

Dept.: Remote Sensing and GIS
Subject : Introduction to Computers
Class : First Year
Lecture No. 1
Instructor: Mr. Alaa Hassan Harif

Chapter 1: Computer Basics

Learning Objectives:

Understand the purpose and elements of information systems

Recognize the different types of computers

Distinguish the main software types

Identify the components of a computer system

Understand how computers communicate

Understanding Information Systems

Information system: An interconnected environment for managing and processing data using a computer

Parts of an information system:

- People
- Hardware
- Software
- Procedures
- Data

Computer Types

Personal Computers

- Desktop PC
 - System unit, separate monitor, keyboard, mouse
- Notebook PC
 - Fold-up design, built-in keyboard and screen
- Tablet PC
 - Slate design, touch screen, no separate keyboard, mouse, or monitor
- Smartphone
 - Hand-held, phone and computer, touch screen

Computer Types

Multi-User Computers

- Server
 - Serves and supports a network
 - Provides centrally accessible storage space
 - Shares printers
 - Does not directly provide processing power to clients
- Mainframe
 - Collects large amounts of business data
 - Provides processing support to terminals
- Supercomputer
 - Largest computer available
 - Universities, research, government

Software Types

Basic Input Output System (BIOS)

- Read-only chip on motherboard
- Startup instructions for computer

Operating System (OS)

- User interface
- Runs application
- File storage
- Communication with hardware

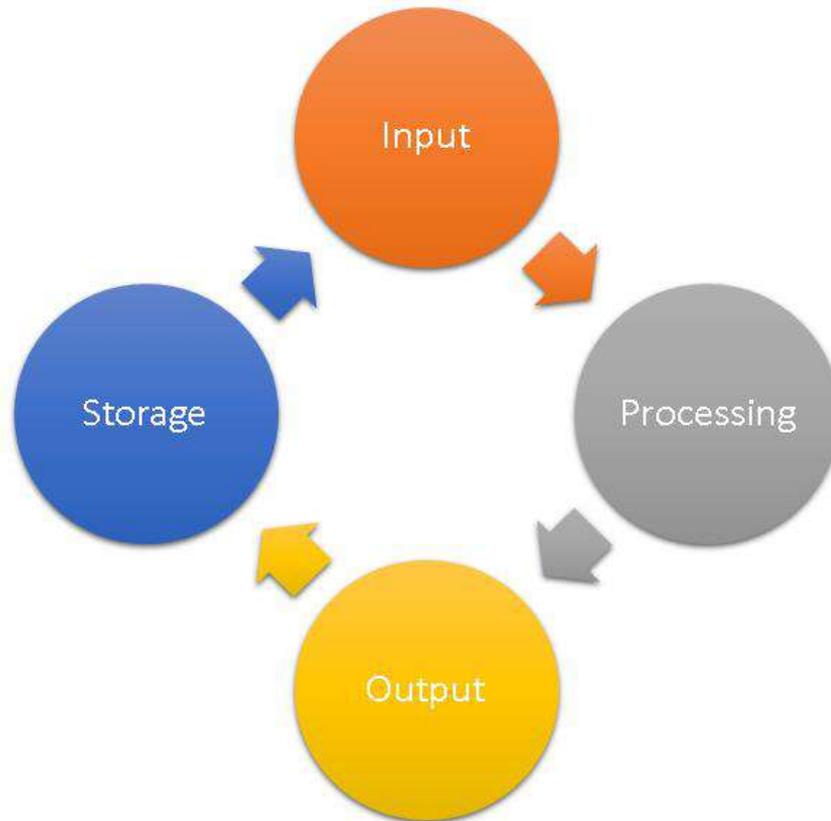
Utilities

- Error correction, optimization, protection

Application Software

- Productivity tools, graphics, games, multimedia

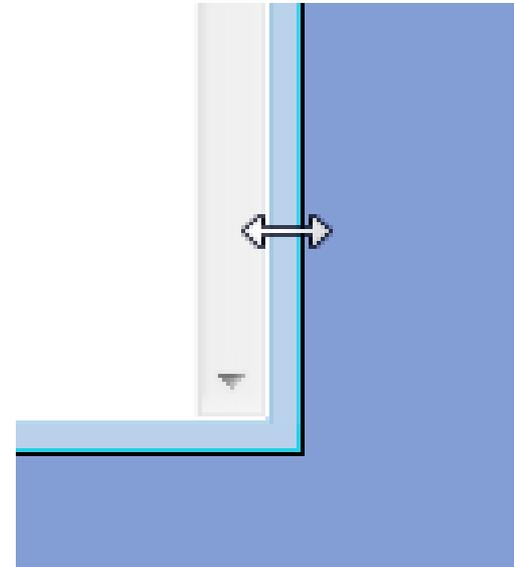
Information Processing Cycle



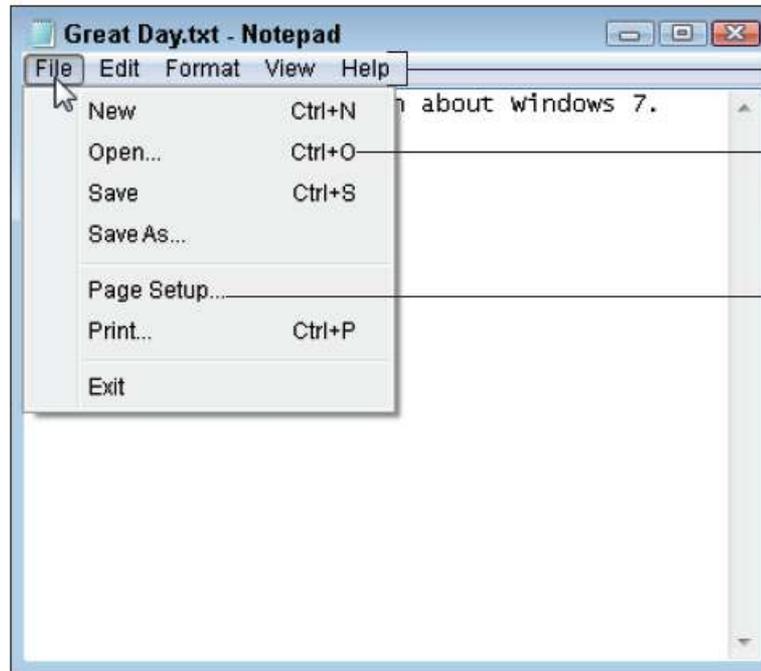
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Class : First Year
Lecture No. 10
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Resizing a Window

Drag the window's
border



Application Menus

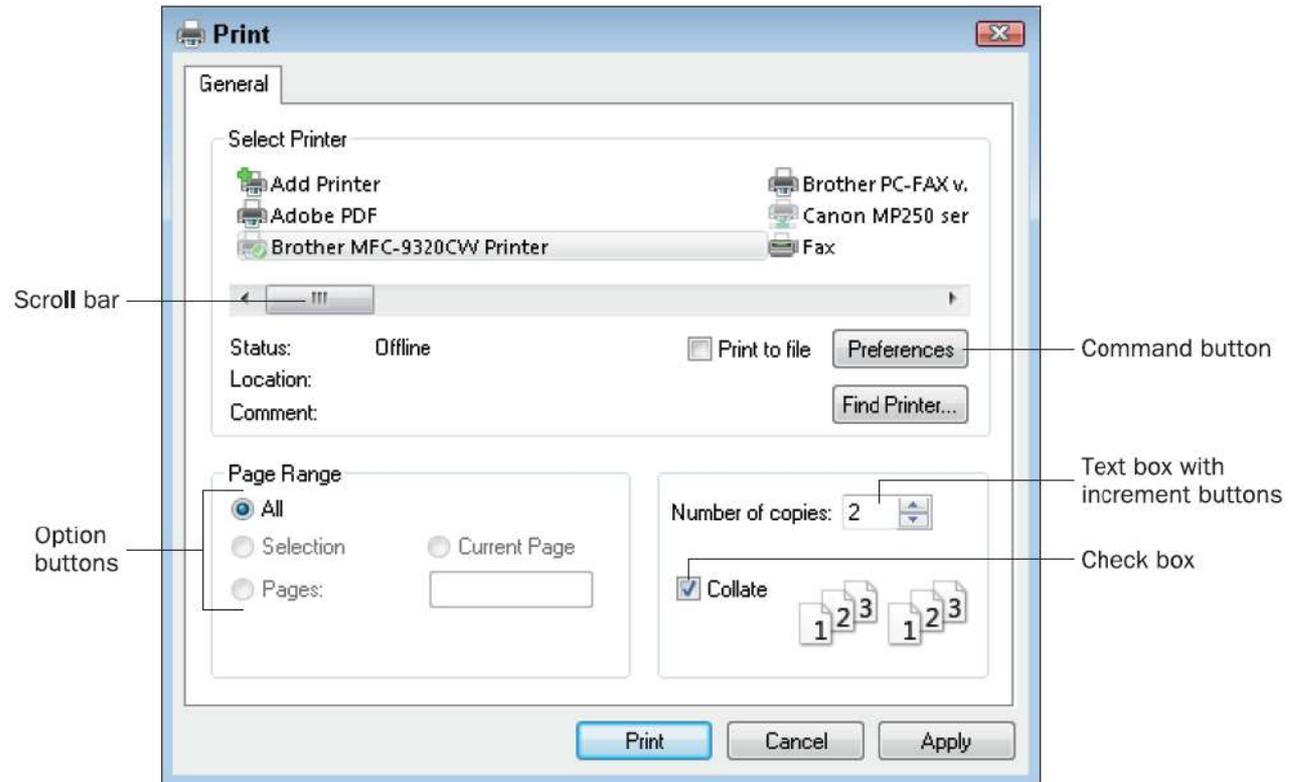


Menu bar

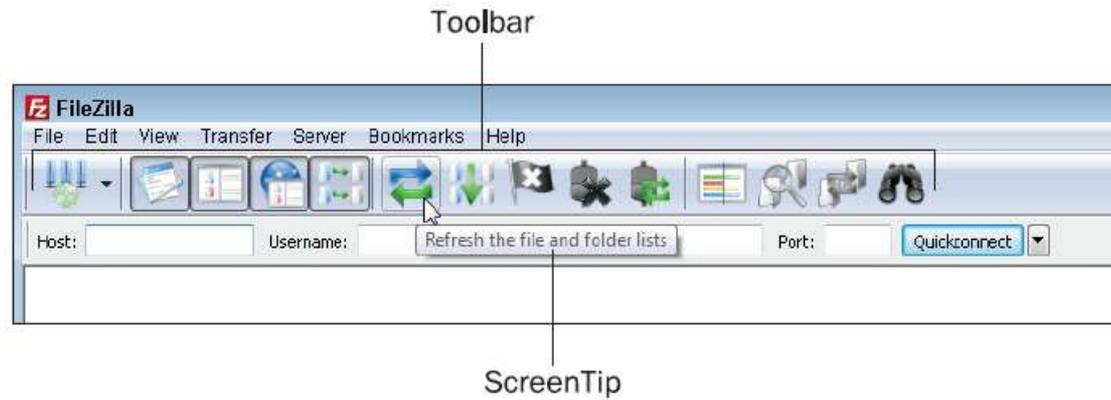
Keyboard shortcuts

An ellipsis indicates a dialog box will appear

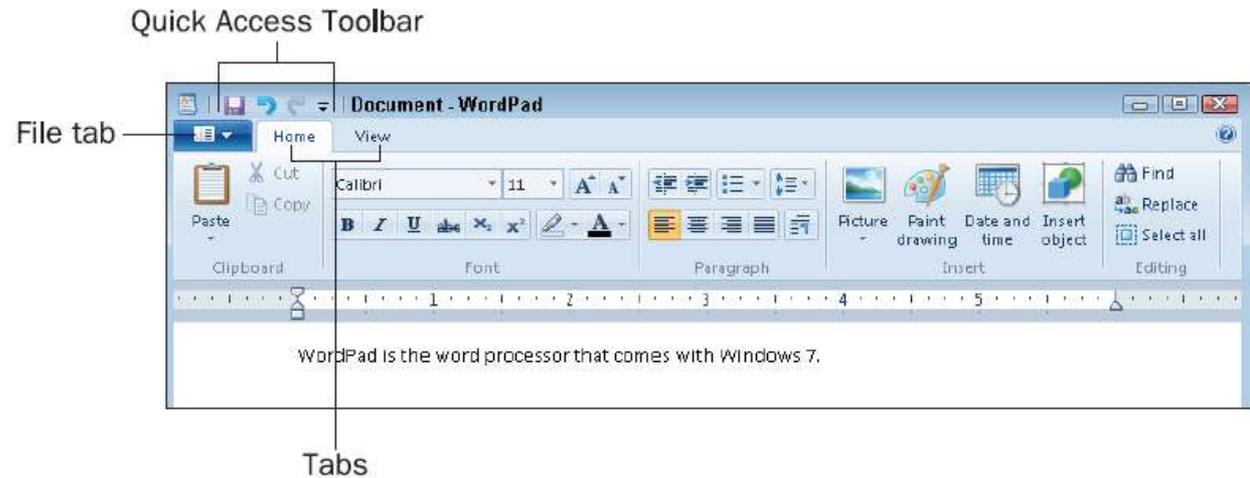
Dialog Box Controls



Toolbars

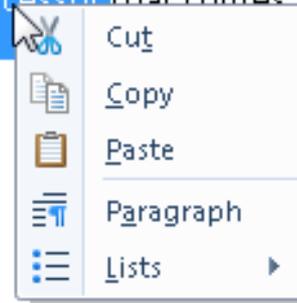


Ribbon



Context (Right-Click) Menu

WordPad is the word processor that comes with Windows 7.



Exiting an Application

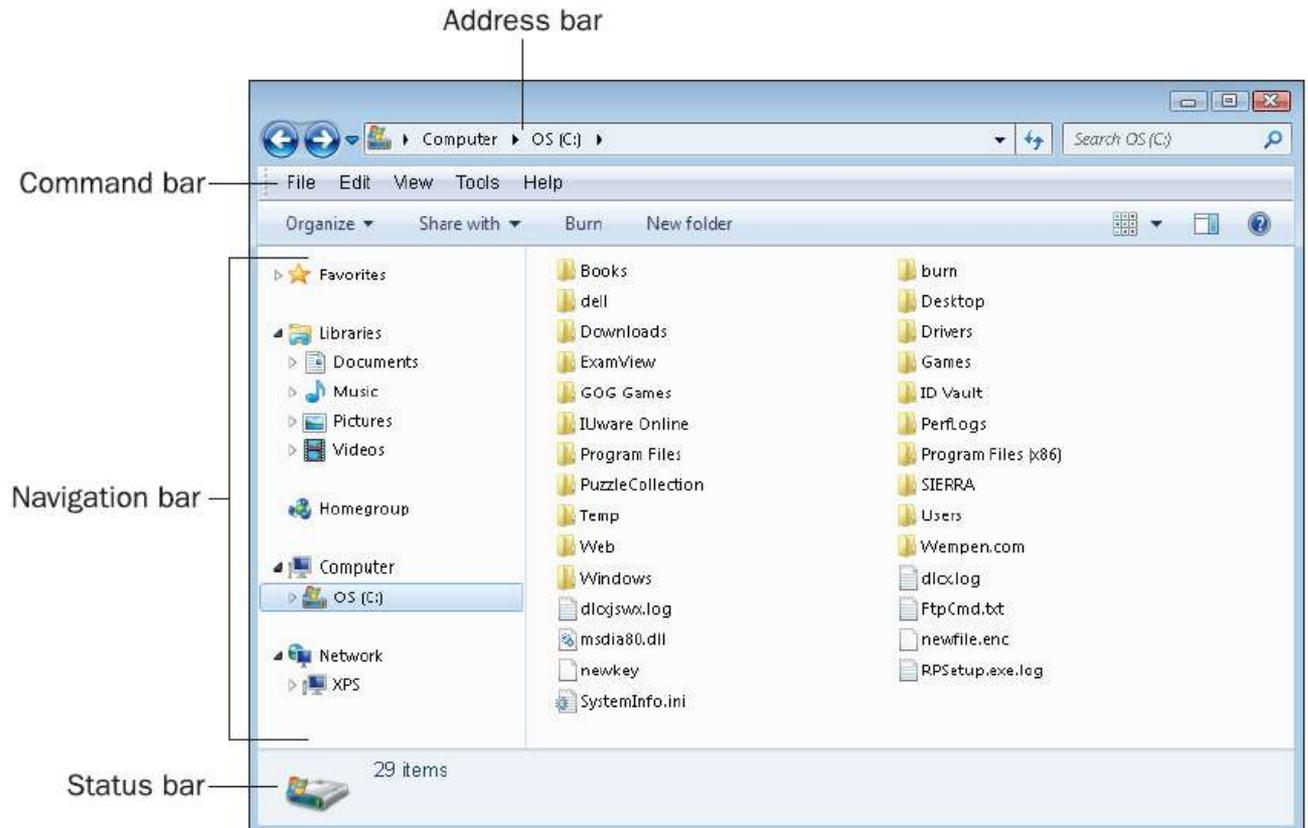
Close button

File, Exit

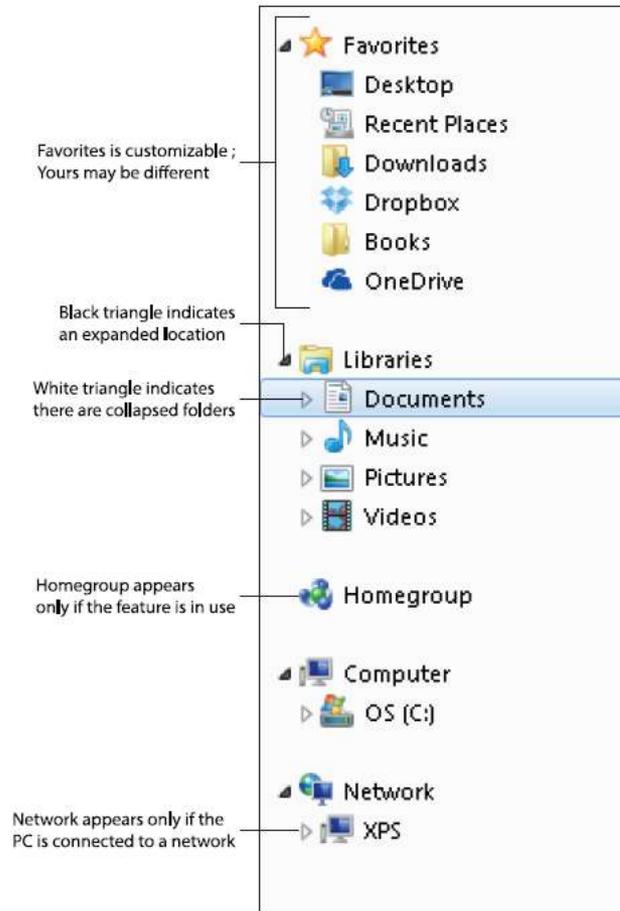
Alt+F4



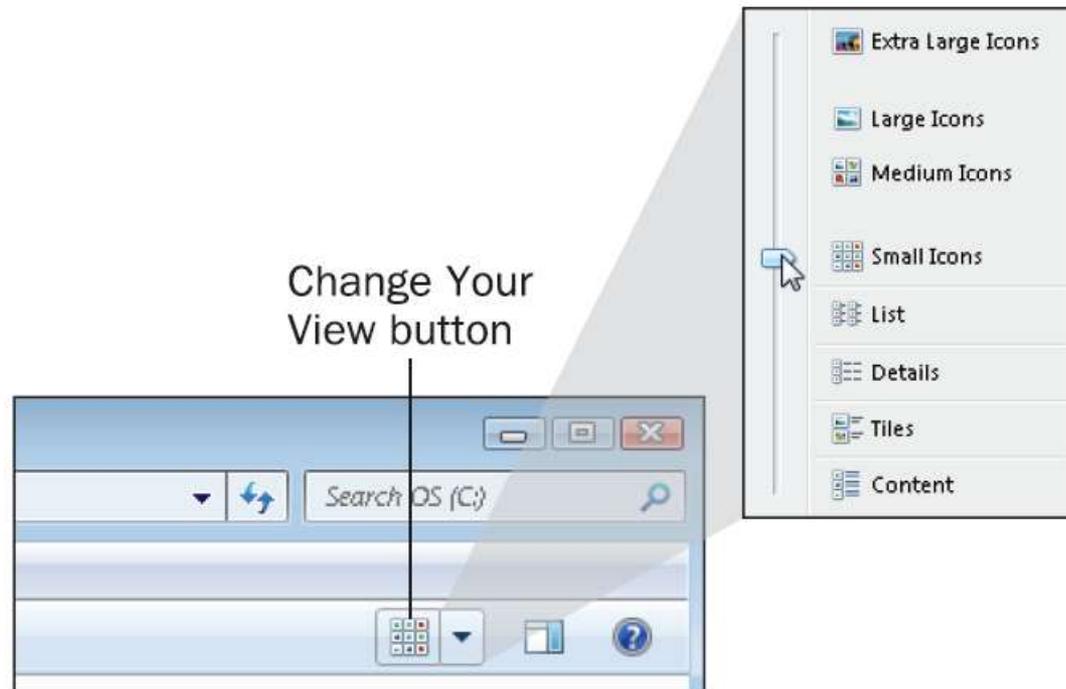
Windows Explorer Interface



Navigation Bar



Changing the View of a Location



Libraries

Virtual folders that combine the contents of one or more folders into a single view

Each library monitors one or more folders

Default libraries: Documents, Music, Pictures, Videos

Selecting Files and Folders

Click to select a single item

Hold down Shift to select contiguous selection

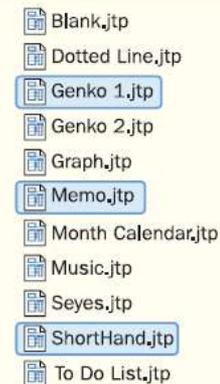
Hold down Ctrl to select non-contiguous selection

Contiguous vs. Non-Contiguous Selection

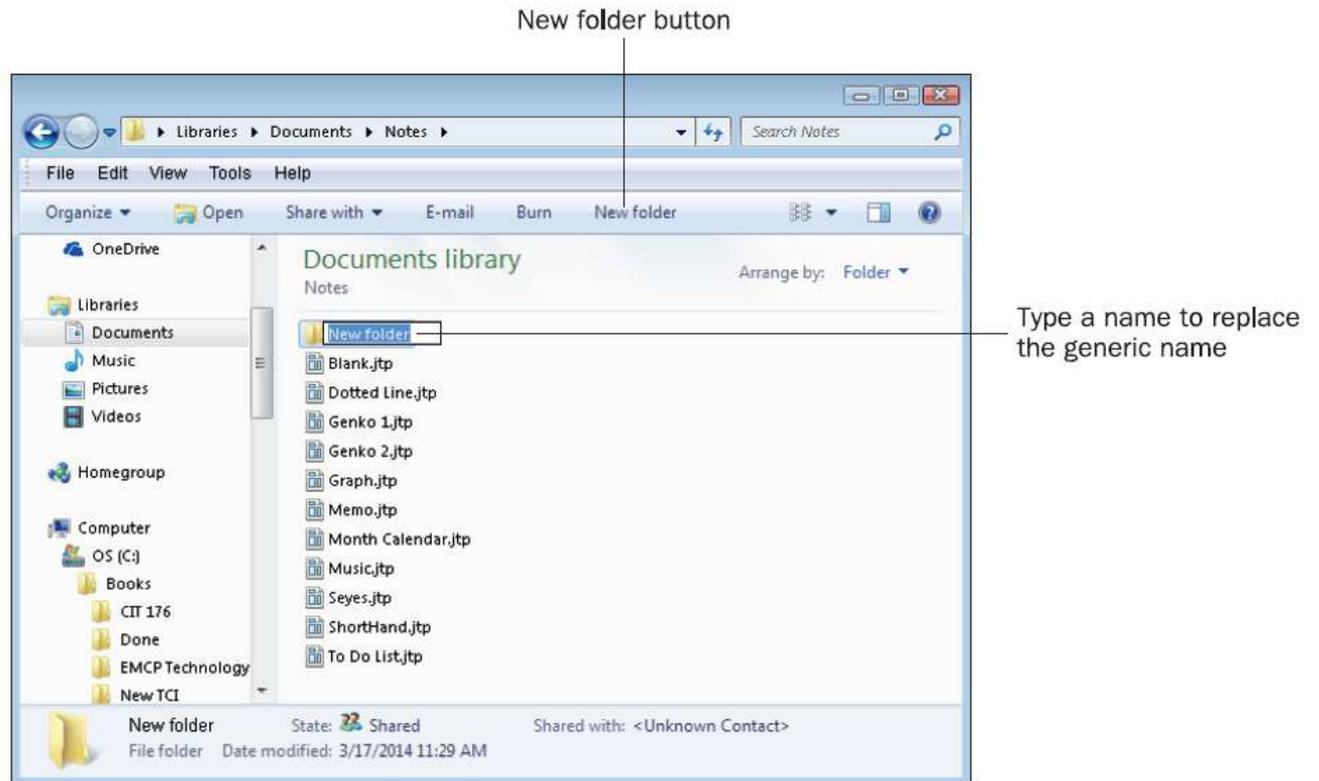
Contiguous: Hold down Shift as you click the first and last items



Non-Contiguous: Hold down Ctrl as you click each item individually



Creating New Folders



Renaming and Deleting

Renaming

- Select the file and press F2 to make the name editable; then type the new name
- Click the file and then click it again to move the insertion point into the name. Edit the name.
- Right-click the file or folder and click Rename.
- Select the item and then open the File menu and choose Rename.

Deleting

- Press Delete on the keyboard.
- Right-click the item and click Delete.
- Open the File menu and click Delete.

Moving and Copying

Clipboard: A reserved area in memory for temporarily holding content that has been cut or copied

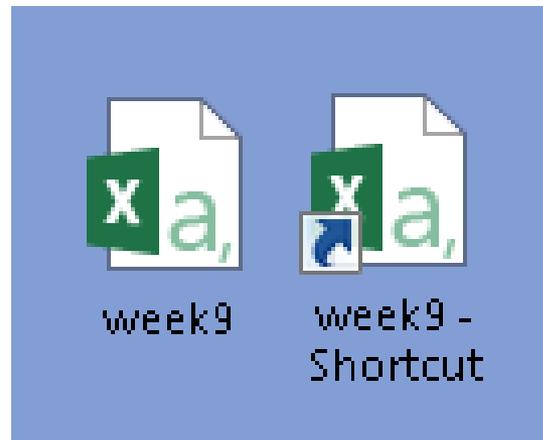
<i>Operation</i>	<i>Keyboard Method</i>	<i>Right-Click Method</i>	<i>Menu Method</i>	<i>Command Bar Method</i>
Cut	Ctrl+X	Right-click and choose Cut	Open the Edit menu and click Cut	Click Organize and click Cut
Copy	Ctrl+C	Right-click and choose Copy	Open the Edit menu and click Copy	Click Organize and click Copy
Paste	Ctrl+V	Right-click and choose Paste	Open the Edit menu and click Paste	Click Organize and click Paste

Shortcuts

Shortcut: A pointer to a file or folder

Some shortcuts have a small arrow in the corner of the icon

To create a shortcut, right-drag and then select Create Shortcuts Here.



Key Terms

address bar

All Programs

Clipboard

cold boot

command bar

contiguous

desktop

dialog box

Hibernate mode

homegroup

icons

keyboard shortcut

library

lock

log off

maximize

menu bar

minimize

non-contiguous

notification area

pinned

restore

Ribbon

save location

Search box

shortcut

shortcut menu

Sleep mode

Start button

Start menu

Switch User

system tray

taskbar

title bar

toolbar

virtual folder

warm boot

window

Summary

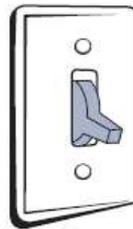
- 1 . Describe the major features of the Start menu and desktop.
- 2 . Explain the alternatives available to completely shutting down your computer at the end of your work session.
- 3 . Explain how to start and exit an application.
- 4 . Describe how to move, resize, minimize, maximize, and close a window.
- 5 . Describe the controls used in dialog boxes.
- 6 . Explain how to move, copy, rename, and delete files and folders.
- 7 . Demonstrate how to navigate between storage locations using Windows Explorer.
- 8 . Explain the difference between a folder and a library.

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Subject : Introduction to Computers
Class : First Year
Lecture No. 2
Instructor: Mr. Alaa Hassan Harif

Desktop Components



How Data is Represented

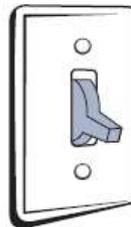


Bit = binary digit (0 or 1)

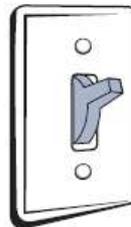
OFF is 0
ON is 1

Data is stored by grouping bits together into one or more bytes

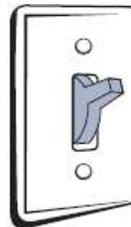
Each different combination of bits has a different meaning to the computer



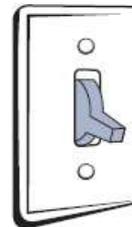
0



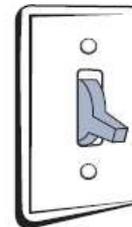
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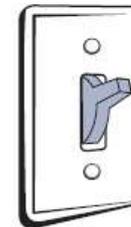
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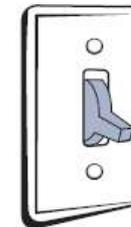
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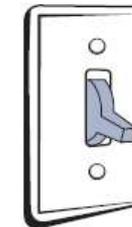
0



1



0



0

Byte = 8 bits (01100100)

Common Quantities of Bytes

Term	Number of Bytes
Kilobyte (KB)	1024 (approximately one thousand)
Megabyte (MB)	1,048,576 (approximately one million)
Gigabyte (GB)	1,073,741,824 (approximately one billion)
Terabyte (TB)	1,099,411,627,776 (approximately one trillion)
Petabyte (PB)	1,125,899,906,842,6624 (approximately one quadrillion)

Information Processing

Input

- Keyboard, pointing devices, digital cameras, scanners, bar code readers

Processing

- Motherboard, CPU, memory, buses, chipset

Output

- Monitor, printer

Storage

- Hard drive, USB flash drive, CD, DVD

Ethernet Networking

Ethernet networking

- Wired Ethernet
- Wi-Fi (802.11)

Hardware

- Network interface card (NIC), a.k.a. network adapter
- Switch
- Router
- Cable (copper, fiber optic)

Types of Networks

- Client/server
- Peer to Peer

Other Ways Computers Communicate

Bluetooth

- Short-range personal networking
- Device connectivity

Internet

- Dial-up
- Broadband
- Internet service provider
- TCP/IP

Key Terms

application software	information system	pointing device
backbone	Internet	processor
BIOS	Internet service	productivity software
bit	provider (ISP)	router
Bluetooth	keyboard	server
broadband	mainframe	server farm
buses	memory	smartphone
byte	Microsoft Office	software
chipset	monitor	Software as a Service
client/server	motherboard	suite
desktop PC	netbook	supercomputer
Ethernet	network	switch
fiber optic cable	network adapter	system unit
global positioning	notebook PC	tablet PC
system (GPS)	operating system	Transmission Control
hard drive	(OS)	Protocol/Internet
hardware	peer-to-peer	Protocol (TCP/IP)
information	personal computer	utility software
processing cycle	(PC)	Wi-Fi

Summary

1. What are the five parts of an information system?
2. What is the difference between a server and a mainframe?
3. What distinguishes an operating system from an application?
4. What are the four parts of the information processing cycle?
5. What is Wi-Fi and what equipment does it require?

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Subject : Introduction to Computers
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Lecture No. 3
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Chapter 2: The System Unit

Learning Objectives:

Recognize how data is processed

Understand processors

Understand memory types and functions

Identify and use ports and buses

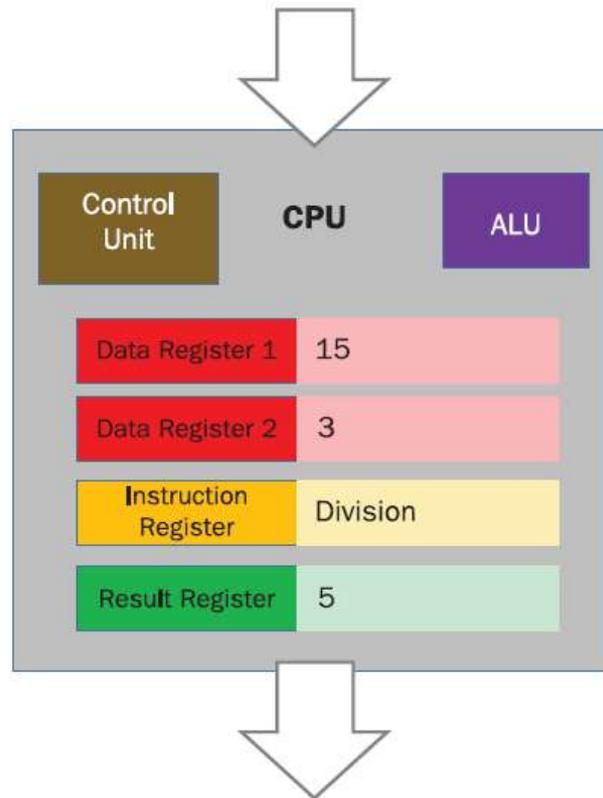
Troubleshoot common system unit problems

Understanding CPUs

Central Processing Unit (CPU)

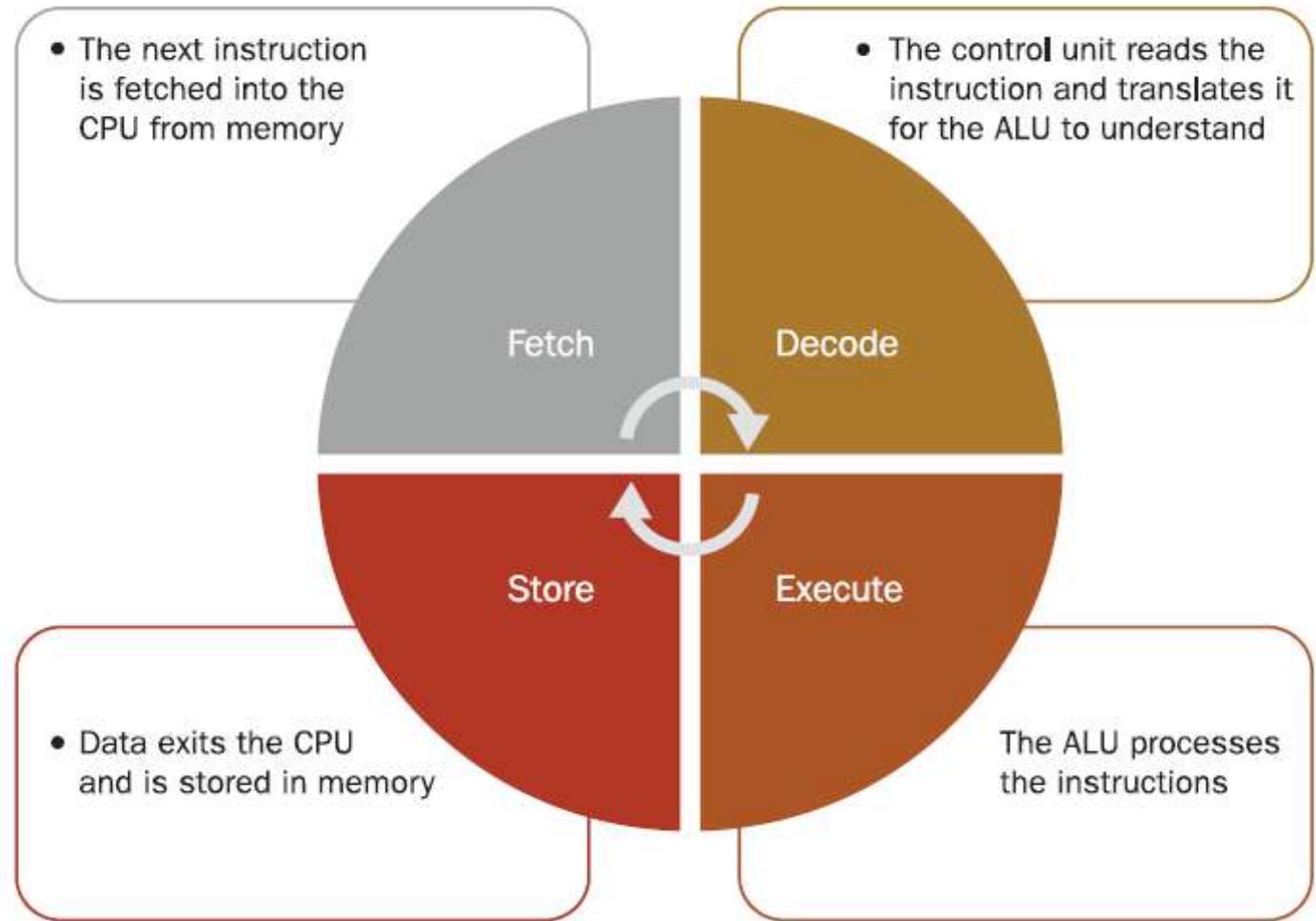
- Control Unit
 - Manages the flow of data through the CPU
- Arithmetic Logic Unit (ALU)
 - Does the actual processing
- Registers
 - Holding areas for data and instructions

Understanding CPUs



- A. **Control** unit fetches the data and places it in **data registers**.
- B. **Control** unit fetches the instruction and places in an **instruction register**.
- C. **Control** unit decodes the instruction to determine what needs to happen, and tells the ALU.
- D. **ALU** executes the instruction and places the result in a **result register**.
- E. **Control** unit orders the data in the **result register** to exit the CPU, where it is stored in memory.

The Machine Cycle



Physical Composition of a CPU

- Semiconductor material (silicon)
- Encased in a ceramic shell
- Mounted on a small circuit board
- Pins or contacts on the underside



Cores

Most modern PC CPUs have multiple **cores**

Common numbers of cores are 2, 4, 6, 8, 10, or 12

Each core has its own control unit, ALU, and registers

Multiple cores allows parallel processing for greater throughput

Caches

Cache is a small amount of fast memory located in or near the CPU

Stores recently used data or data soon to be used

Helps limit latency to improve performance

Multi-level cache system

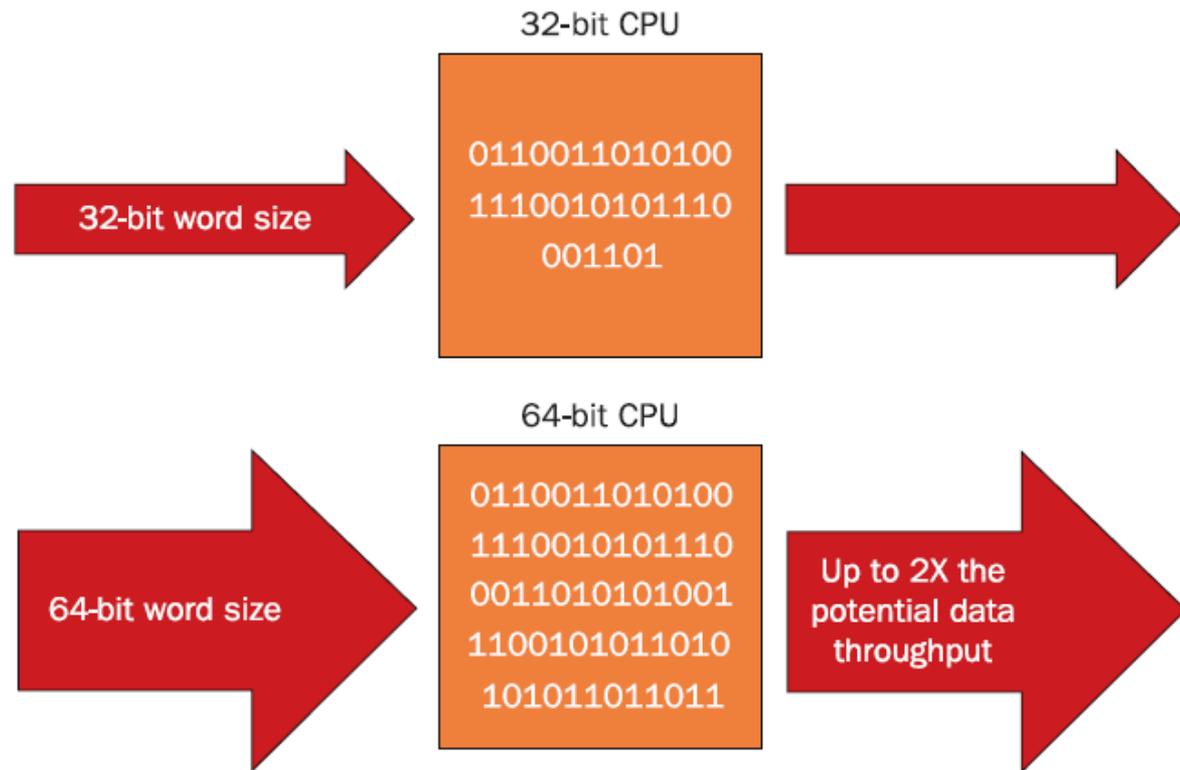
- L1, L2, L3
- L1 is smallest, fastest, closest to core
- Fetching from L3 takes 10 times as long as from L1

CPU Performance Factors

Speed (in gigahertz, GHz)

Instructions per Second

Word size (32-bit or 64-bit)



Understanding Memory

Static vs. Dynamic Memory

- Static = non-volatile
- Dynamic = volatile

Random Access Memory (RAM) vs. Read Only Memory (ROM)

- RAM = rewriteable
- ROM = not rewriteable (with exceptions)
- Electrically Erasable Programmable ROM (EEPROM), basis for solid-state drives and USB flash drives

How Computers Use Memory

System memory (main memory)

Component memory (printers, display adapters)

ROM-BIOS (EEPROM chip)

CPU caches

USB flash drives

Memory cards

Solid-state hard drives

Understanding System Memory

Main memory is **dynamic RAM (DRAM)**

Virtual memory is simulated memory from data-swapping on/off the hard drive

Paging file is the area of the hard drive dedicated for virtual memory

Memory addresses

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Subject : Introduction to Computers
Class : First Year
Lecture No. 4
Instructor: Mr. Alaa Hassan Harif

Memory's Physical Form

Dual inline memory modules (DIMMs)

Small-outline DIMMs (SO-DIMMs) for portables

Memory capacity per DIMM

- 2GB, 4GB, 8GB, 16GB, etc.

Synchronous DRAM (SDRAM) synchronizes with the system bus speed

Double data rate (DDR) SDRAM

- DDR2, DDR3, DDR4

Understanding Motherboards

Motherboard: large circuit board inside the computer

Capabilities dictated by **chipset**

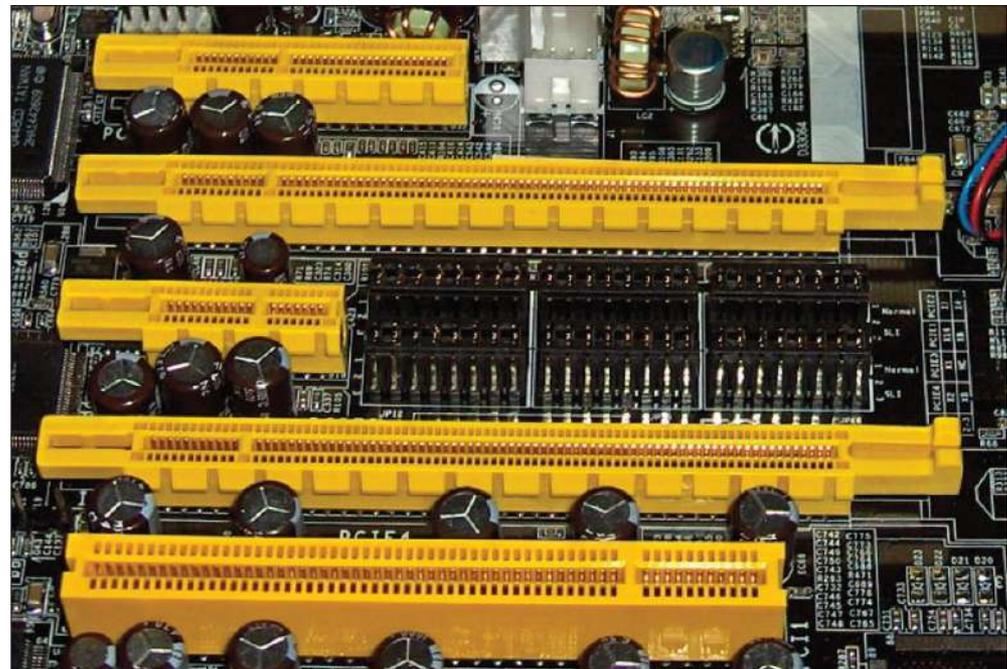
Form factor: size and shape of motherboard



Understanding Motherboards

Expansion slots in desktop motherboard, for expansion cards

- PCI
- PCI Express (PCIe), x1, x4, x16



Understanding Motherboards

ExpressCard slot in notebooks

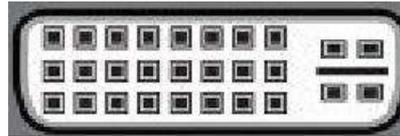
PCI Express Mini Card socket in notebooks



Built-In Components

Graphics Ports:

- Digital Visual Interface (DVI)



- Video Graphics Array (VGA)



Built-In Components

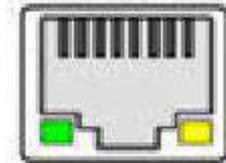
Speakers/Headphones

- 3.5 mm



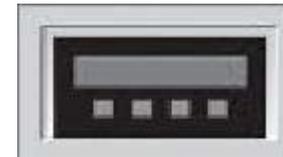
Ethernet networking

- RJ-45 jack
- Resembles a wide telephone plug



Universal Serial Bus (USB)

- USB 1.1, 2.0, 3.0 speeds



FireWire (IEEE 1394)



Built-In Components (Legacy)

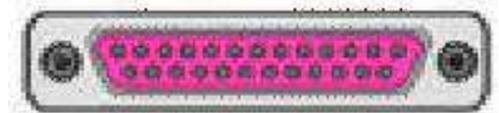
PS/2

- Used for older keyboards and mice



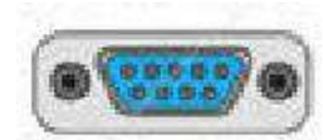
Parallel Port

- Used for older printers



Serial Port

- Used only for very old components (mice, modems)



Drive Connectors

Parallel ATA

- Older hard disk drives
- Older CD and DVD drives

Serial ATA

- Newer hard disk drives
- Newer CD and DVD drives
- Solid-state hard drives

Understanding Power Supplies

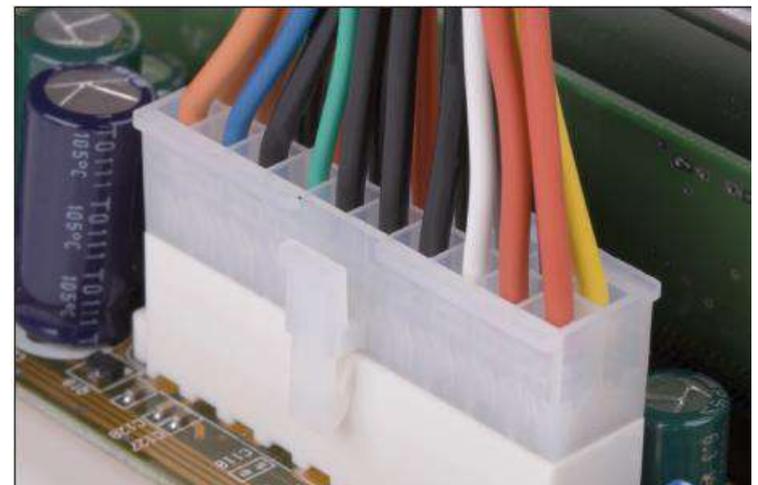
Power supply
has two functions:

- Converts AC to DC
- Decreases the voltage to the appropriate levels for the devices it powers



Wire Colors

Wire Color	Voltage
Black	Ground/neutral
Red	+5v
Yellow	+12v
White	-5v
Blue	-12v



Notebook Power Supply

Transformer block (brick)



Troubleshooting System Unit Problems

No Response

- Check for power
- Hold down Power button for 10 seconds, then press it again
- Do a soft reset (mobile device)
- Do a hard reset (mobile device)

Fan Noise but Nothing Onscreen

- Power-on Self Test (POST) card diagnostic
- Remove all non-essential hardware
- Remove newly installed hardware

Troubleshooting System Unit Problems

Error Message on Black Screen

- Troubleshoot according to the message received
- Research error message online
- Use CMOS Setup (BIOS Setup) to adjust settings or check device status

Error Message on Bright Blue Screen

- “Blue Screen of Death” (BSOD)
- Turn computer off and back on again
- If error persists, there may be a hardware incompatibility or failure

Troubleshooting System Unit Problems

Windows Hangs at Startup

- Restart in Safe Mode
- Prevent non-essential drivers and programs from loading

PC Shuts Down or Freezes

- Most likely overheating

Key Terms

active heat sink
benchmark
cache
Central Processing Unit (CPU)
chipset
CMOS setup
core
Digital Visual Interface (DVI)
double data rate (DDR)
dual inline memory module (DIMM)
dynamic memory
Electrically Erasable Programmable ROM (EEPROM)
expansion cards
expansion slots
ExpressCard
form factor
gigahertz (GHz)
hard reset
heat sink
hertz
IEEE 1394A
instructions per second
latency
machine cycle
memory address
motherboard
overclock
paging file
Parallel ATA
parallel port
PCI Express (PCIe)
PCI Express Mini Card
Peripheral Component Interface (PCI)
POST card
power supply
power-on self test (POST)
PS/2
Random Access Memory (RAM)
Read-Only Memory (ROM)
RJ-45 jack
semiconductor
Serial ATA
serial port
single data rate (SDR)
soft reset
static memory
swap file
synchronous dynamic RAM (SDRAM)
system clock
system memory
transformer block
Universal Serial Bus (USB)
Video Graphics Adapter (VGA)
virtual memory
word size

Summary

- 1 . What are the three basic components inside a CPU?
- 2 . What are the four steps of the machine cycle, and how do the parts you named in #1 fit into it?
- 3 . How do the L1, L2, and L3 caches improve CPU performance?
- 4 . What is the difference between static and dynamic memory?
- 5 . What are four ways in which one motherboard may differ from another?
- 6 . Why does a power supply have different colored wires?

Dept.: Remote Sensing and GIS
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Chapter 3: Input, Output, and Storage

Learning Objectives:

Define input and describe the available types of keyboards and pointing devices

Describe scanning and image-capturing device types and features

Define output and explain the types of output devices available

Differentiate between types of monitors and explain their features

Differentiate between types of printers and identify the best printer for a task

Chapter 3: Input, Output, and Storage

Learning Objectives (continued):

Classify storage devices according to their capacities, interface, and media

Explain cloud and network storage and identify online and network-based storage technologies

Keyboards

QWERTY layout

Function keys

Toggle keys

Modifier keys

Positional keys



Specialty Keyboards

Wireless

- Bluetooth
- Infrared

Ergonomic

Bilingual

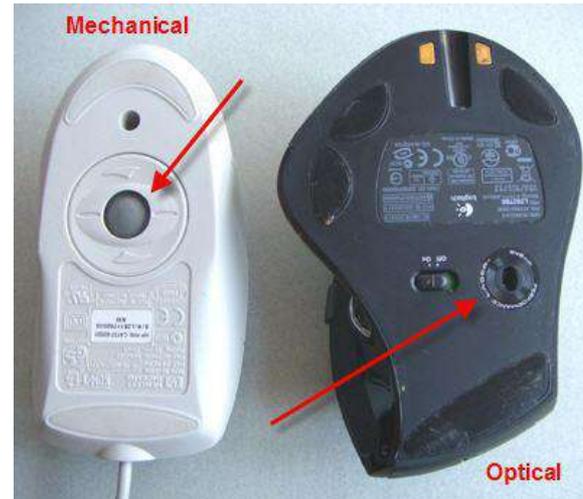
Virtual



Pointing Devices

Mouse

- Mechanical (ball) or optical



- Corded or cordless



Pointing Devices

Trackball



Touchpad



Touch screen



Joystick



Drawing Tablet

Inkless pen called a **stylus**

Used for creating digital artwork



Sensory Input Devices

Global Positioning System (GPS)



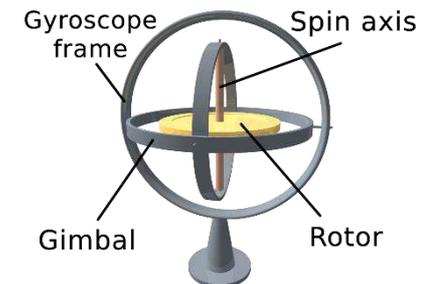
Accelerometer



Compass



Gyroscope



Scanning Devices

Digitizes hard copy

Uses a photosensitive charge-coupled device (CCD)

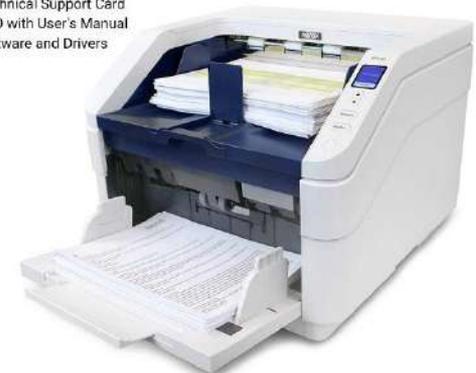
Types of scanners

- Flatbed
- Document feeder
- Bar code reader
- Business card scanner



IN THE BOX

- Xerox W130 Duplex Scanner
- Power Supply & Cables
- USB 3.1 Cable
- Quick Install Guide
- Technical Support Card
- DVD with User's Manual
Software and Drivers



Scanning Devices

Bar code reader



Business card scanner



Other Input Devices

Magnetic card reader



Optical mark recognition (OMR)



Magnetic character recognition (MICR)



Other Input Devices

Radio frequency (RF) ID chip



Other Input Devices

Biometric authentication devices

- Fingerprint scanner



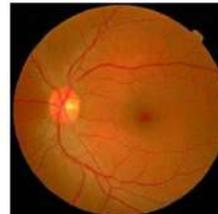
- Facial recognition software and camera



- Iris and Retina scanner



Iris



Retina



Capture Devices

Digital camera

Digital video camera

Web cam



Audio Input Devices

Audio adapter (sound card)

Microphone

- Voice recognition software
- Speech recognition software



Display Screens

Video screen the computer uses to provide information to a human user

Display is made up of individual dots called **pixels**



Current Monitor Technologies

Liquid Crystal Display (LCD)

- Active vs. Passive Matrix

Light-Emitting Diode (LED)

Organic LED (OLED)

E-paper

Digital/smart whiteboard



Digital projector

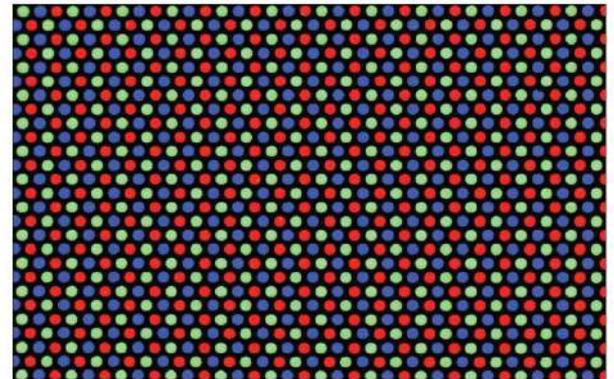


Cathode Ray Tube (CRT)

Older technology, mostly obsolete

Large vacuum tube with electron guns that strike phosphors to light up the screen

Triads of red, green, and blue phosphors



Resolution

Measured in horizontal and vertical pixels, such as 1024 x 768

Each display has a maximum (native) resolution
LCD and LED displays look best at their native resolution

Aspect ratio is ratio of width to height, such as 4:3 or 16:9

Resolution

Horizontal resolution: number of pixels horizontally. For example, 1600

Vertical resolution: number of pixels vertically. For example, 900

Aspect ratio: ratio of horizontal to vertical resolution. For example, 1600:900 is a 16:9 ratio.



Other Measures of Monitor Performance

Refresh rate

- Number of times per second each pixel is refreshed
- Mostly an issue on CRTs; insufficient refresh rate can cause flickering

Color depth

- Number of bits required to describe the color of each pixel
- 32-bit or 16-bit is the norm for most operating systems

Display Adapter

The hardware that helps the operating system communicate to the monitor what should be displayed

May be built into the motherboard or may be a separate circuit board installed on the motherboard

If separate, has its own memory

Requires a device driver installed in the operating system

Printers

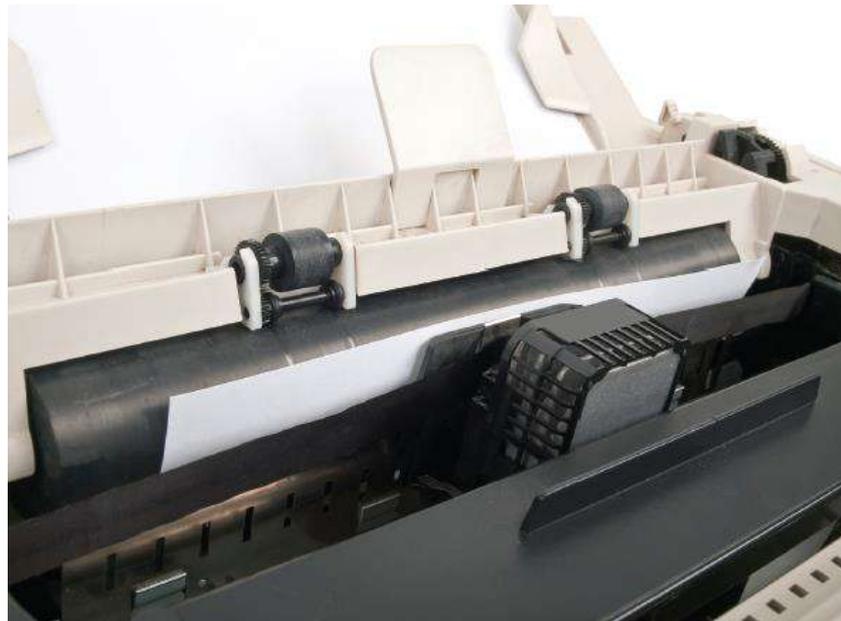
Factors to Consider:

- Initial cost
- Per-page cost (consumables)
- Resolution (dots per inch)
- Speed
- Color
- Paper handling
- Interface
- Multiple functions

Impact vs. Non-Impact

Impact printers strike an inked ribbon to make a mark on the paper

- Dot matrix printers are still used in industrial settings
- They print on multi-part forms



Impact vs. Non-Impact

Non-impact printers lay the ink or toner down on the paper without striking it

- Inkjet
- Laser
- Thermal
- Plotter

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Subject : Introduction to Computers
Class : First Year
Lecture No. 6
Instructor: Mr. Alaa Hassan Harif

Inkjet Printer

Sprays liquid ink onto the page

Separate ink cartridges:
black, cyan, magenta,
yellow



Some printers can print photos very realistically

Initial cost of the printer can be very low

Ink is expensive

Laser Printer

Uses powdered toner

Can be color or black-and-white

Initial cost is higher than inkjet

Cost per page of toner is low



Laser Printer Printing Process

Drum inside printer is negatively charged

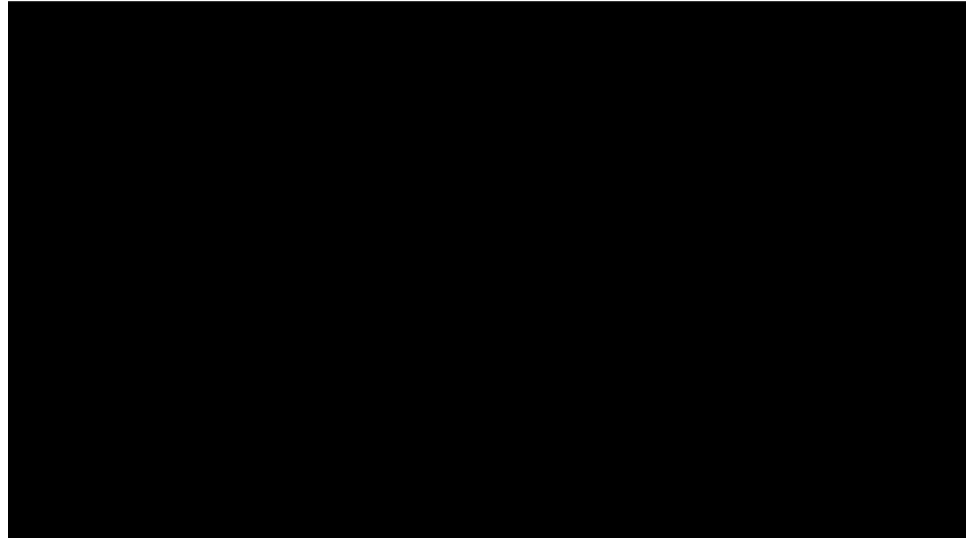
A laser partly neutralizes the charge in certain areas

Toner clings to the neutralized areas

Paper is charged so that toner jumps off onto paper

Fuser heats the paper, melting the toner into the paper

Laser Printer Printing Process



Laser Printer Printing Process



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Comparing Printer Types

	Dot Matrix	Inkjet	Laser
Initial Cost	Medium	Inexpensive	Expensive
Per-page Cost	Inexpensive	Expensive	Inexpensive
Resolution	Poor	Good	Good
Speed	Slow	Medium	Fast
Color	No	Yes	Some models
Paper handling	Continuous feed	Single low-capacity tray	Multiple high-capacity trays (some models)
Suitable for	Multi-part forms, text-only printouts	Photo printing, home use	Business printing, high-volume printing

Specialty Printers

Thermal

- Direct thermal
- Thermal wax transfer
- Thermal dye transfer

Plotter

Storage Devices

Primary storage: memory

Secondary storage: disks and solid-state drives

Evaluations of storage:

- Capacity
- Cost
- Access speed
- Interface
- Media type
- Portability
- Removability

File Storage Vocabulary

File: a named collection of bits that represent a single object

Folder: A logical organizing unit for files

File Storage Vocabulary

Volume or Partition: A physical storage device or a portion of one that is assigned an identifying letter



File Storage Vocabulary

Drive: A physical storage device, or the mechanical parts that spin a disk so that data can be written and read on it



File Storage Vocabulary

Disk: A spinning platter that holds data



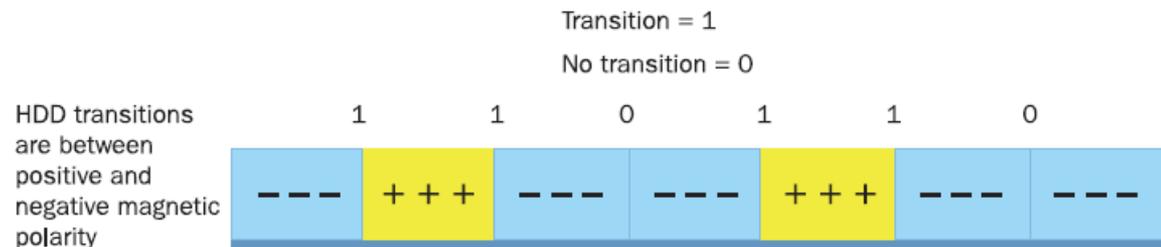
Hard Disk Drive (HDD)

A mechanical storage drive

Consists of a stack of metal platters

Read-write heads access the stored data

Data is stored in binary form in changes between positive and negative magnetic polarity

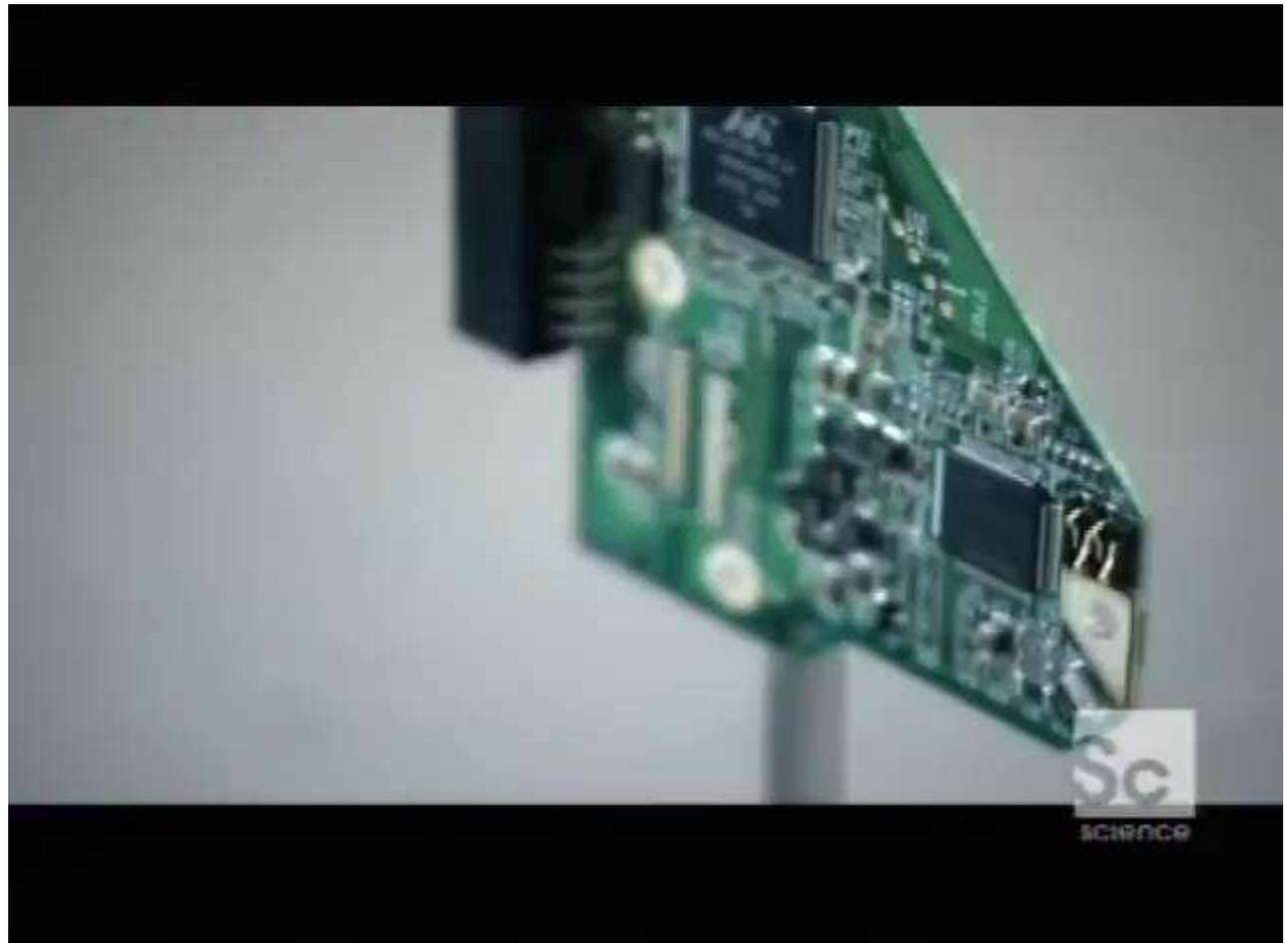


Hard Disk Drive (HDD)

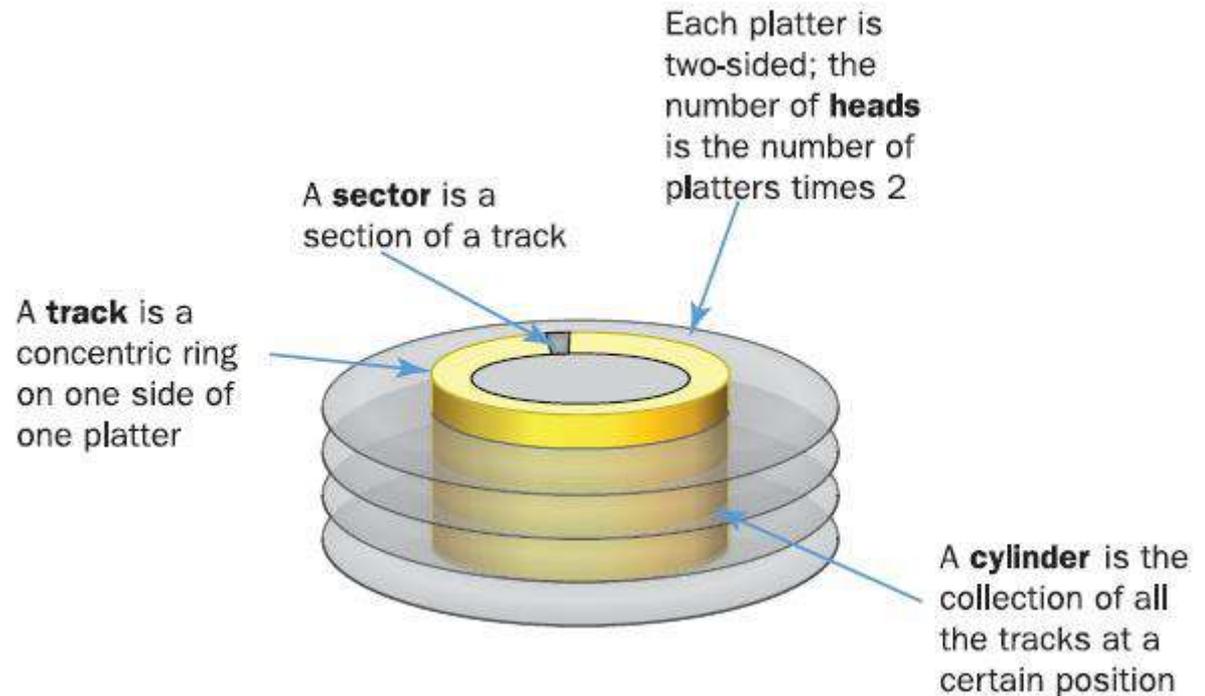
A mechanical storage drive



Hard Disk Drive (HDD)



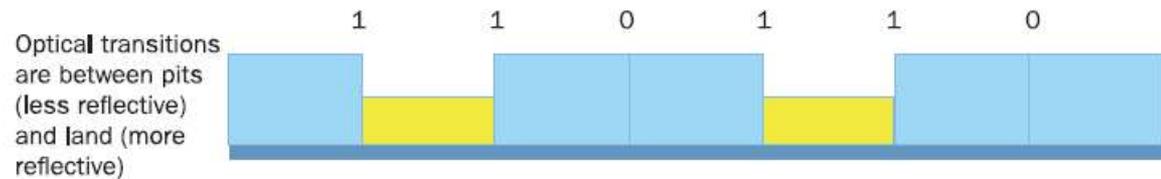
Hard Disk Drive (HDD)



Optical Drives

CDs, DVDs, Blu-ray

Reads and writes in patterns of greater or lesser reflectivity



Types of Discs

CD, DVD, Blu-ray

Read-only, write-once, or rewriteable

Single-sided or double-sided

Single-layer, double-layer

Types of Discs

CD, DVD, Blu-ray



Types of Discs

<i>Disc</i>	<i>Capacity</i>	<i>Notes</i>
CD-ROM	650 to 900 MB	Read-only, used to distribute commercial music and software
CD-R	650 to 900 MB	Recordable once, used to burn CDs that will not change
CD-RW	650 to 900 MB	Rewriteable, used to burn CDs that might need to be changed later
DVD-ROM	4.7 GB per side and per layer	Read-only, used to distribute standard-definition music and software
DVD+R DVD-R	4.7 GB per side and per layer	Recordable once, used to burn DVDs that will not change Two competing standards; most optical drives in computers support both DVD drives also support CDs.
DVD+RW DVD-RW	4.7 GB per side and per layer	Rewriteable, used to burn DVDs that might need to be changed later Two competing standards; most optical drives in computers support both
Blu-ray (BD)-ROM	25 to 128 GB, depending on number of layers	Read-only, used to distribute commercial high-definition movies
BD-R	25 to 128 GB depending on number of layers	Recordable once, used to burn BDs that will not change BD drives also support CDs and DVDs
BD-RW	25 to 128 GB, depending on number of layers	Rewriteable, used to burn BDs that might need to be changed later

Solid-State Drives

Use a form of EEPROM (memory) to store data
Small, removable drives like USB flash drives are portable

Large solid state drives designed to replace the hard disk drive are solid-state hard drives (SSHD)



Network Storage Vocabulary

Direct-attached storage: Local storage, connected directly to the computer

Network-attached storage: Storage accessed via a network

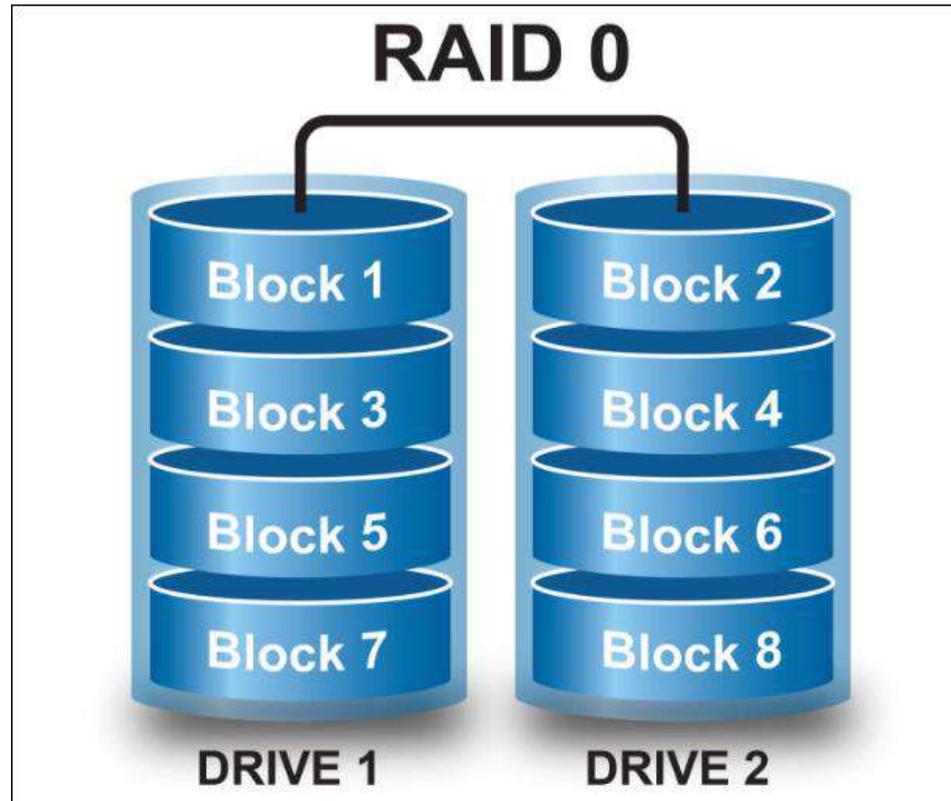
NAS appliance: A specialized device that provides storage space to network users

Storage-area network: Network-accessed storage that appears to the user as local storage

RAID

Redundant Array of Inexpensive Disks

- RAID0: Striping for performance

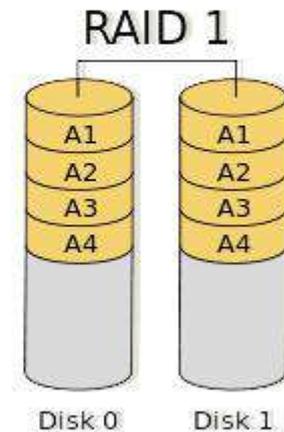
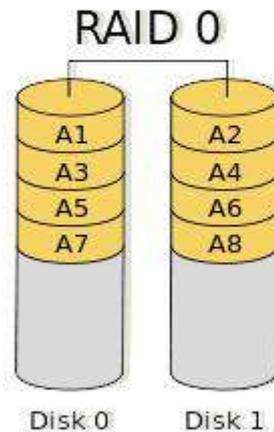


RAID

Redundant Array of Inexpensive Disks

- RAID0: Striping for performance
- RAID1: Mirroring for data security

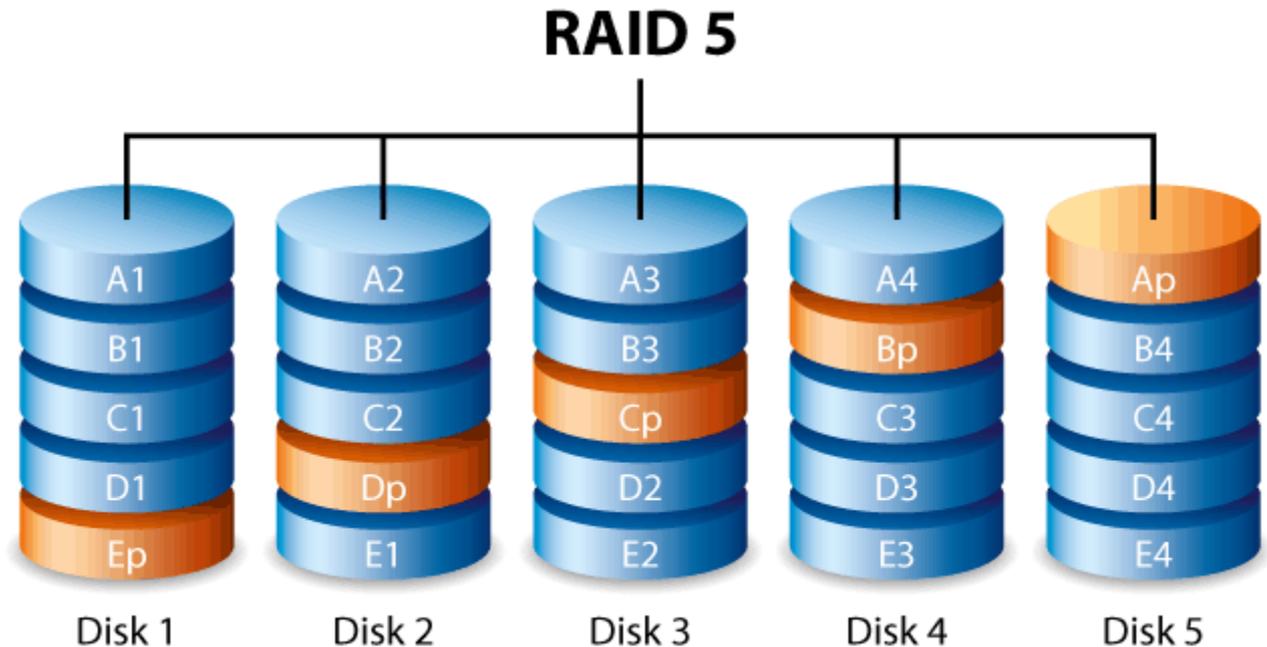
RAID 0 VS RAID 1



RAID

Redundant Array of Inexpensive Disks

- RAID0: Striping for performance
- RAID1: Mirroring for data security
- RAID5: Striping with parity, for both performance and data security



Cloud Storage

Cloud: A secure computing environment accessed online

Cloud storage: Storage that is accessed from a cloud environment



Troubleshooting

<i>Problem</i>	<i>Probable Cause</i>	<i>Solution</i>
Keyboard		
Keyboard not responsive	Connector not firmly plugged in, or keyboard has failed	Check connectors; try a different keyboard.
One key is not working	Key is stuck, or debris under key	Turn keyboard upside down and shake it, or use compressed air to blow out the debris under the keys.
Mouse		
No response from mouse	Connector not firmly plugged in	Check connectors.
Mouse doesn't move in one direction	Contacts inside mouse are dirty or debris is covering a sensor	Clean the mouse.
Pointer jumps around erratically on screen	Display adapter is malfunctioning	Restart the computer. If the problem is not resolved, update the display adapter driver.
Display		
No display, no lights on monitor	Monitor is not powered on	Check power cord, press the Power button.
Monitor has amber light on front, and no display	Monitor is not getting a signal from the computer	Check connector, and make sure computer is on.
Display shows a green, blue, or red overall tint	Monitor cable connector is loose	Check connector.
Display is garbled or distorted	Display adapter driver is corrupted	Download a new copy of the driver and reinstall.
Some graphics don't appear correctly in certain games	Display adapter driver's current version is not compatible with the game	Download an updated version of the driver and reinstall.

Troubleshooting

<i>Problem</i>	<i>Probable Cause</i>	<i>Solution</i>
Printer		
Vertical stripes, missing or wrong colors on inkjet printout	Inkjets are clogged	Run printer's cleaning utility (check printer documentation to find out how).
One edge of printout from a laser printer appears dirty, or stray toner overall on page	Loose toner inside printer	Clean printer thoroughly, following procedures in printer documentation.
Printing appears light or faded	Low toner	Shake toner cartridge from side to side to distribute remaining toner. Replace cartridge when possible.
Smudged ink on inkjet printout	Page is still wet	Let page dry before handling it.
Loose toner on laser printout	Fuser isn't working	Have printer serviced.
Blank pages from laser printer	Out of toner, or printer is malfunctioning	Replace toner cartridge; if that doesn't work, have printer serviced.
Sound		
No sound from speakers	Speakers are not plugged in, or volume is muted or turned down	Check volume control in the operating system, check connection to speakers.
Inadequate volume level	Speakers are not being powered, or main volume is turned down too low in operating system	Check speaker power source. Check volume control in operating system; there may be a mixer utility with separate controls for main (overall) volume and individual types of sounds, such as system sounds and music playback.
Operating system does not show any audio adapter installed (for example, no volume controls available)	Audio adapter driver is corrupted or audio adapter is failed	Restart the computer. If problem persists, reinstall audio adapter driver (download if needed from company's website). If problem persists, have computer serviced.
Sound is garbled or crackles	Audio adapter is malfunctioning, or speakers are damaged	Restart the computer. If problem persists, try replacing speakers, or have computer serviced.

Troubleshooting

<i>Problem</i>	<i>Probable Cause</i>	<i>Solution</i>
Hard disk drive		
Hard disk drive not recognized by computer	Drive has failed, or connector has come loose	<p>Check cable connectors between computer and drive.</p> <p>Check BIOS Setup program to see if BIOS recognizes the drive.</p> <p>Have computer serviced to replace drive and recover data if possible.</p>
Read or write errors reported by operating system	Physical bad spots on the disk surface	Run a disk scanning program such as Check Disk in Windows 7.
Hard disk makes read/write noises almost continuously, even when you are not working with any files	There is not enough RAM in the computer, so the hard disk is being used for virtual memory	Install more RAM in the computer if possible.
Optical discs		
Read errors	The disc is dirty or scratched	Clean the disc with a soft cloth. Use a scratch repair kit or service if the disc contains important data that needs to be recovered.
Disk won't eject using Eject button on computer or drive	Button may be malfunctioning	<p>Open a file management window in the OS, right-click the drive, and choose Eject.</p> <p>Restart the computer.</p> <p>On some desktop optical drives that use a tray, there is a small hole in the front panel; straighten a paperclip wire and stick it in the hole to manually eject the tray.</p>
Errors when writing to a disk	The recording speed is too high for the drive to handle, or other operations may be interfering with the CPU's attention to the writing process.	Try recording at a slower speed; do not use the computer for anything else while the recording is taking place.

Key Terms

active matrix
aspect ratio
audio adapter
bar code reader
Blu-ray disc (BD)
cathode ray tube (CRT)
charge-coupled device
cloud
cloud storage
cluster
color depth
compact disc (CD)
consumables
cost per page
cylinder
digital camera
digital projector
digital versatile disc (DVD)
digital video camera
digital whiteboard
digitize
direct thermal printer
direct-attached storage (DAS)
disk
display adapter
display screen
dithering
document feeder
dot matrix
dots per inch (dpi)
drawing tablet
drive
drum
duplexing
electromagnetic interference (EMI)
e-paper
ergonomic keyboard
file
flatbed scanner
folder
frame
fuser
hard copy
hard disk drive (HDD)
high-definition multimedia interface (HDMI)
high-definition TV (HDTV)
impact printer
inkjet printer
input device
insertion point
joystick
laser printer
liquid crystal display (LCD)
lumens
magnetic card reader
magnetic-ink character recognition (MICR)
maximum resolution
mechanical mouse

Key Terms (continued)

mouse	chip	thermal wax transfer printer
multi-function device	read/write head	thin-film transistor (TFT)
NAS appliance	redundant array of inexpensive disks (RAID)	toner
network-attached storage (NAS)	refresh rate	touch screen
non-impact printer	resolution	touchpad
optical drive	secondary storage	track
optical mark recognition (OMR)	sector	trackball
optical mouse	solid-state hard drive (SSHD)	transceiver
organic light-emitting diode (OLED)	speech recognition	triad
passive matrix	software	Universal Product Code (UPC)
pixel	storage-area network (SAN)	virtual keyboard
plotter	striping	voice recognition software
powered speakers	stylus	volume
primary storage	subfolder	webcam
QR code	thermal dye transfer printer	wireless keyboard
QWERTY	thermal printer	wireless mouse
radio frequency identification (RFID)		

Summary

- 1 . List three input devices and three output devices.
- 2 . How do wireless input devices communicate with the computer?
- 3 . Explain briefly how LCD and CRT technologies form screen images.
- 4 . List three types of printers and give an example of an appropriate use for each one.
- 5 . Explain how HDD and SSHD differ internally.
- 6 . Differentiate between DAS, NAS, SAN, and cloud storage.

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Subject : Introduction to Computers
Class : First Year
Lecture No. 7
Instructor: Mr. Alaa Hassan Harif

Chapter 4: Operating System Basics

Learning Objectives:

Understand the types of operating systems available

Differentiate among the major desktop operating systems

Explain how device drivers work

Explain computer file storage concepts

System Software

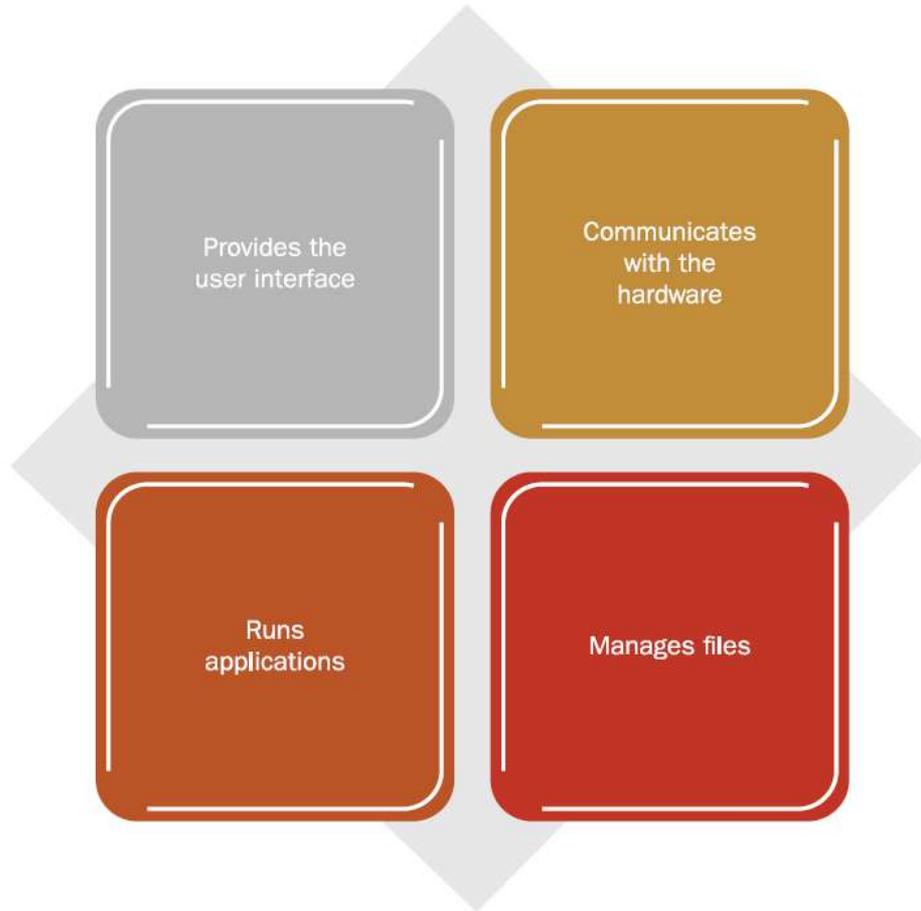
System BIOS

- Stored on a ROM BIOS chip on the motherboard
- “Firmware” – both hardware and software
- Starts up the computer at a low level

Operating System

Utilities

Operating System



Operating System

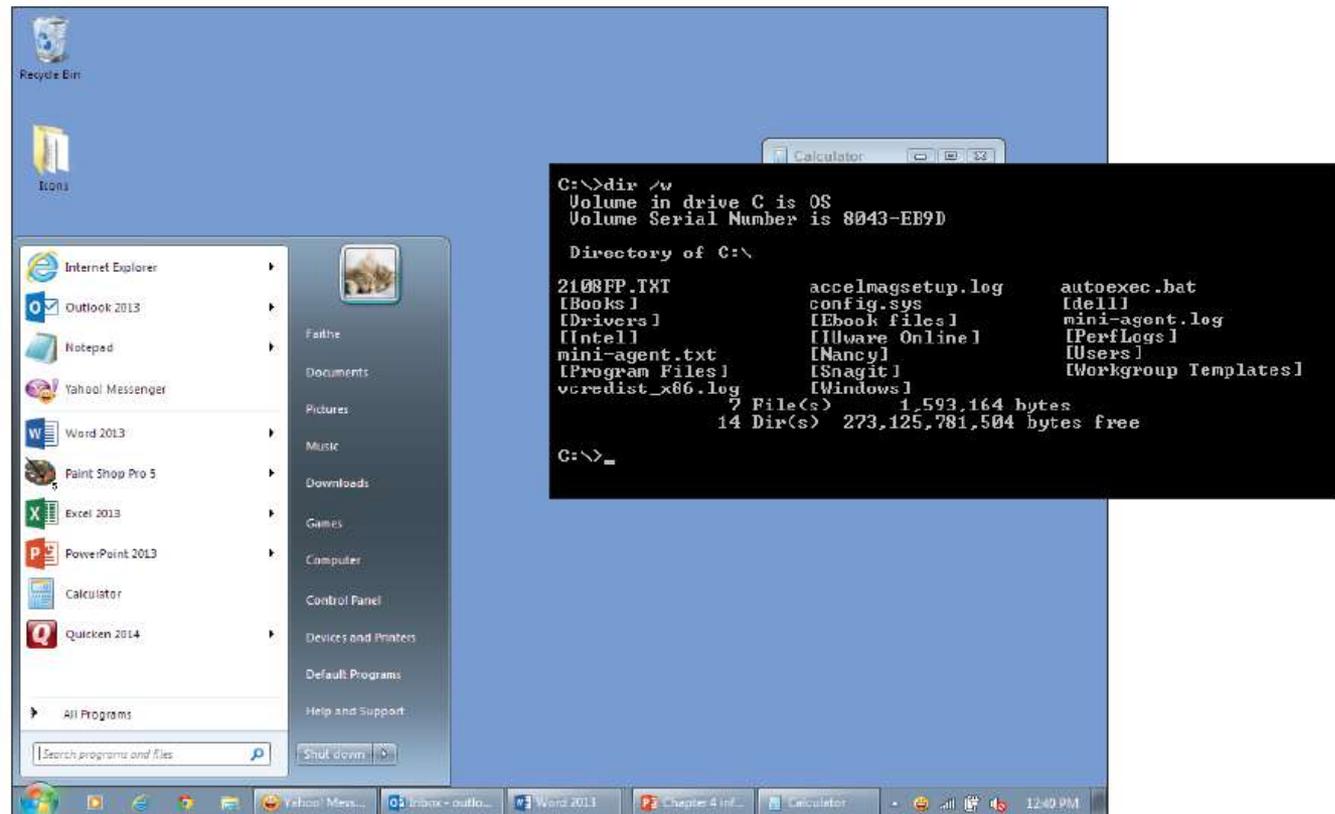
Platform: the hardware required to run a particular operating system

- Intel platform (IBM-compatible)
 - Windows
 - DOS
 - UNIX
 - Linux
- Macintosh platform
 - Mac OS X
- iPad and iPhone platform
 - iOS

Interface Types

Graphical User Interface (GUI)

Command-line interface



Utility Software

Protection from malware

Disk error correction

Disk optimization

File cleanup

Uninstallers

Registry cleanup

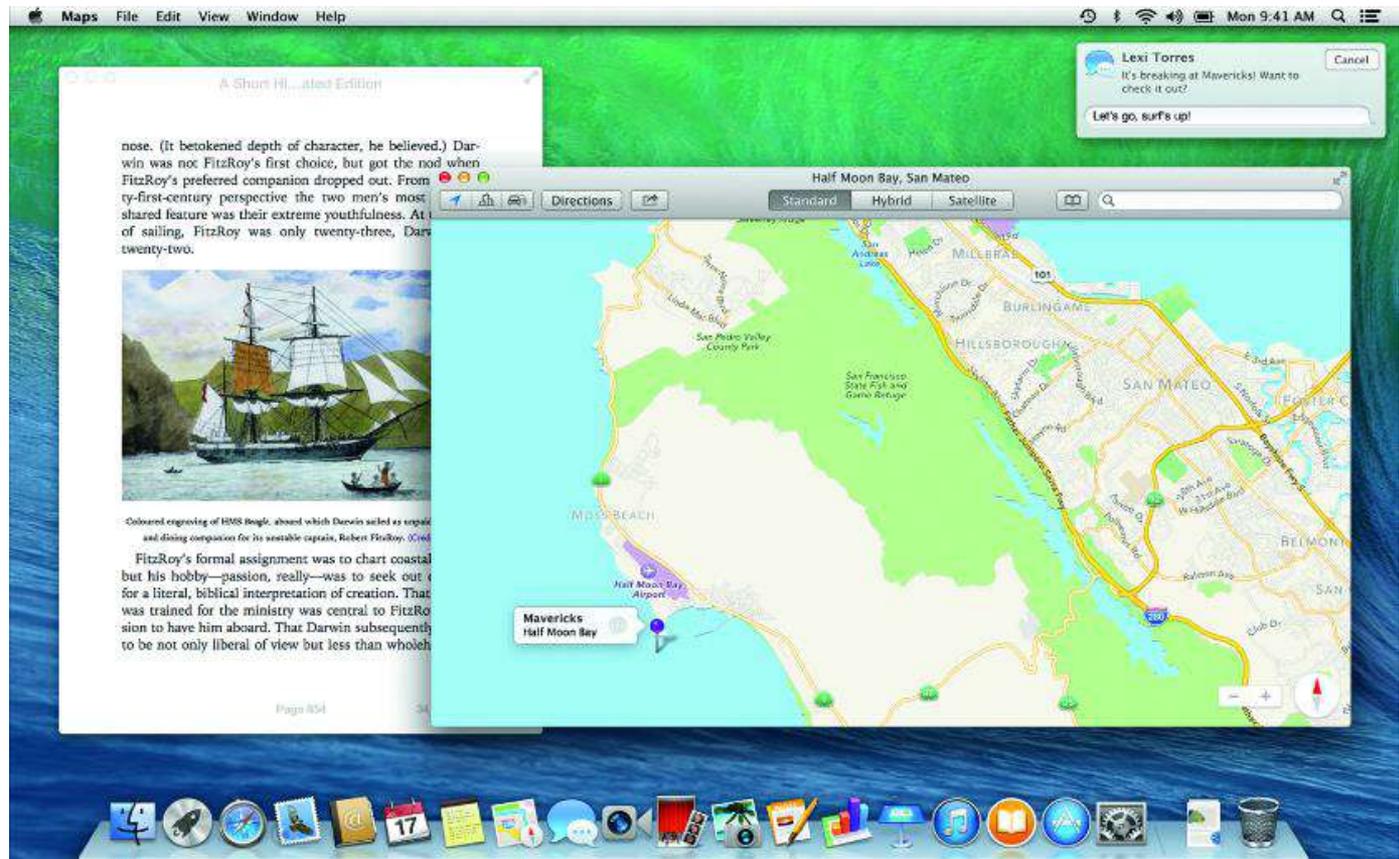
Desktop and Notebook Operating Systems

Windows: Best known, greatest selection of applications available

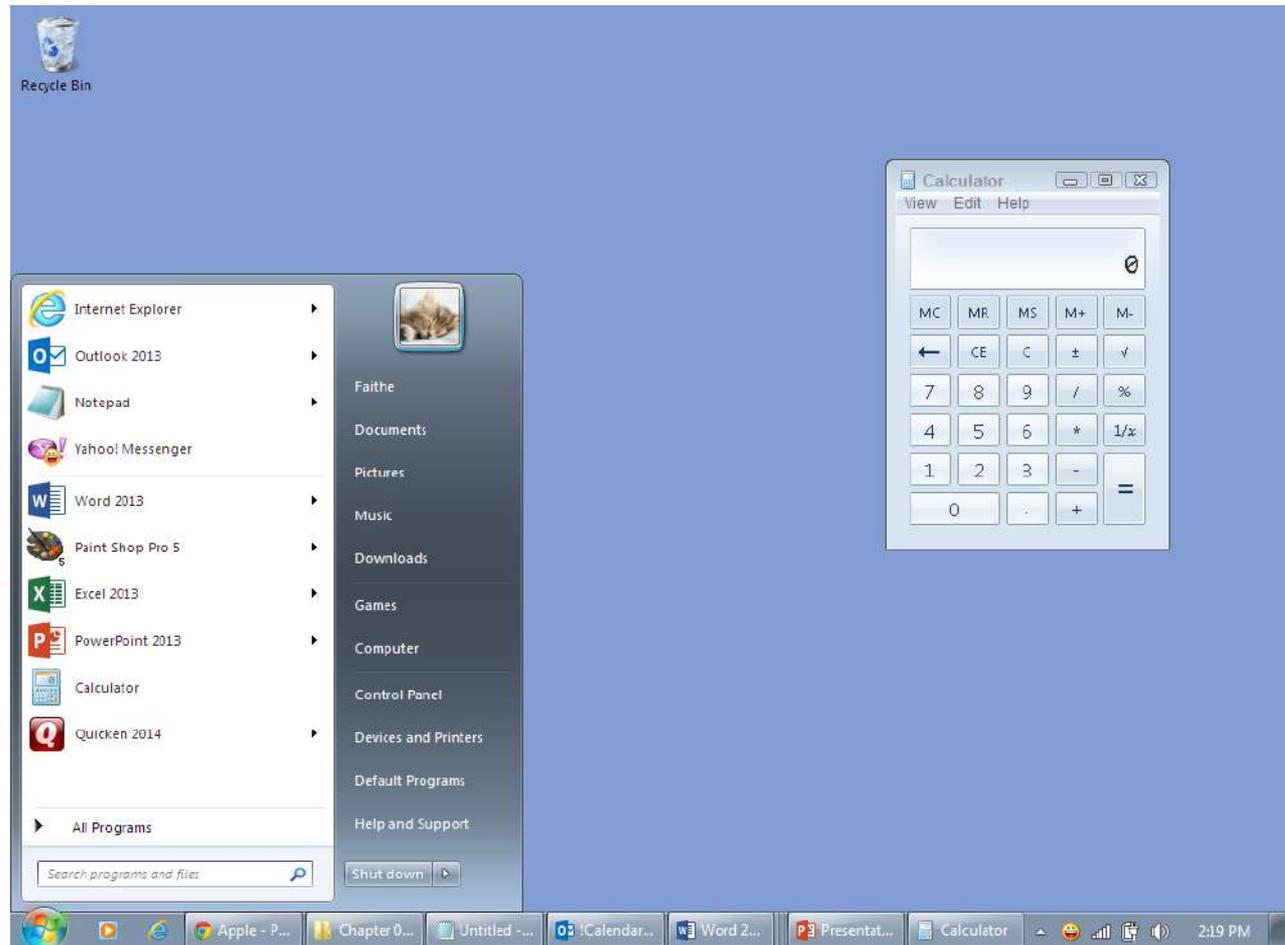
Mac OS: User-friendly, runs on Mac hardware. Many applications available

Linux: Free, but can be more challenging to configure; few applications available

Mac OS X Mavericks



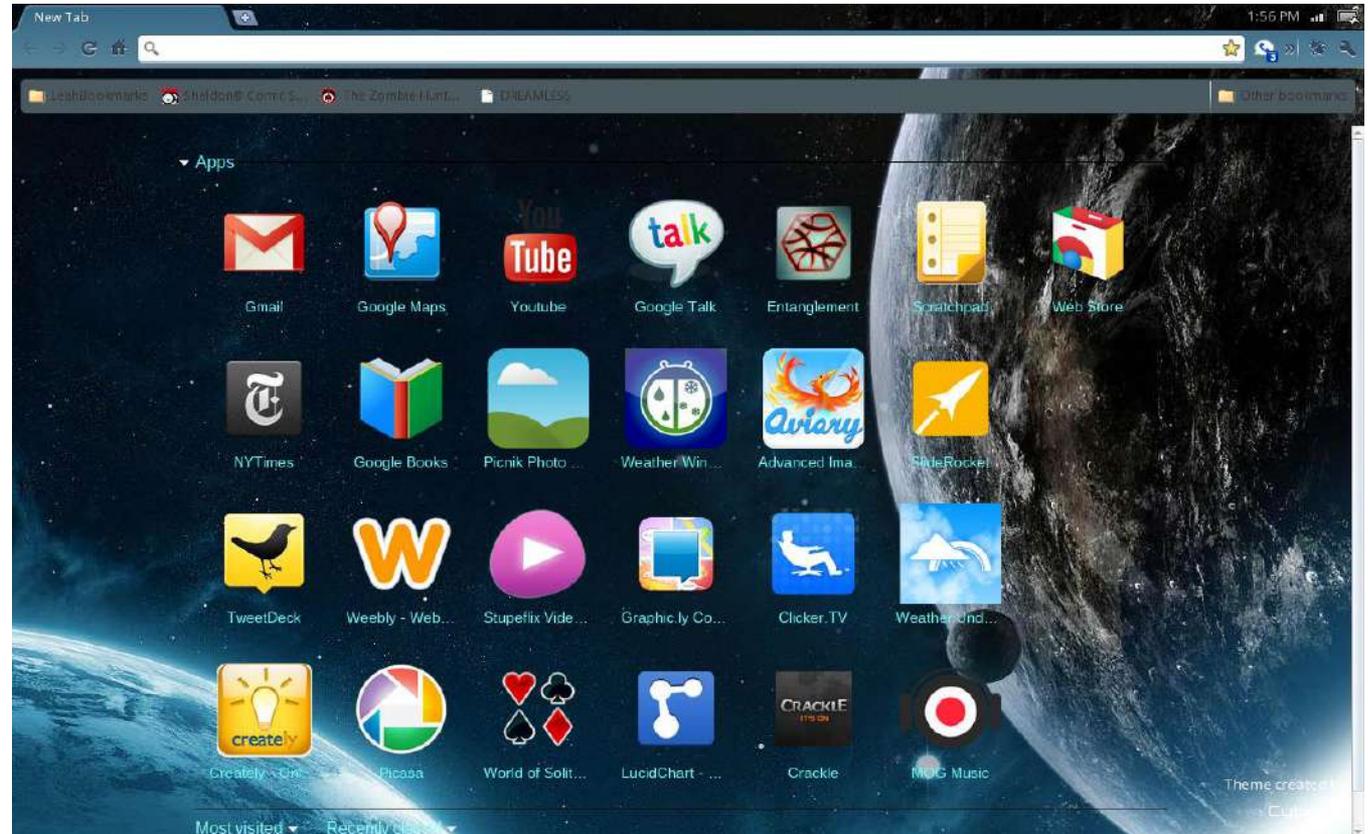
Microsoft Windows 7



Ubuntu Linux



Google Chrome OS



Server Operating Systems

Windows Server

- Familiar GUI interface for those experienced with Windows

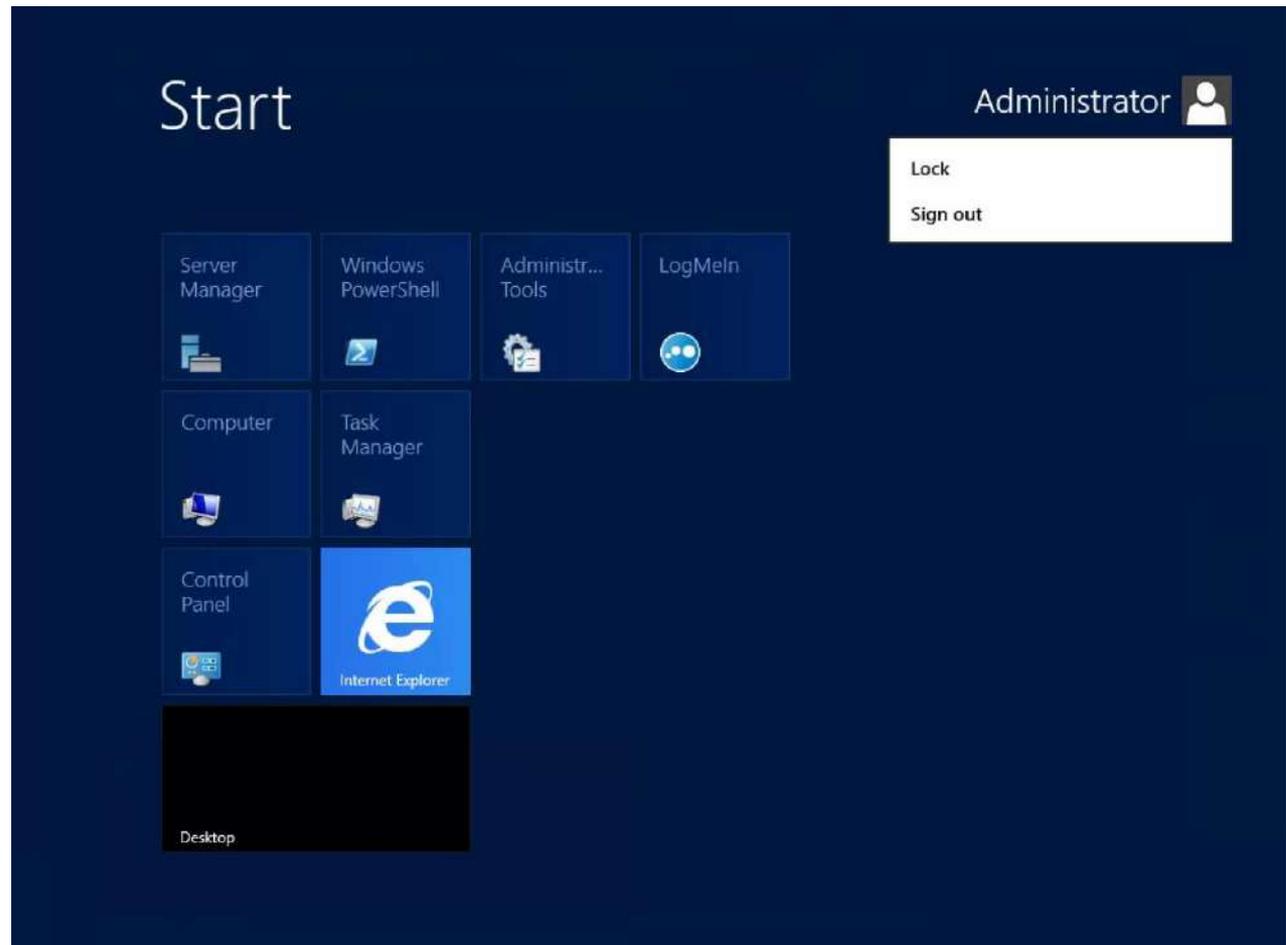
UNIX

- Very mature server capabilities, time-tested, large user community, stable

Linux

- Free, customizable, many free services and utilities available

Windows Server



UNIX

```
mars@marsmain /usr/portage/app-shells/bash $ sudo /etc/init.d/bluetooth status
Password:
* status: started
mars@marsmain /usr/portage/app-shells/bash $ ping -q -c1 en.wikipedia.org
PING rr.esams.wikimedia.org (91.198.174.2) 56(84) bytes of data.

--- rr.esams.wikimedia.org ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 2ms
rtt min/avg/max/mdev = 49.820/49.820/49.820/0.000 ms
mars@marsmain /usr/portage/app-shells/bash $ grep -i /dev/sda /etc/fstab | cut --fields=-3
/dev/sda1          /boot
/dev/sda2          none
/dev/sda3          /
mars@marsmain /usr/portage/app-shells/bash $ date
Sat Aug  8 02:42:24 MSD 2009
mars@marsmain /usr/portage/app-shells/bash $ lsmod
Module              Size  Used by
rndis_wlan          23424  0
rndis_host           8696  1 rndis_wlan
cdc_ether            5672  1 rndis_host
usbnet              18688  3 rndis_wlan,rndis_host,cdc_ether
parport_pc          38424  0
fglrx               2388128 20
parport              39548  1 parport_pc
iTCO_wdt             12272  0
i2c_i801             9380  0
mars@marsmain /usr/portage/app-shells/bash $ █
```

Tablet and Phone Operating Systems

System-on-chip (SoC)

Downloadable applications (apps) from a Store app

Popular SoC operating systems:

- iOS: for iPad, iPhone
- Windows Phone: for Windows phones
- Android: for a variety of tablets and phones

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Class : First Year
Lecture No. 8
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Tablet and Phone Operating Systems

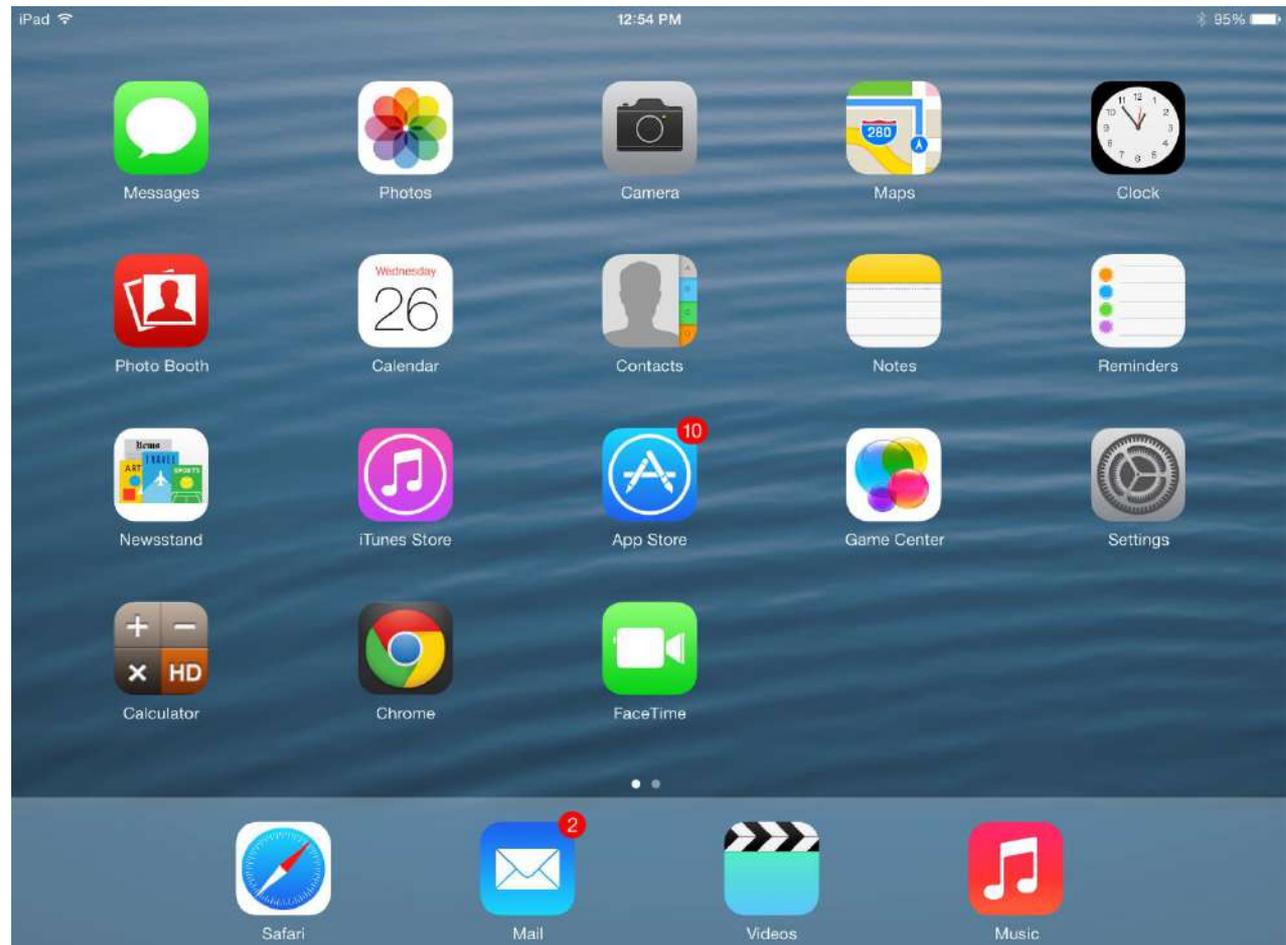
System-on-chip (SoC)

Downloadable applications (apps) from a Store app

Popular SoC operating systems:

- iOS: for iPad, iPhone
- Windows Phone: for Windows phones
- Android: for a variety of tablets and phones

iOS on the iPad



Windows Phone OS

2:36



Device Drivers

Translate the OS requests into the language of the device

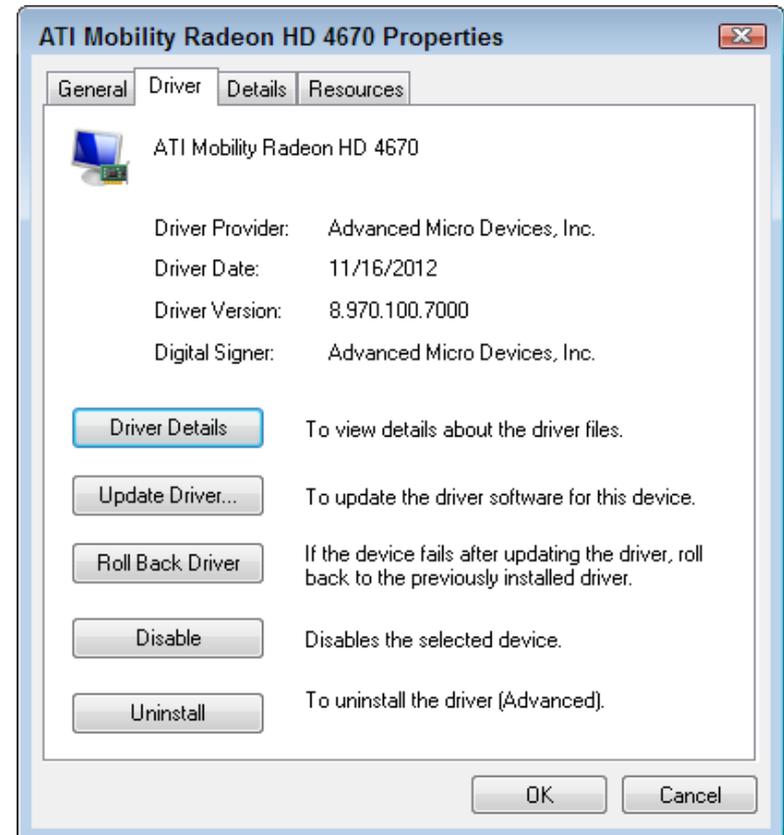
Translates messages from the device back to the OS

Published by the device manufacturer for a specific operating system and device model

Updates are periodically released that fix bugs and improve performance

Device Manager

Access from the
Control Panel
(System section)
Shows the
installed devices
Shows driver
details and
versions



Digital Storage Vocabulary

Drive: Physical storage device

Volume: A lettered section of a storage device (a logical drive)

Partition: To create logical volumes out of a single physical drive

Format: To create the file system on a volume

File Systems

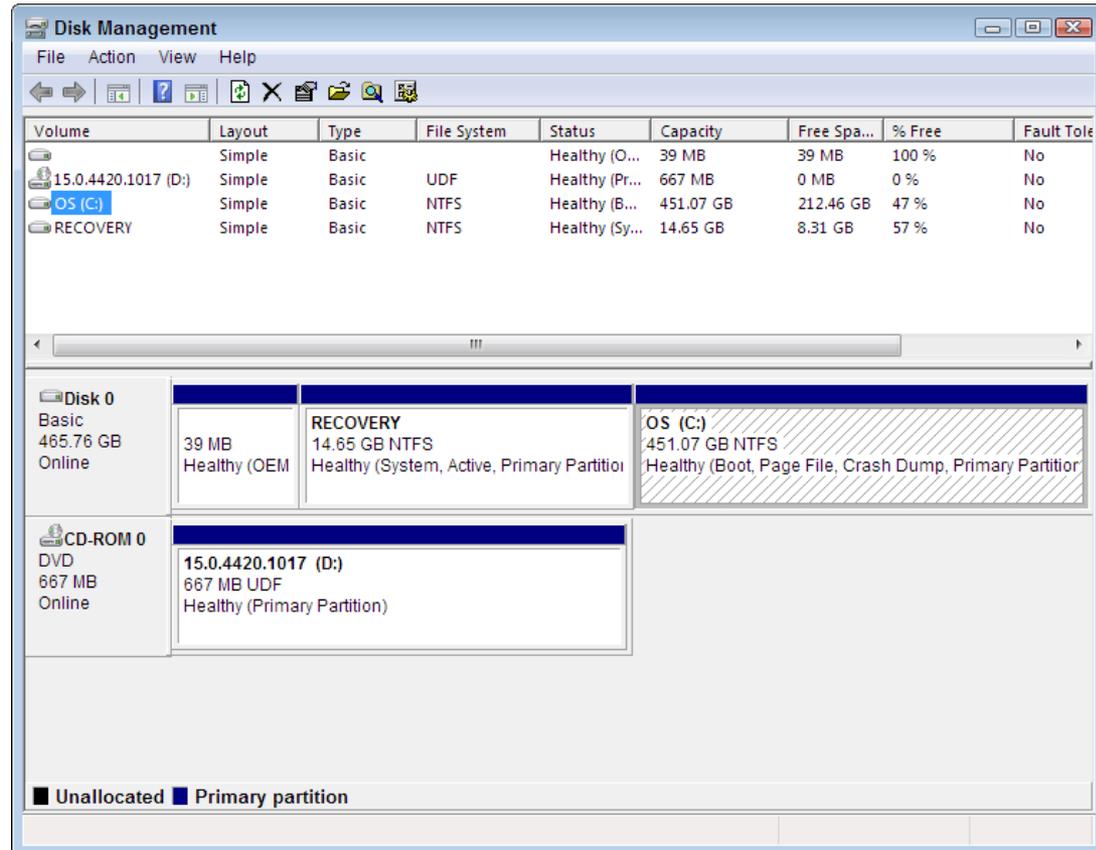
File system: The storage system used to store and organize the files on a particular volume

Common file systems:

- NTFS: Most Windows hard drives (Windows 2000 and higher)
- HFS+: Hard drives for Mac OS X
- ISO 9660 or UDF: CDs and DVDs
- FAT32: Hard drives for Windows 95/98/Millennium Edition

Disk Management

Access from Administrative Tools in Control Panel



File Paths

Root directory = top-level folder

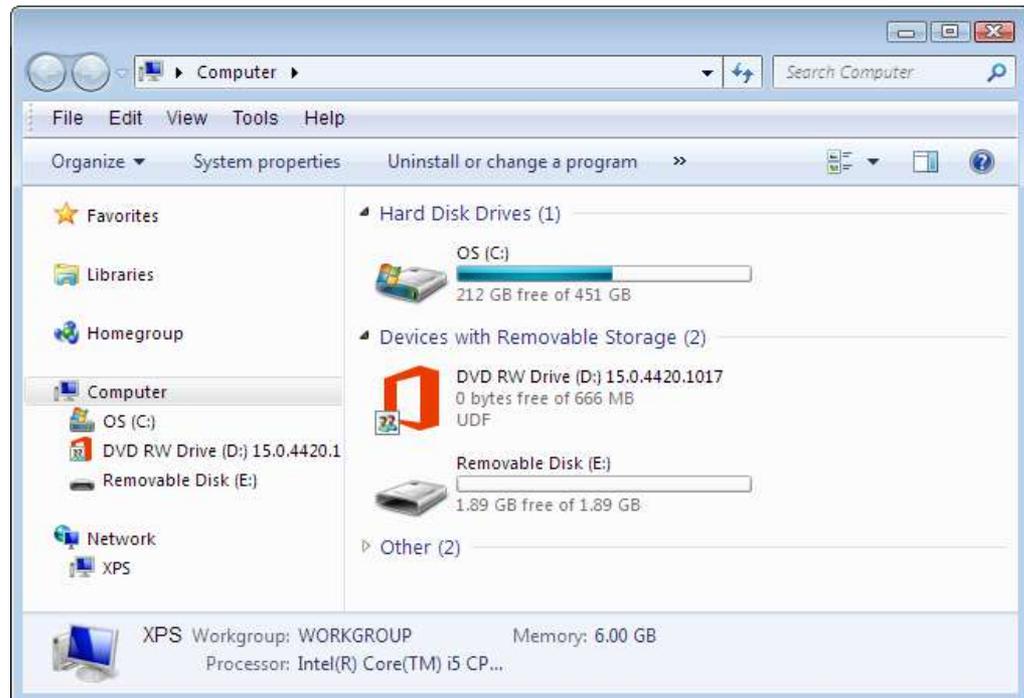
Path: the complete descriptor of a file's location, including the volume and folders

Path is written like this:

E:\Budget\January.txt

File Paths

Folder tree in navigation pane in Windows Explorer shows graphical representation of folder system



File Extensions and Types

Extension: characters after the period in a file name that indicate the file's type

Extensions tell the OS which application to use to open a data file

Extensions tell the OS which files are executable (.exe or .com)

File Extensions and Types

<i>Extension</i>	<i>File Type</i>	<i>Associated Application</i>
txt	Text	Notepad, WordPad, Microsoft Word
gif, png, jpg, tif	Photo or graphic	Paint, Photoshop, or almost any other photo editing program
doc, docx, docm	Word processing document	Microsoft Word, some other word processing programs also support
rtf	Word processing document	WordPad, Microsoft Word, or almost any word processing program
xls,xlsx,slxm	Spreadsheet	Microsoft Excel
ppt, pptx, pptm	Presentation	Microsoft PowerPoint
mdb, accdb	Database	Microsoft Access
pdf	Portable document format (platform-independent formatted document)	Adobe Reader, Adobe Acrobat, limited support in Microsoft Word
xps	XML document format (Microsoft-specific platform-independent formatted document)	XPS Viewer, Windows 7, Windows 8, limited support in Microsoft Word
exe, com, bat	Executable program files	n/a
dll, ini, dat	Helper files for programs and for Windows itself	n/a
zip	Compressed archive file	Windows Explorer, or a third-party program such as WinZip

File Compression

ZIP files

- Individual files or groups of files
- Individual folders or groups of folders
- Creates a single compressed archive file
- Right-click a group of selected files, point to Send To, and choose Compressed (zipped) folder

NTFS compression

- Can be applied to individual files or folders
- Invisible to the user
- In the Properties box for the folder, click Advanced and mark the Compress Contents to Save Disk Space check box

File Encryption

Protects files from being accessed by unauthorized users

NTFS encryption

- Only the user who encrypted the files can view them on the local volume

BitLocker encryption

- Encrypts the entire drive so that it can't be read if it is removed from the current computer

Backup Vocabulary

Archive attribute: File attribute that indicates whether or not a file has changed since its last backup

Full backup: Backs up all files and sets their archive attribute to Off

Differential backup: Backs up all files that have the archive attribute On but does not change that attribute

Incremental backup: Backs up all files that have the archive attribute On and then sets it to Off

Key Terms

adware
algorithm
Android
anti-spam software
app
archive attribute
backup set
backup software
BitLocker
Chrome OS
command-line interface
compressed archive
Device Manager
device driver
differential backup
disk checking program
distribution (distro)
encrypt
FAT32
file extension
file system
firewall software
folder tree
format
full backup

graphical user interface
Hierarchical File System
Plus (HFS+)
incremental backup
Intel platform
iOS
ISO 9660
Linux
Mac OS X
malware
Mavericks
Microsoft Windows
New Technology File
System (NTFS)
partition
path
platform
Plug and Play
registry
registry cleanup program
roll back
root directory
server
shell
spyware

system-on-chip (SoC)
system software
system volume
thin client
uninstaller utility
Universal Disc Format
(UDF)
UNIX
utility software
virus
Windows Phone
Windows RT
Windows Server
x64
x86

Summary

- 1 . List three types of system software.
- 2 . What is the difference between an OS and a platform?
- 3 . List five types of utility programs.
- 4 . List three operating systems that would run on an IBM-compatible desktop PC.
- 5 . Name three operating systems used on smartphones.
- 6 . Explain the purpose of Plug and Play technology.
- 7 . Explain the purpose of partitioning a drive.
- 8 . Give an example of a complete path to a file, and explain the parts of the path.

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Class : First Year
Lecture No. 9
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Chapter 5: Introduction to Windows 7

Learning Objectives:

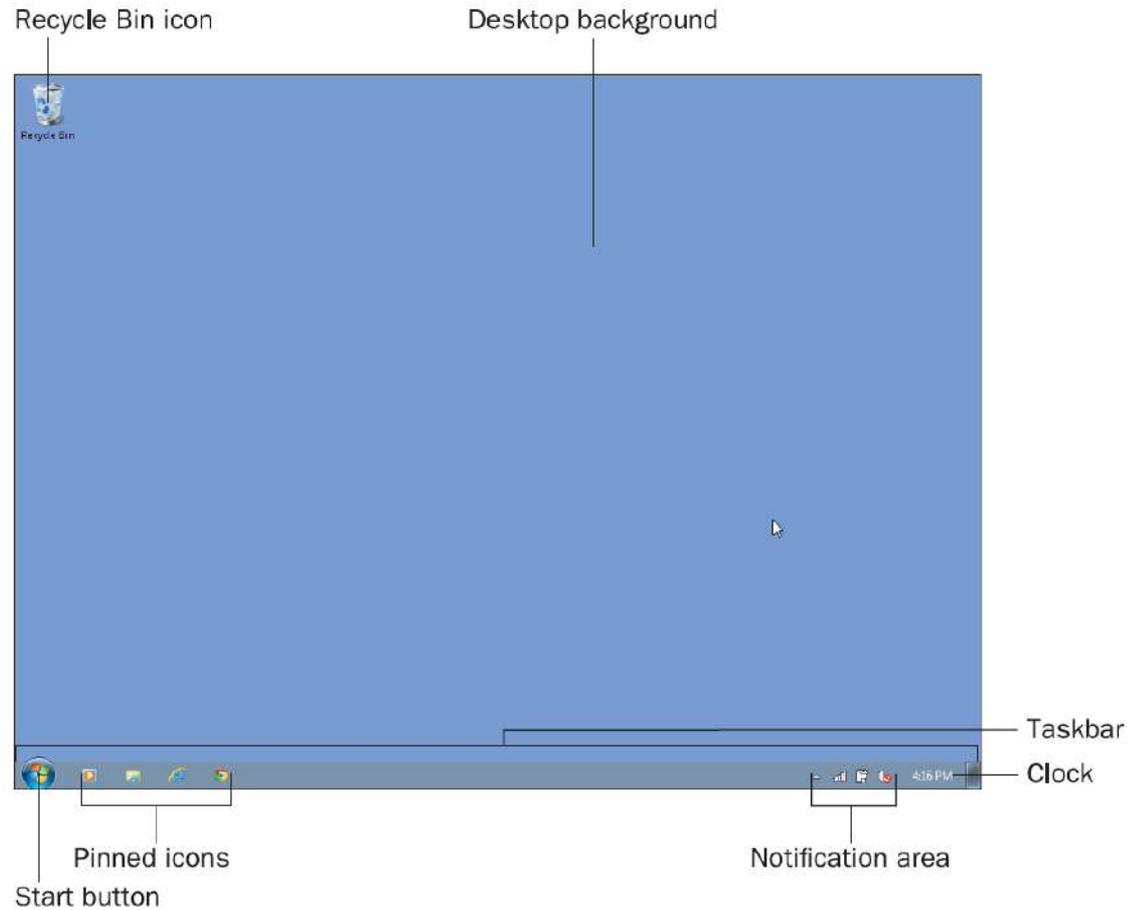
Understand the Windows 7 Interface

Be able to start up and shut down Windows

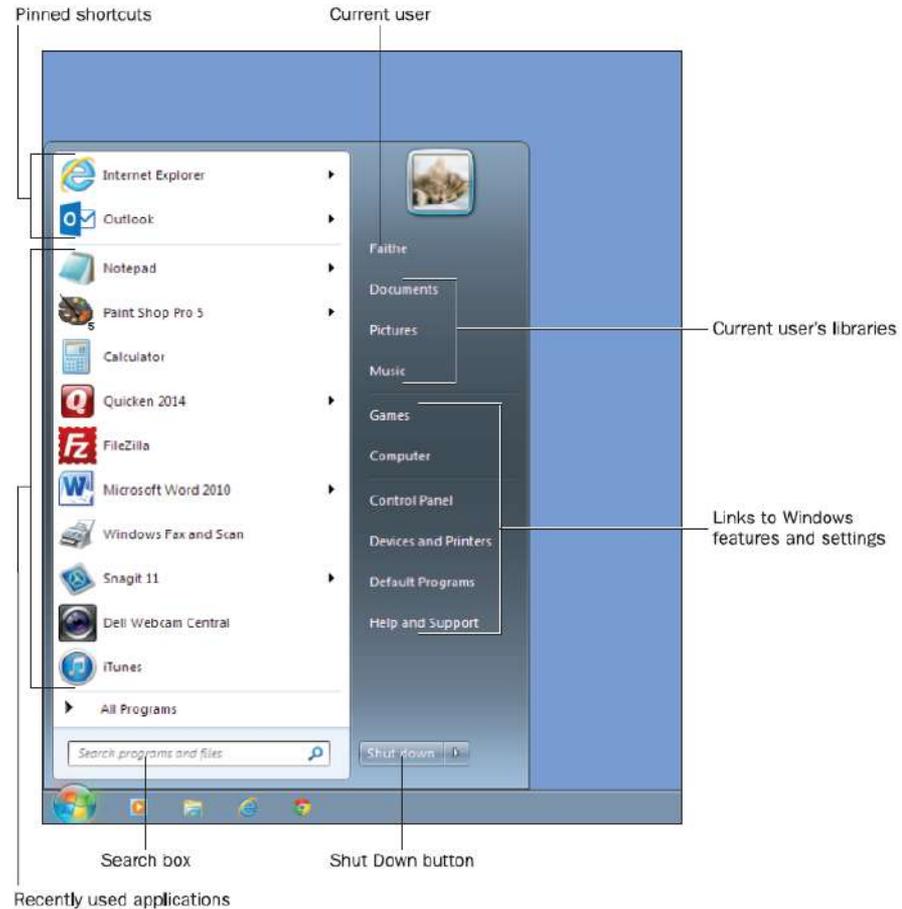
Know how to run programs

Perform common file management tasks

A Tour of Windows 7



The Start Menu



Locations and Settings on the Start Menu

<i>Link</i>	<i>Opens</i>
User's name	The user's personal folders: C:\Users\ <i>username</i>
Documents	The user's Documents library
Pictures	The user's Pictures library
Music	The user's Music library
Games	The Games folder, which is a virtual folder that shows shortcuts to all installed games in one place
Computer	The Computer view of Windows Explorer, showing the local volumes
Control Panel	The Control Panel (top level)
Devices and Printers	The Devices and Printers section of the Control Panel
Help and Support	The Windows 7 Help and Support window

Starting Up

Cold boot: starting from an Off state

Warm boot: restarting from an On state

Click your user name, and type the account's password if prompted

Shutting Down or Restarting

Use the submenu on the Shut Down button on the Start menu



Placing the PC in Low Power Mode

Sleep: low power state, keeps RAM powered

Hibernate: no-power state, RAM contents is saved to the hard drive



Logging Off

Log off: Shuts down running programs, allows another user to log on



Switching Users

Switch user: Leaves all programs running, allows another user to log on



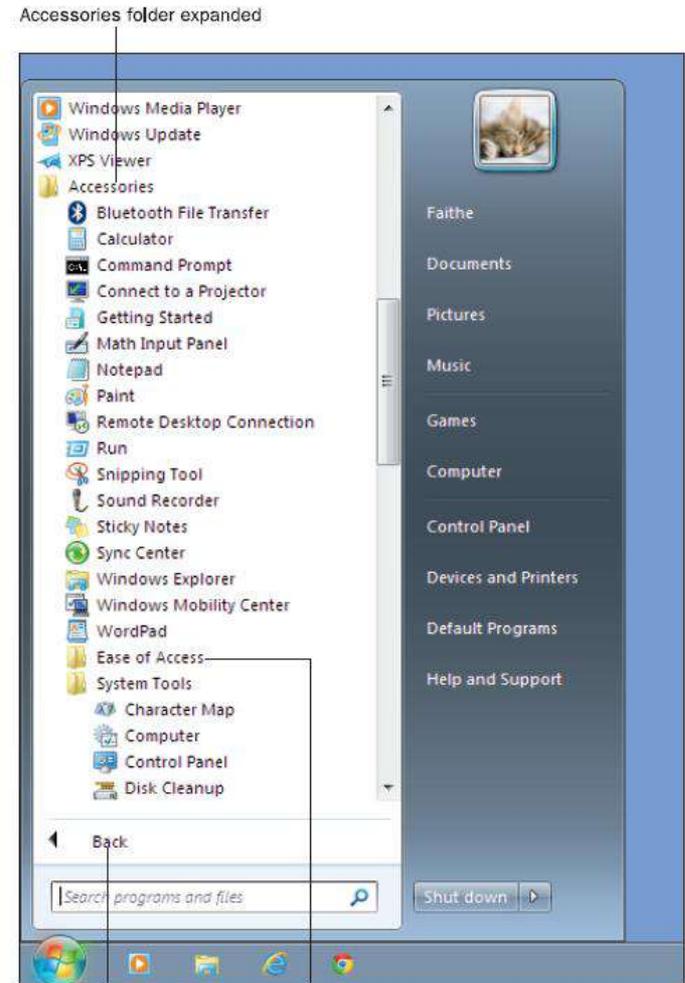
Locking the PC

Returns to the password prompt for the current user but does not log the user out



Starting an Application

All Programs menu

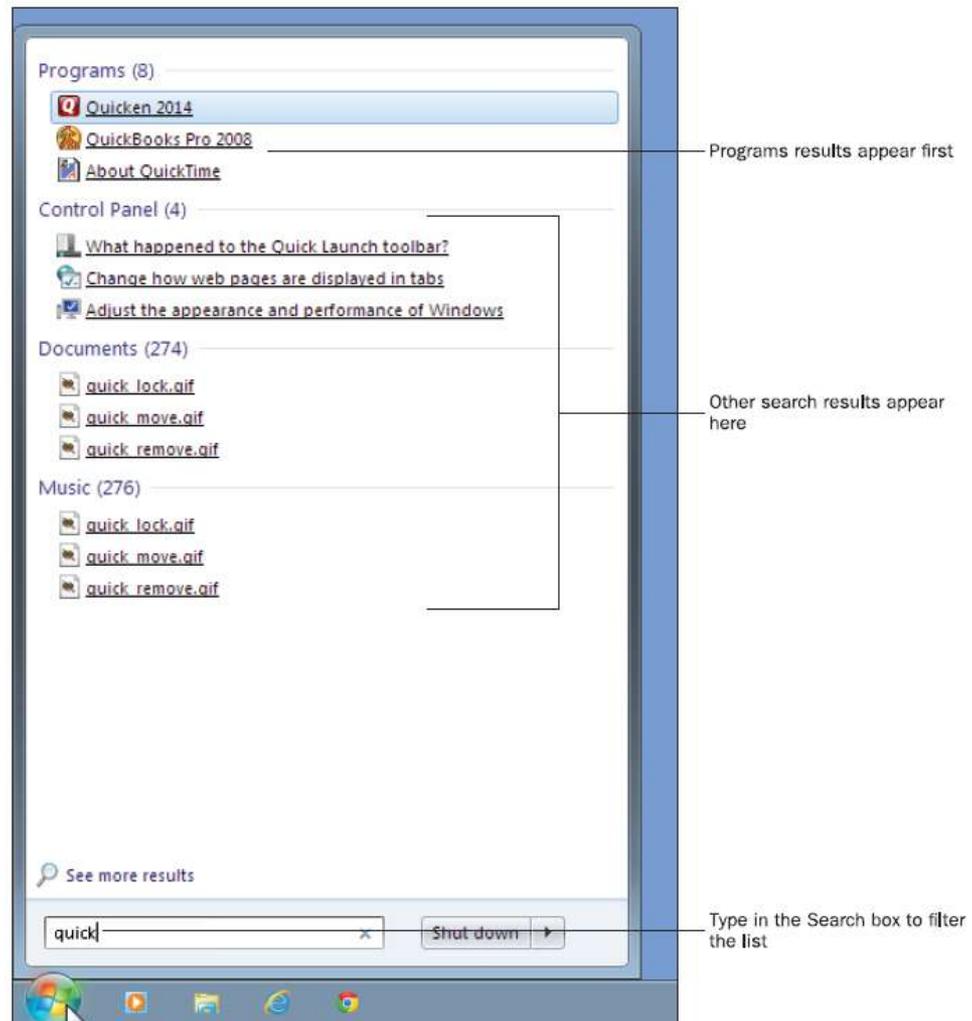


Accessories folder expanded

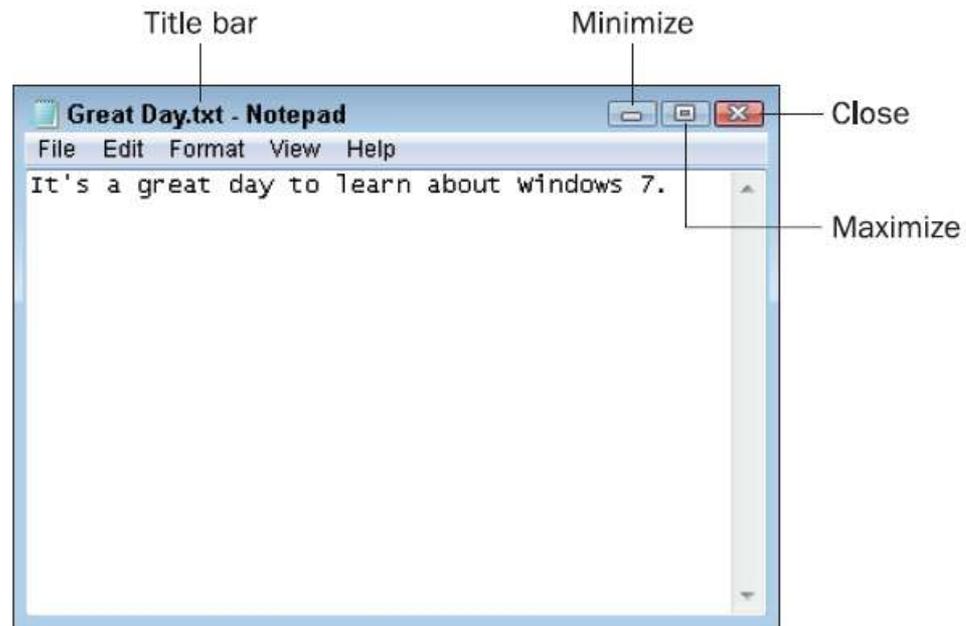
Subfolders within Accessories

Click Back to return to the top level of the Start menu

Searching for an Application

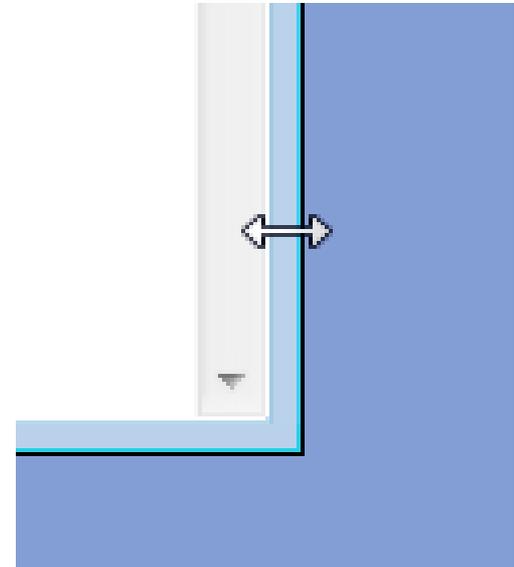


Manipulating a Window

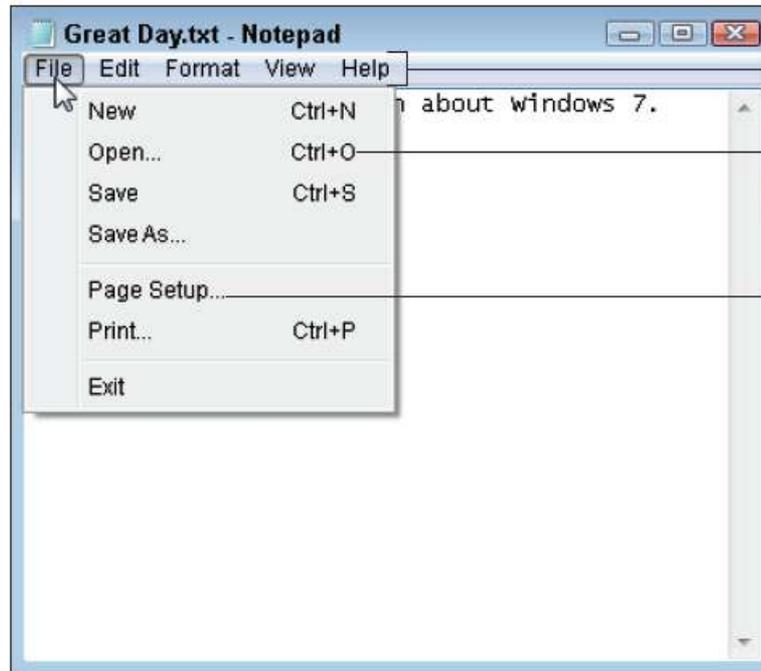


Resizing a Window

Drag the window's
border



Application Menus



Menu bar

Keyboard shortcuts

An ellipsis indicates a dialog box will appear