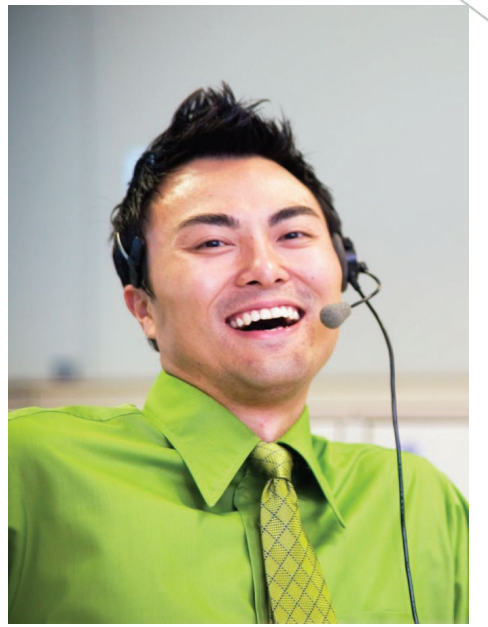
- Tool to create and collaborate with others
- Creating /sharing documents
  - Free and easy to use
  - Free Google account
  - Free online storage



System Software

Introduction

- Computers and computer applications have become a part of the fabric of every day life
  - They are great as long as they are working
- We give little thought to the processes and programs running behind the scenes to keep them functioning effectively.
- Such programs (i.e. operating systems, utility programs, and device drivers) are the system software you learn about here.



System Software

- Works with end users application software, and computer hardware
  - Handles the technical details
  - Includes
    - Operating systems
    - Utilities
    - Device drivers
    - Language translators

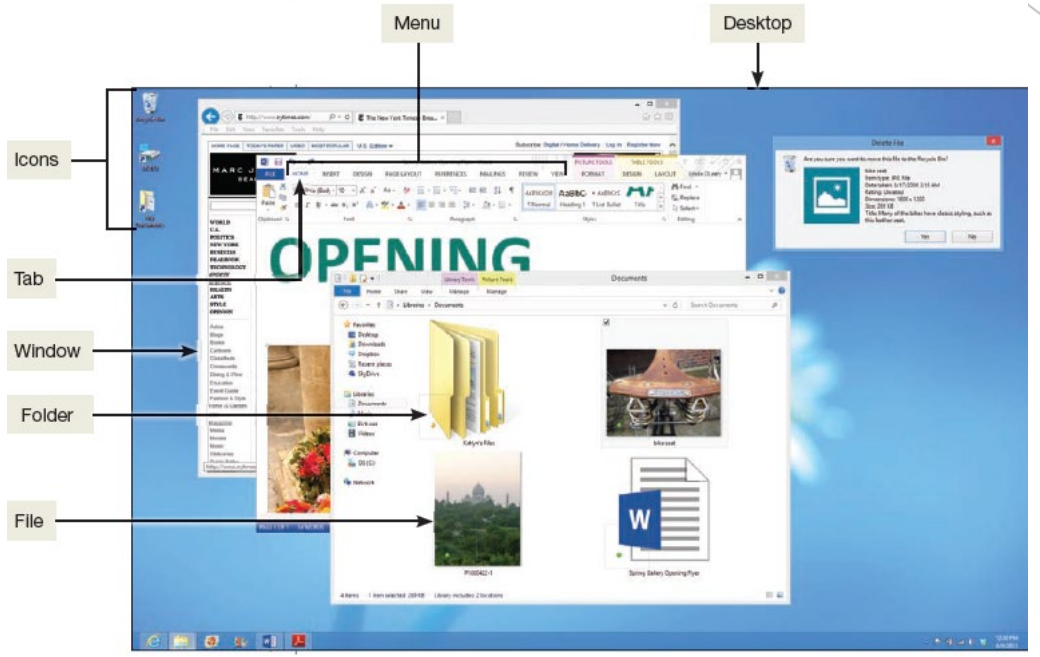
Operating Systems

A collection of programs that handle technical tasks

- Functions
  - Manages resources
  - Providing user interface
    - User interface
    - Graphical user interface (GUI)
  - Runs applications
    - Multitasking
    - Foreground and background applications

Features of an Operating System

- Features
  - Booting – starting or restarting the computer
- Features in common with application software
  - Icons
  - Pointer
  - Windows
  - Menus
  - Tabs
  - Dialog boxes
  - Help
  - Gesture Control
- Files and Folders
  - Files share data and programs
  - Folders store related files



Categories of Operating Systems

- Three basic categories
  - Embedded operating systems – RTOS (real-time operating systems)
    - Smartphones
    - Smartwatches
    - Video game systems
  - Stand-alone operating systems
    - Also called desktop operating system
  - Network operating systems (linked computers)
    - Windows Server, Linux, Unix
    - OS stored on network server which coordinates all communication between the other computers

Mobile Operating Systems

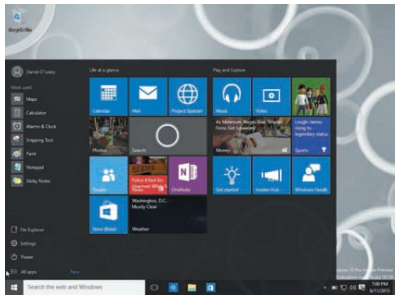
- Mobile OS
  - Embedded operating system
    - Less complicated and more specialized for wireless
  - Some of the best known
    - Android
    - iOS
    - Windows Phone

Desktop Operating Systems

- Operating systems commonly used by individuals
  - Windows – most widely used
  - Mac OS – powerful and easy to use
  - UNIX – network; originally designed for Web
  - LINUX – non proprietary; free from the Web

Windows - mac

- **Windows 10**
- Merges Windows desktop and mobile operating systems



- **macOS**
- Runs only on Apple computers
- Most innovative operating systems

UNIX and LINUX

- UNIX operating system
  - Servers on the Web
  - Mainframe computers
  - Personal Computers
- LINUX - version of UNIX
  - Alternative to windows
  - Open source - free
  - Google Chrome OS based on Linux
    - Focuses on Internet connectivity and cloud computing
    - Speed is determined by the speed of the Internet

Virtualization

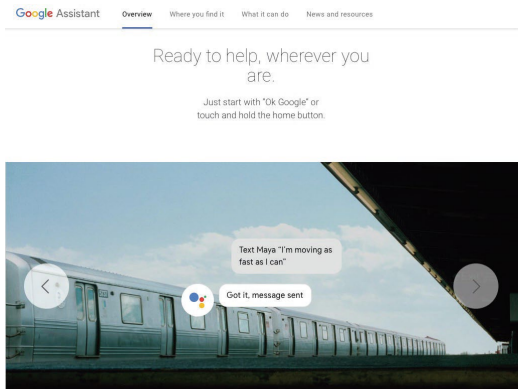
- Ability to support multiple operating systems on a single physical machine
- Virtualization software
  - Each virtual machine appears as a separate independent computer
    - Host operating system
    - Guest operating system
- Parallels
  - Mac to run Windows programs in OS X

Utilities

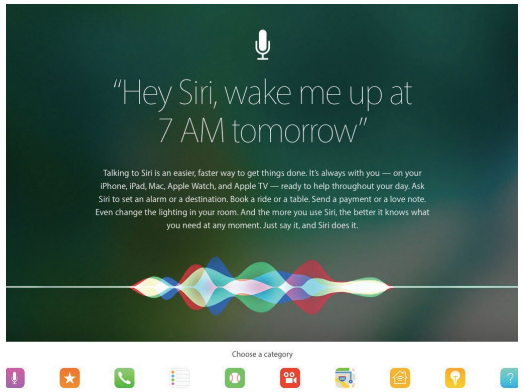
- Specialized programs to make computing easier
- Most essential utilities
  - Troubleshooting or diagnostic programs
    - Recognizes and correct problems
  - Antivirus programs
    - Guard your computer against viruses
  - Backup programs
    - Copies of files to restore if necessary
  - File compression programs
    - Reduces the size of files for more efficient storage

Making IT Work for You – Virtual Assistant

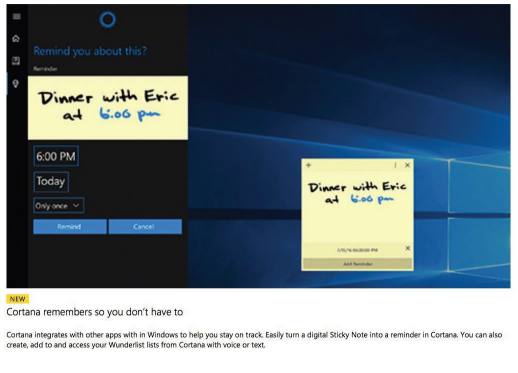
- Your personal assistant just waiting for you to take advantage of it.



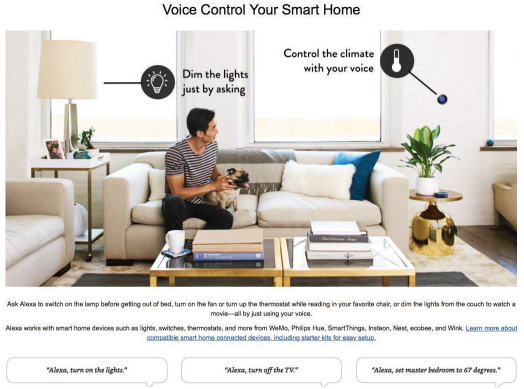
Google's Assistant



Apple's Siri



Microsoft's Cortana



Amazon's Alexa

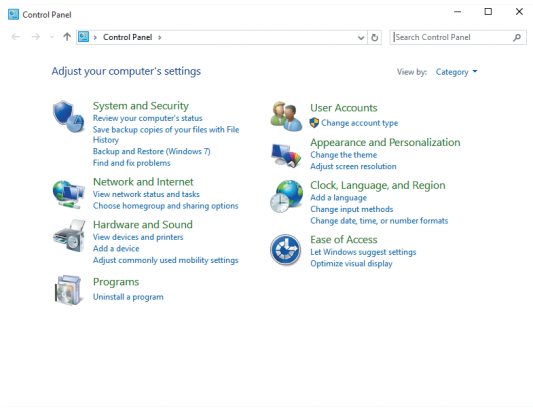
Windows Utilities

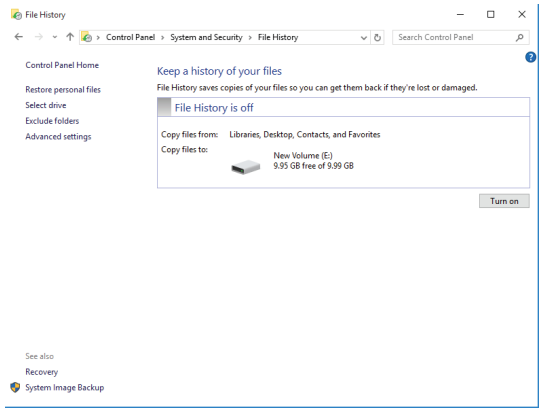
Windows Operating Systems includes utilities such as:

- File History
  - Can create a backup for your hard drive
- Disk Cleanup
  - Identifies and eliminates non essential files
- Disk Defragmenter
  - Rearranges files and unused disk space to optimize performance

File History

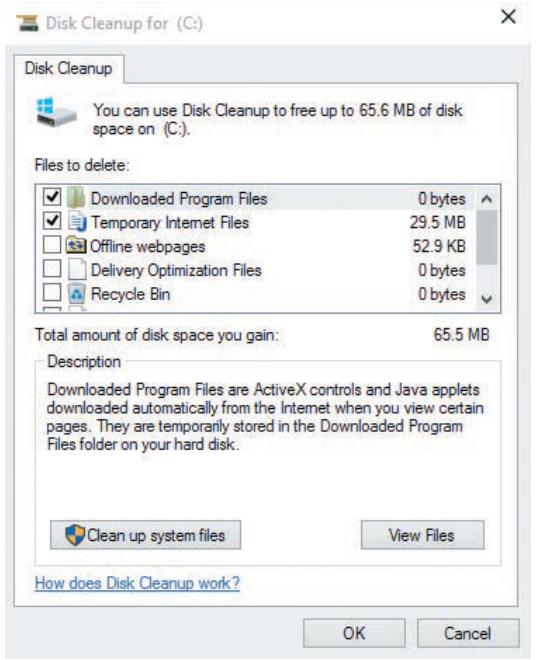
- Utility program included with Windows 10
- Makes a copy of all files in the libraries, contacts, favorites and the desktop
- Helps prevent the effect of disk failure

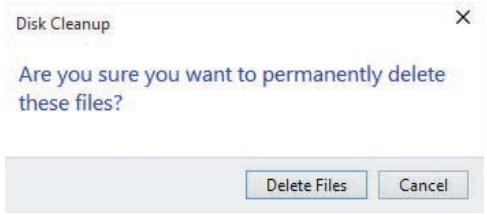


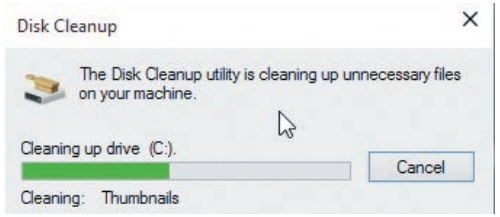


Disk Cleanup

- Identifies and eliminates nonessential files
- Frees up valuable space and improves system performance

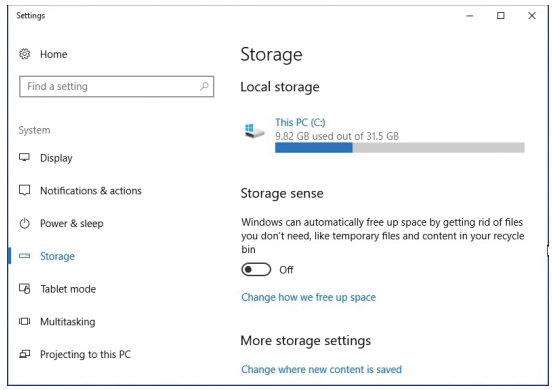


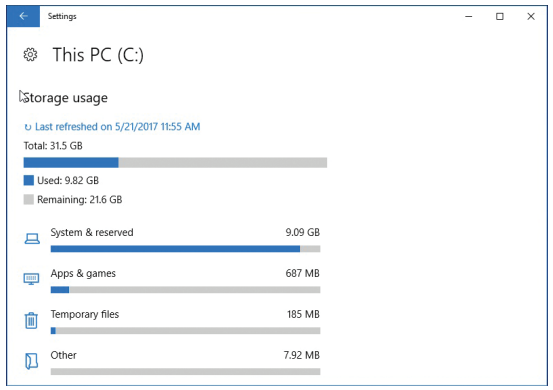


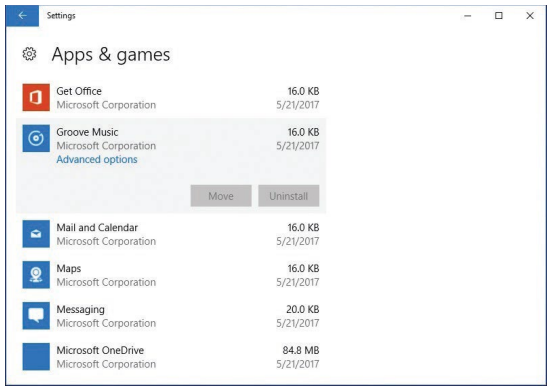


Storage

- Utility program included with Windows 10
  - Eliminates unused files and applications
  - Gives OS the space needed to run at peak efficiency

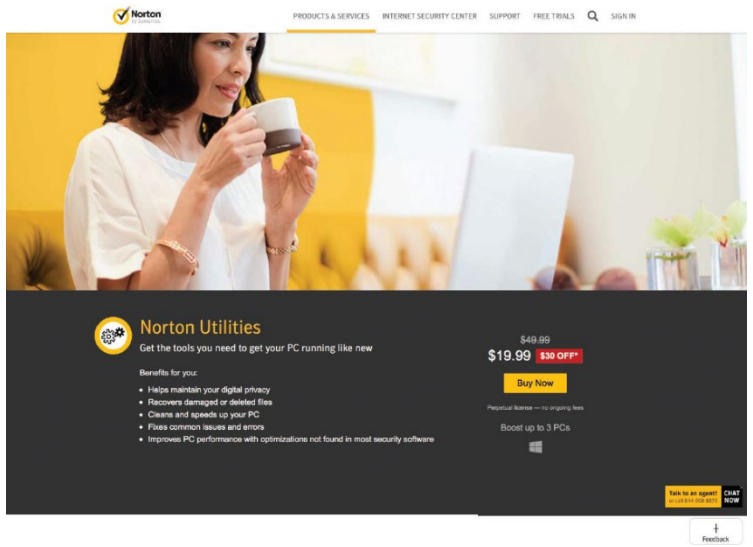






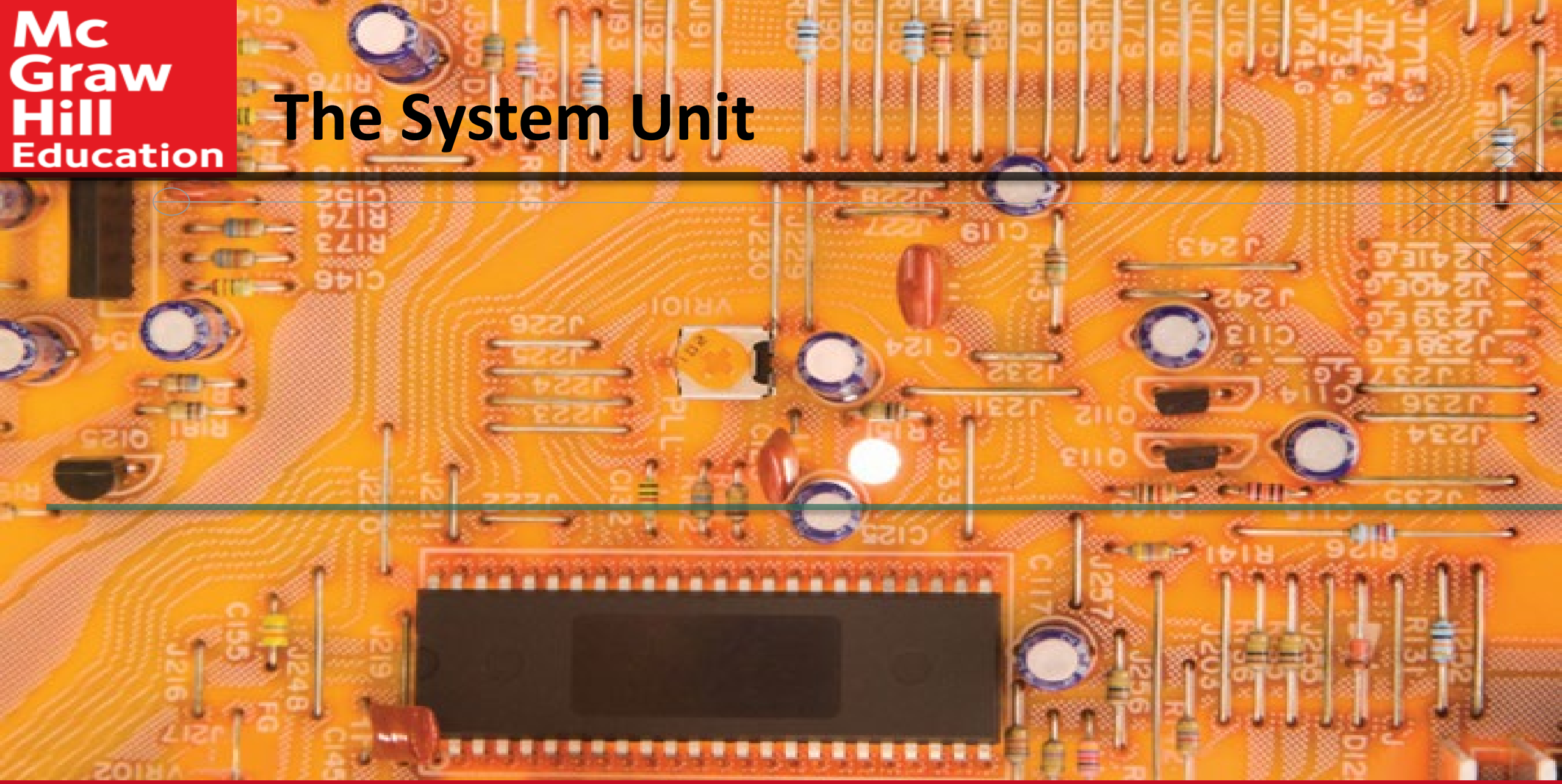
Utility Suites

- Combine several programs into one package
- Less expensive
- Popular suites
  - Bit Defender
  - Norton Utilities
  - Kaspersky



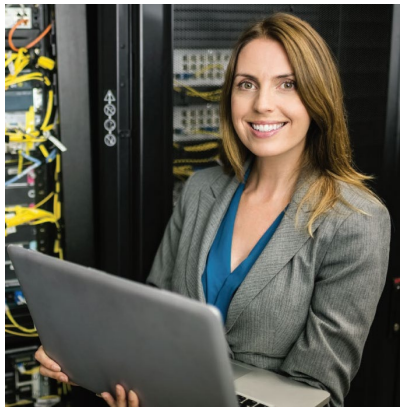
Mc Graw Hill Education

The System Unit



Introduction

- Speed, capacity, and flexibility determine the power of personal computers.
- Knowledge of a computer's power allows you to make good buying decisions and to determine if your current system will run new applications.
- Competent end users need to understand the functionality of the basic components of the system unit



System Unit

- Container that houses most of the electronic components that make up a computer system
  - System Chassis
- Personal Computer - Most widely used type of computer
- Five most common types
  - Desktops
  - Laptops
  - Tablets
  - Smartphones
  - Wearable Computers

System Unit Types

1. Desktops
   - System unit is in a separate case
     - Tower Units
     - All-in-Ones
       - All components including monitor

2. Laptops
   - Portable and much smaller
     - Two-in-one laptops
     - Ultrabooks
     - Gaming

System Unit Types cont.

3. Tablet or Tablet Computer
   - Mini tablet

4. Smartphone
   - Most popular device – handheld computer
   - Extend the capabilities of cell phones
5. Wearables
   - Contain embedded computers
     - Smartwatch
     - Activity Trackers

Making IT Work for You ~ Gaming

- Console gaming
- Mobile gaming
- PC gaming

Components

- Although all devices come in many shapes and sizes they have similarities such as
  - System boards
  - Microprocessors
  - Memory

System Board

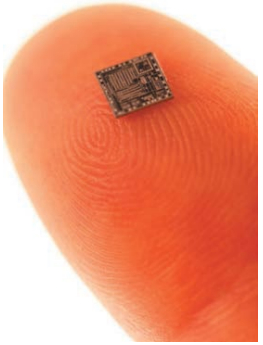
System board or main board or motherboard controls communication for the entire computer system

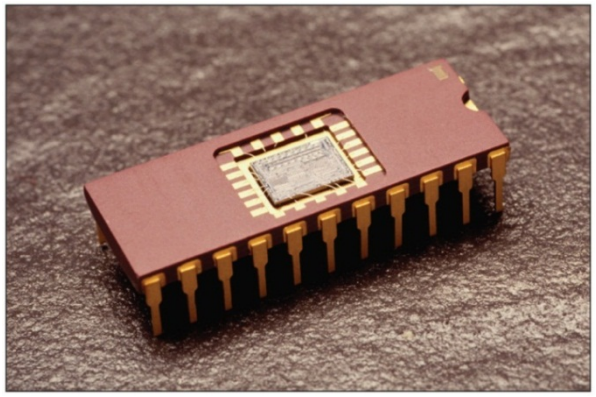
- All components and devices connect to the system board
- Data path and traffic monitor
  - Allows various components to communication efficiently with one another

Sockets and Chips

The system board contains a variety of electronic components

- Sockets – the connection point for chips
- Chips
  - Tiny circuit boards etched onto squares of silicon
  - Also called silicon chip, semiconductor, or integrated circuit
  - Mounted on chip carriers





Slots and Bus Lines

Additional system board components:

- Slots
  - Provide a connection point for specialized cards or circuit boards
  - Provide expansion capabilities for the computer
- Bus lines
  - Connecting lines that provide pathways to support communication among electronic components

Microprocessor

- Central Processing Unit (CPU) or Processor
  - Contained on a single chip call a Microprocessor
  - Brains of the computer
- Two Basic Components of the CPU
  - Control unit
    - Tells the computer system how to carry out a program's instruction
  - Arithmetic-logic unit (ALU)
    - Performs arithmetic and logical operations

Microprocessor Chips

- Chip capacities are expressed in word size
  - Word is the number of bits that can be processed at one time: 16, 32 or 64
- Clock Speed
  - Processing speed or the number of times the CPU fetches and processes data or instructions in a second

Unit	Speed
Microsecond	Millionth of a second
Nanosecond	Billionth of a second
Picosecond	Trillionth of a second
Femtosecond	Quadrillionth of a second

Multicore Chips

- Multicore Processors
  - Two or more separate and independent CPUs within a system unit
    - Quad-core supports 4 core processes
- Parallel Processing
  - Computer's ability to divided tasks into parts that can be distributed across each core
  - Windows 10 and macOS High Sierra support parallel processing

Processor	Manufacturer
A-Series	AMD
E-Series	AMD
Atom	Intel
i7	Intel

Specialty Processors

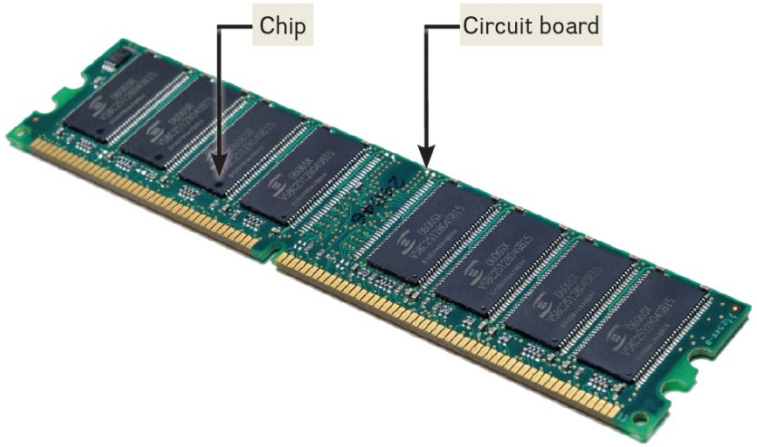
- Coprocessors
  - Designed to improve specific computing operations
  - Graphics Processing Unit (GPU) / Graphics coprocessors
  - Designed to handle a variety of specialized tasks
    - 3D images
    - Encrypting data
    - Standard features in gaming computers

Memory

- Holding area for data, instructions, and information
- Contained on chips connected to the system board
- Three well-known types of memory chips:
  - RAM
    - Random Access Memory
  - ROM
    - Read Only Memory
  - Flash Memory

RAM

- Random Access Memory (RAM) chips hold programs and data that the CPU is presently processing
  - Volatile or temporary – contents are lost when computer is powered off
- Cache memory – temporary, high-speed holding area between the memory and CPU
  - Additional RAM can be added using an expansion module called a DIMM (Dual in-line memory module)



RAM continued

- Virtual Memory
  - Dividing a program between memory and storage enabling the system to run very large programs
- Memory is expressed in bytes

Unit	Capacity
Megabyte (MB)	1 million bytes
Gigabyte (GB)	1 billion bytes
Terabyte (TB)	1 trillion bytes

ROM

- Read-only memory (ROM)
  - Information stored by the manufacturer
  - Non-volatile and cannot be changed
- CPU can read, or retrieve data and programs in ROM but the computer cannot change ROM
- Contain special instructions
  - Start the computer
  - Access memory
  - Handle keyboard input

Flash Memory

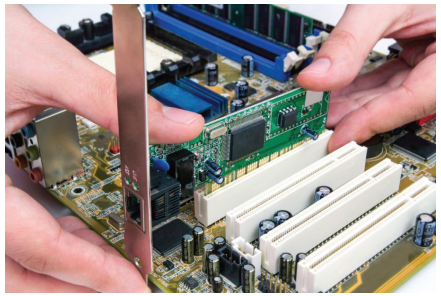
- Flash memory combines of the features of:
  - RAM, it can be updated
  - ROM, it is non-volatile
  - Contains startup information
    - BIOS (basic input/output system)
    - Amount of RAM
    - Type of keyboard, mouse, and secondary storage devices connected

Many ROM chips are being replaced by flash memory

Expansion Slots and Cards

Expands your system's capabilities

- Graphics cards for high quality 3D graphics
- Network interface cards (NIC) connect devices to networks via cables
- Wireless network cards connect devices to networks without cables
- SD cards
  - Expansion cards for mobile devices



Bus Lines / Bus

Connect parts of the CPU to each other and various other components on the system board

- Pathway for bits representing data and instructions
- Bus width
  - Number of bits that can travel simultaneously down a bus
- Architecture and design are tied to the speed and power for the computer
- Two basic categories of buses
  - System bus – connects CPU to memory
  - Expansion bus – connects CPU to other components

Expansion Buses

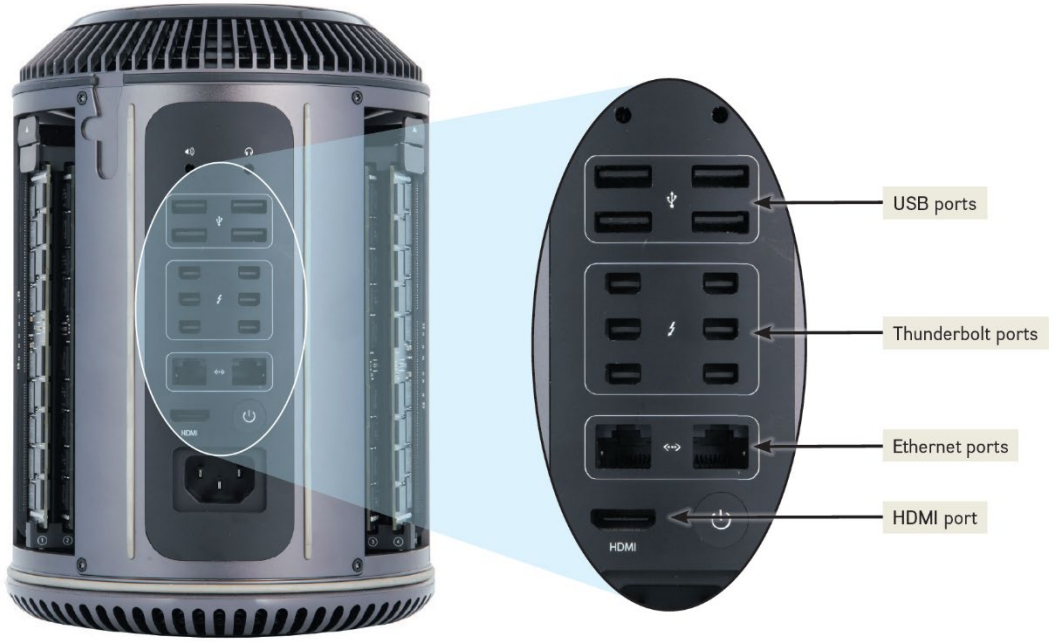
Principle types:

- Universal Serial Bus (USB)
  - Connects external USB devices onto the USB bus
- FireWire
  - Primarily used to connect audio and video equipment to the system board
- PCI Express (PCIe)
  - Single dedicated path for each connected device

Ports

Socket for connecting external devices to the system unit

- Ports connect directly
  - To the system board
  - To cards inserted into slots on the system board
- Two Types
  - Standard Ports
  - Specialized Ports



Standard Ports

- USB
  - Keyboards, mice, printers, storage devices
- Ethernet
  - High speed networking
- HDMI – High Definition Multimedia Interface
  - High definition video and audio
- Thunderbolt
  - Provides high-speed connections
  - Can connect up to 7 separate devices through 1 port

Specialized Ports

- External Serial Advanced Technology Attachment (eSATA)
  - High-speed connection for external secondary storage
- Musical Instrument Digital Interface (MIDI)
  - Connect musical instruments
- Mini DisplayPort (MiniDP or mDP)
  - Connection to large monitors
- VGA & DVI
  - Connections to analog and digital monitors
- FireWire
  - High-speed connections to FireWire devices

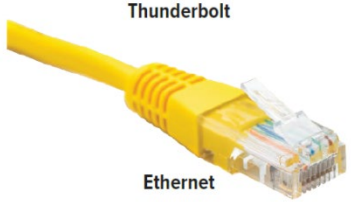
Cables

- Used to connect external devices to the system unit via the ports
- One end of the cable is attached to the device and the other end has a connector that is attached to a matching connector on the port


USB


HDMI


Thunderbolt


Ethernet

Power Supply

- Computers require direct current (DC) power converting alternating current (AC) from wall outlets or batteries
  - Desktop computers have a power supply unit in the system unit
  - Laptops use AC adapters in the system unit
  - Tablets and mobile devices use internal AC adapters
  - Smartphones can use wireless charging platforms

Electronic Data and Instructions

- Digital electronic signals
  - Recognized by computers
- Analog signals
  - Continuous signal
  - Created by voices
- Conversion must take place from analog to digital before processing can occur

Numeric Representation

- Two-state binary system consists of only two digits called bits
  - On = 1; negative charge
  - Off = 0; no charge
- Byte = 8 bits grouped together
- Hexadecimal system
  - Uses 16 digits to represent binary numbers

(0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F)

Decimal	Binary	Hex
00	00000000	00
01	00000001	01
02	00000010	02
03	00000011	03
04	00000100	04
05	00000101	05
06	00000110	06
07	00000111	07
08	00001000	08
09	00001001	09
10	00001010	0A
11	00001011	0B
12	00001100	0C
13	00001101	0D
14	00001110	0E
15	00001111	0F

Character Encoding

Character encoding standards assign a unique sequence of bits to each character

- ASCII
  - American Standard Code for Information Interchange
  - Used by personal computers
- EBCDIC
  - Extended Binary coded Decimal Interchange Code
  - Used by mainframe computers
- Unicode
  - New encoding due to explosion of the Internet
  - Uses 16 bits
  - Recognized by virtually all computer systems