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Chapter   4

System Software

Operating system is a set of programs designed to manage the resources of a computer.

The primary reason that a computer needs an operating system is to coordinate the **interactions** of its **hardware** components with each other as well as to coordinate their interaction with **application software**.

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Functions of operating system

- **Starting the computer and transferring files from the storage device to RAM memory.**

- **Managing programs that are active and on the desktop and taskbar or running in the background.**

- **Managing memory (RAM) to optimize its use.**

- **Coordinating tasks including the communication between input and output devices and programs.**

- **Providing a user interface to allow for easy and seamless communication with the user.**
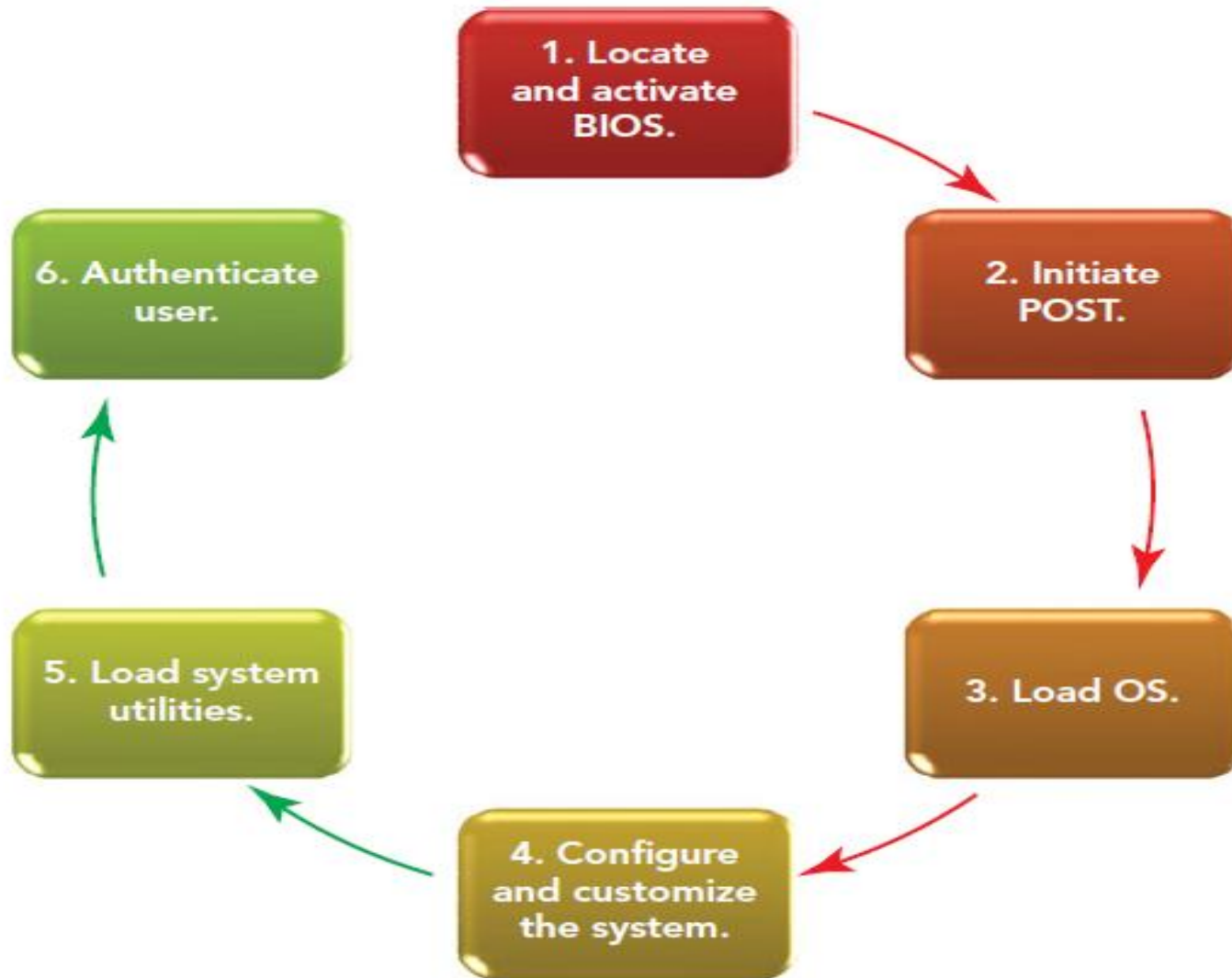
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1- Starting computer Booting

The process of loading the OS from storage device to memory (RAM).

With a cold boot start a computer that has not yet been turned on.

With a warm boot (Restart) , restart a computer that is already on.

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1- Starting computer

1. Locate and activate BIOS.
2. Initiate POST.
3. Load OS.
4. Configure and customize the system.
5. Load system utilities.
6. Authenticate user.

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start of the system's **BIOS** boot program. The **BIOS** **basic input/output system**) is the part of the system software that provides the computer with the descriptions of the equipment that system contains, typically the CPU, hard disk, RAM, and video component—equipment not usually replaced by the user. Encoded in ROM.

Power-on self-test (POST): Among the components tested are the computer's main memory (RAM), the keyboard, mouse, disk drives, and the hard disk.

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Plug-and-Play (PnP) **capabilities, which automatically detect new PnP-compatible peripherals that might have installed.**

System Utilities : **Speaker volume control, antivirus software, and power management options.**

2- Managing applications

CPU loads the application from storage into RAM.

Single-tasking operating systems could run only one application at a time.

Multitasking operating systems enable more than one application to run at the same time.

3- Managing Memory

The OS gives each running program and some devices their own portion of RAM and attempts to keep the programs from interfering with each other's use of memory.

OS can make the computer's RAM seem larger than it really is. This trick is accomplished by means of virtual memory.

3- Managing Memory

The transferring of files from the hard disk to RAM and back is called **paging**.

ReadyBoost performance is better than hard disk virtual memory because accessing files on flash memory (USB flash drives and secure digital SD memory cards) is quicker than accessing information on hard drive.

4- Coordinate Tasks.

The driver enables communication between the OS and the input and output devices connected to a computer system.

Windows operating system provides a feature called Windows Update that can automatically detect new hardware and install the required driver in less than one minute.

4- Coordinate Tasks.

The OS provides interrupt handlers also called interrupt service routines, which are mini programs that immediately respond when an interrupt occurs.

5-Providing User Interface

1- Start (launch) application programs.

2- Manage storage devices, such as hard disks, optical drives, and USB drives, and organize files.

3- Shut down the computer safely by following an orderly shutdown procedure.

Types of user interface

1- Graphical user interface (GUI) : uses graphics and the point-and-click technology of the mouse to make the operating system and programs easier to use.
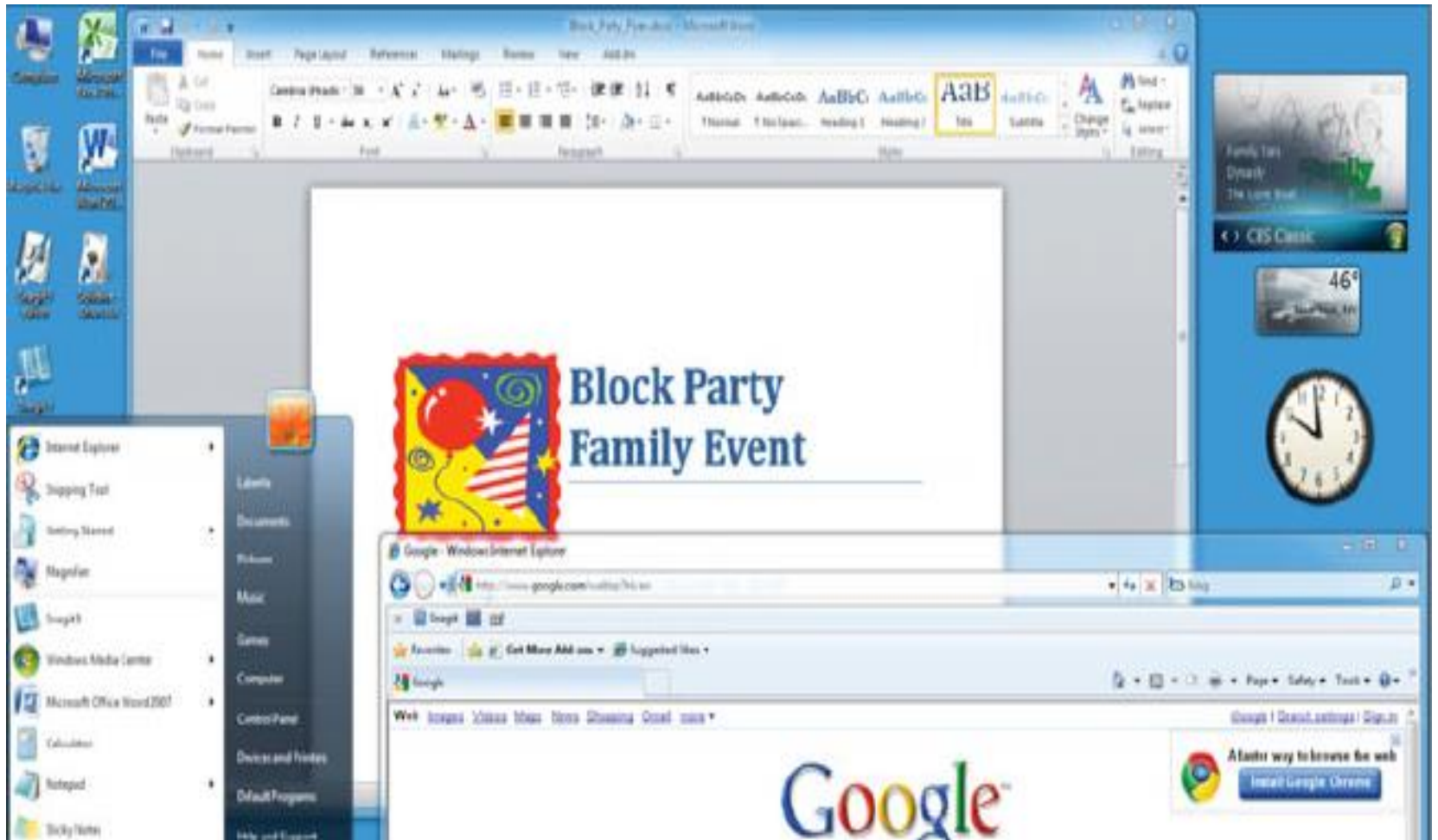
Types of user interface

2- Menu-driven user interfaces: enable to avoid memorizing key words such as *copy* and *paste*) and syntax (a set of rules for entering commands). On-screen, text-based menus show all the options available at a given point.

Types of user interface

3- Command-line user interfaces require to type commands using keywords that tell the OS what to do (such as *Format* or *Copy*) one line at a time.

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Operating System Categories

1- Stand-alone : **single user.**

2- Server : **client/server network.**

3- Embedded: **found on ROM chips in the portable or dedicated devices use today**

| Category	Name
Stand-alone	DOS—developed for original IBM PC Windows 3.X, Windows 95, Windows 98, Windows 2000 Professional, Windows ME, Windows XP, Windows Vista, Windows 7 MAC OS X UNIX Linux
Server	Windows NT Server, Windows 2000 Server, Windows Server 2003, Windows Server 2008 UNIX Linux Novell Netware Solaris Red Hat Enterprise Server
Embedded	Windows CE (variations are Windows Mobile, Pocket PC) iPhone OS Palm OS BlackBerry OS Embedded Linux Google Android Symbian OS

Mac OS
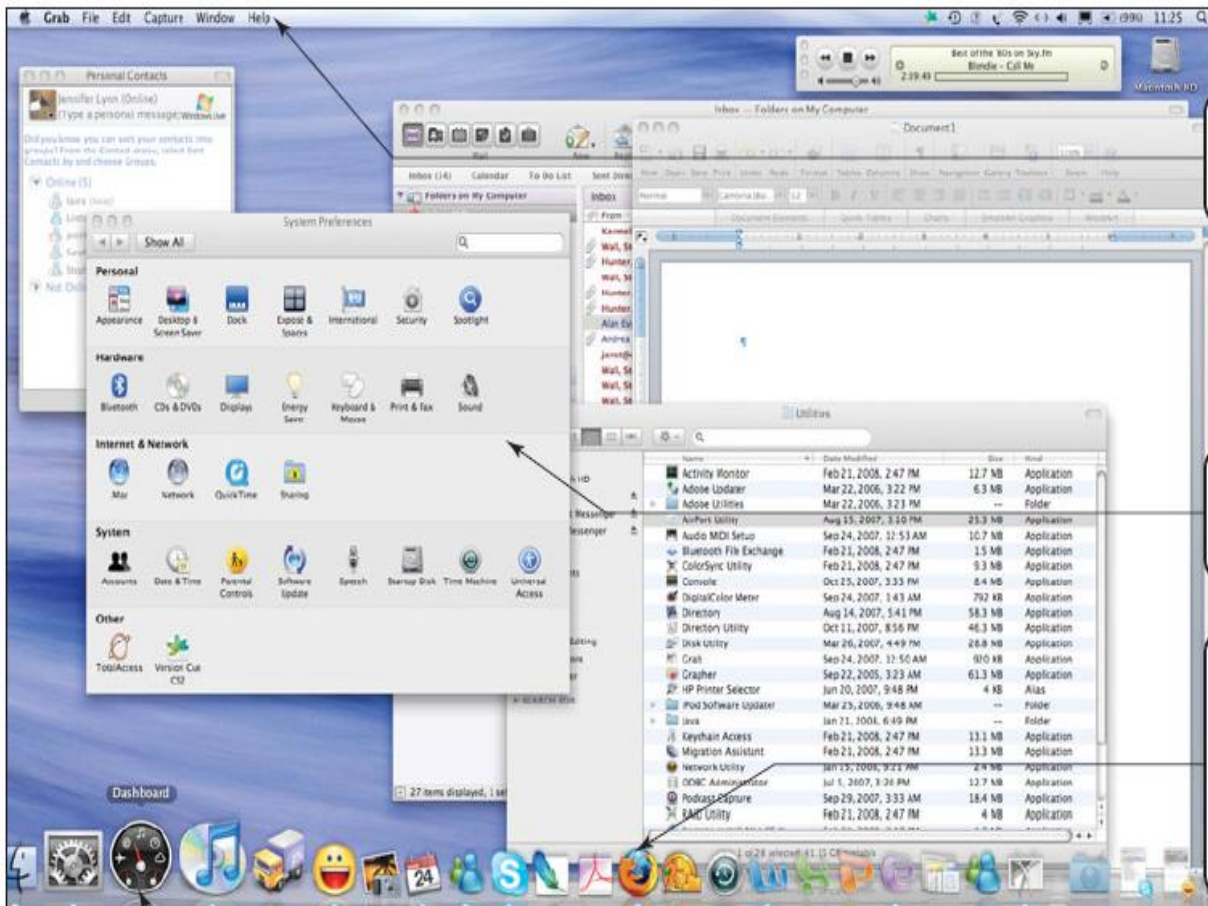
The menu bar contains commands and tasks for the current application.

The System Preferences panel is similar to the Windows Control Panel.
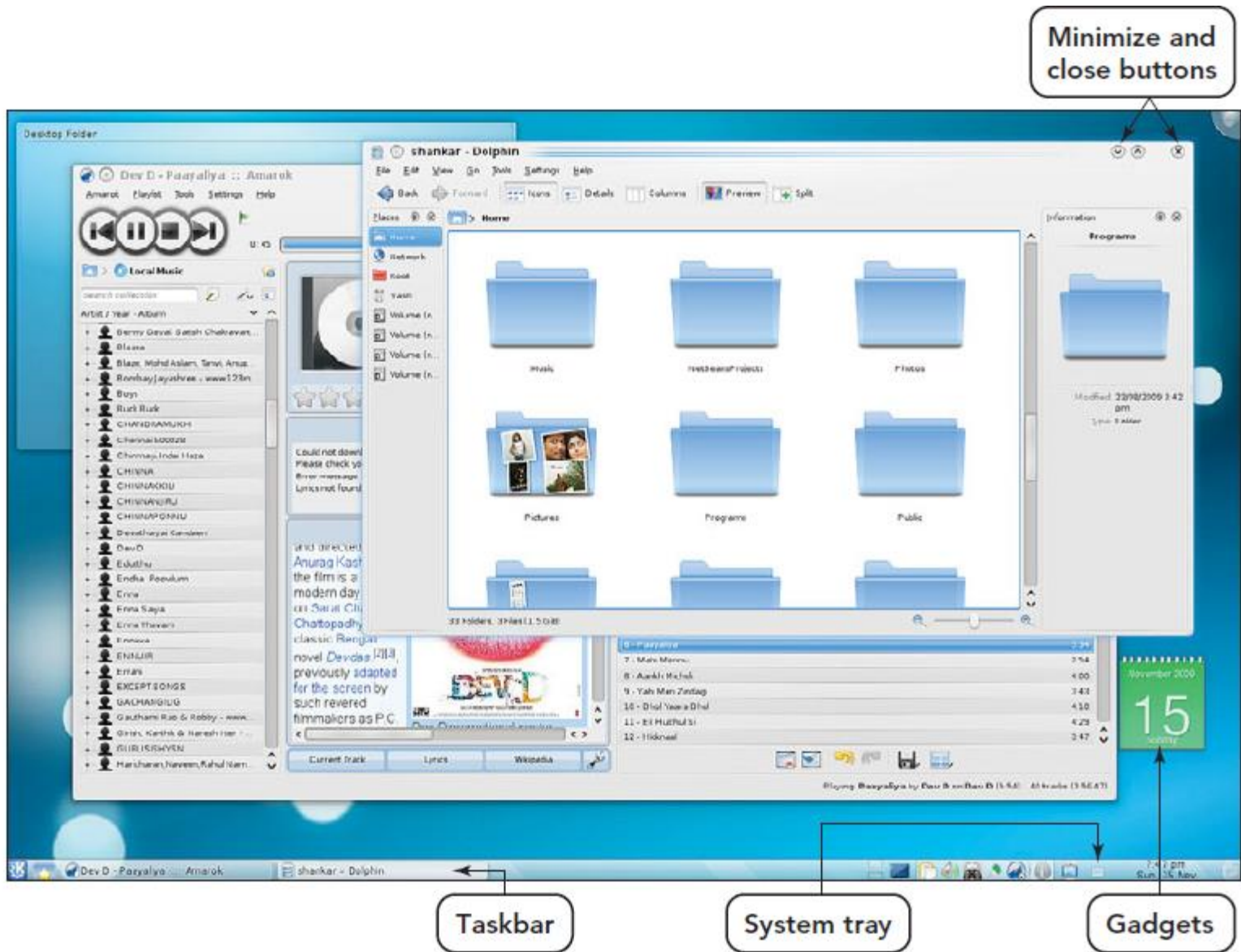
The Dock, similar to the Windows taskbar, provides access to frequently used applications and those currently in use.

The dashboard icon is used to access widgets, similar to the gadgets stored on the sidebar in Windows 7.

Unix
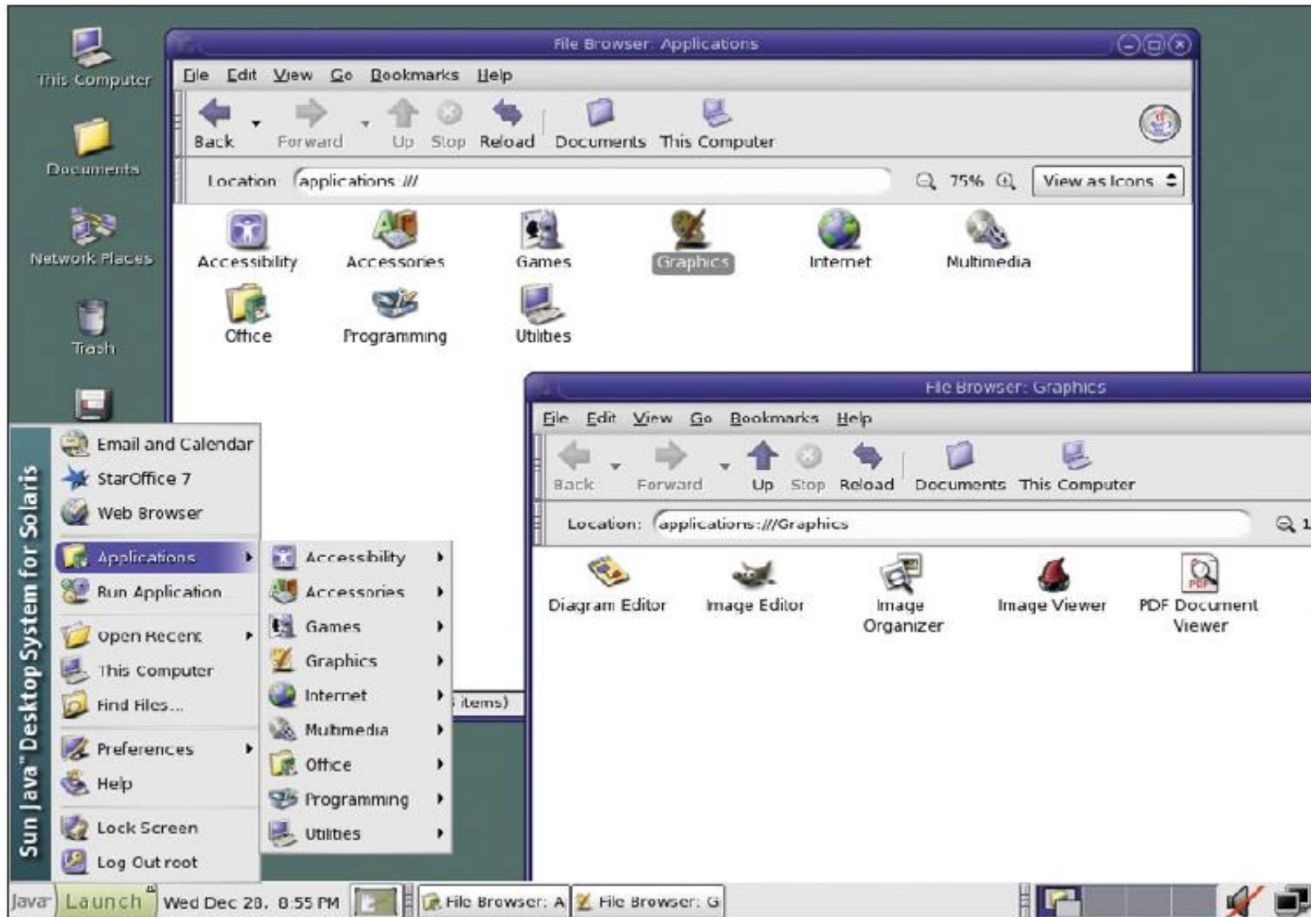
Linux: open source software

Platform : microprocessor + OS

1- Mac: Motorola chip or IBM chip + Mac OS

2- PC: Intel or AMD + Windows OS

Mac: Intel chip + Mac OS or Windows

Operating System Usage

- 5%
- 1%
- 2%
- 92%

Legend:
- Windows
- Mac
- Linux
- Other
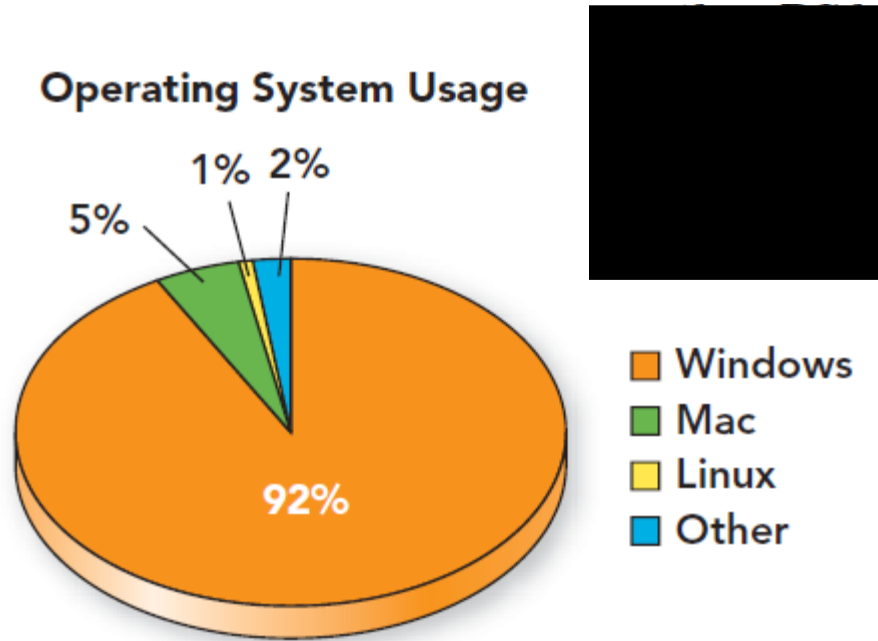
Server operating systems are designed for network use. Normally they are complete operating systems with a file and task manager. Additional features like a Web server, directory services, and a messaging system may also be included.

Benefits of operating system

1- Security: prevent unauthorized access to corporate networks, data, and user accounts.

2- Web server: Enhanced capabilities are available for developing and hosting Web applications and services.

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3-Administiration: **All configuration and maintenance is done through the command-line interface or through remote administration.**

4- Virtualization: **Multiple servers can be consolidated as separate virtual machines on a single physical server, and multiple operating systems can run in parallel.**

Server operating System

1- Unix and Linux

2-Netware

3-Solaries

4- Mac OS X

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Embedded operating System

Embedded operating systems are specialized operating systems designed for specific applications.

Automobiles that display the fuel and energy use   All smartphones   Programmable thermostats

Microsoft Windows Mobile

1- Windows CE

2-Palm OS

3- Symbian OS

4- Android:

5- iPhone OS

Open source software

the basic code is free, can find pieces of it running iPods, supercomputers, smartphones, and many other computer systems.

System Utilities

Programs that work in tandem with the operating system and perform services that keep the computer system running smoothly.

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Tasks of system utilities

1- Backing up system and application files Providing antivirus protection.

2- Searching for and managing files.

3-Scanning and defragmenting disks and files.

Tasks of system utilities

4- Compressing files so that they take up less space on storage media.

5-Providing additional accessibility utilities to meet the needs of individuals with special needs.

Backup Software

Backup software copies data from the computer's hard disk to backup devices, such as flash drives, CDs, DVDs, an external hard drive, or an online storage location.

Drive imaging software

Drive imaging software creates a mirror image of the entire hard disk— including the OS and applications, as well as all files and data. In the event of a hard disk or computer system failure, the drive image can be used to restore the system.

Antivirus software

Antivirus software protects a computer from computer viruses.

Bad sector is a portion of the disk that is unable to store data reliably.

File manager

Program that helps organize and manage the data stored on disk. The file manager enables to perform various operations on the files and folders created on computer's storage devices.

A disk cleanup utility

Utility improves system performance and increases storage space by removing files that no longer need.

Disk scanning program

Detect and resolve a number of physical and logical problems that may occur when computer stores files on a disk.

Fragmented files on disk

Defragmented files on disk

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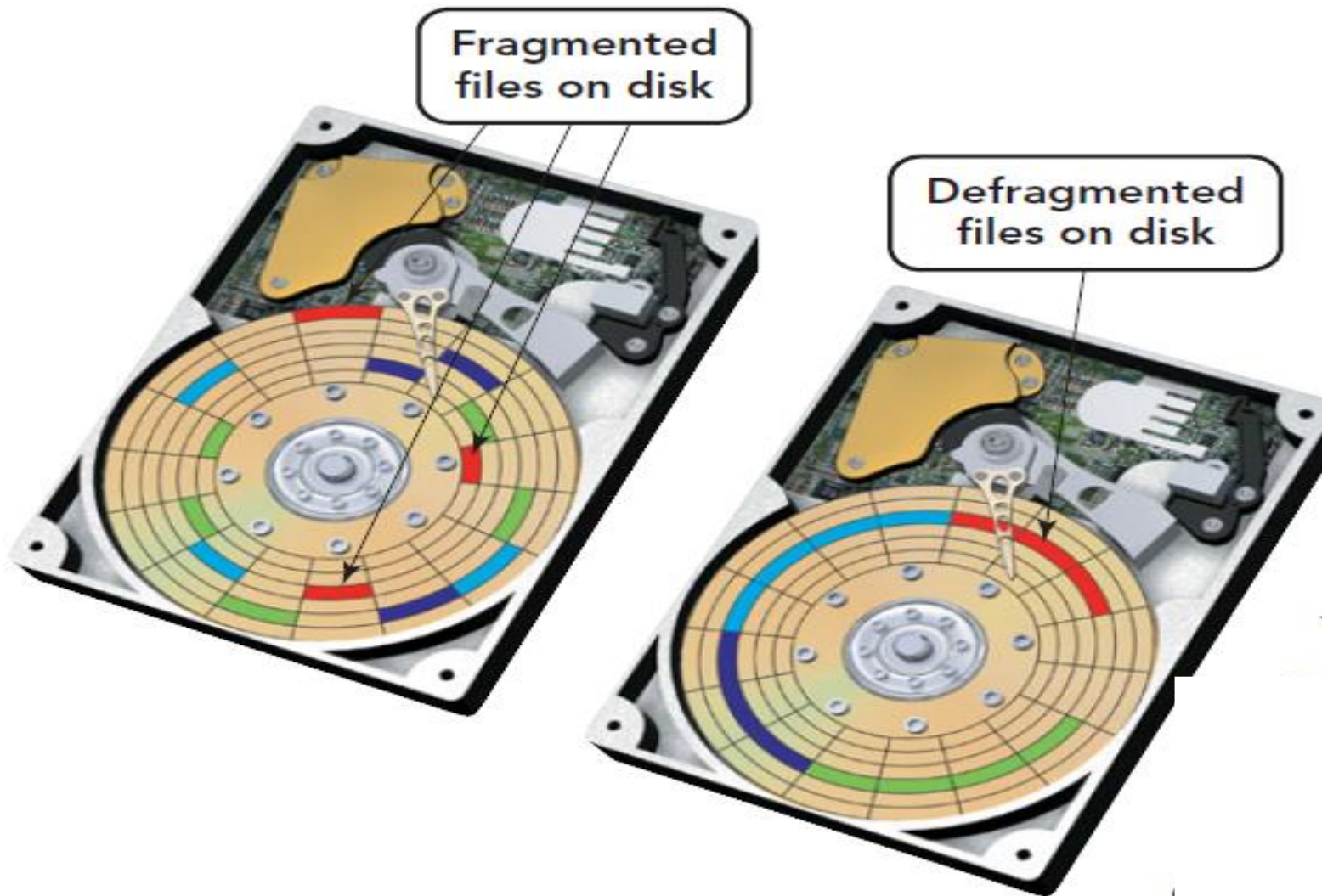
File Compression

Utility exchanges programs and data efficiently by reducing the size of a file by as much as 80 percent without harming the data.

Accessibility Utilities

Accessibility utilities are utilities designed to make computing easier for individuals with special needs.

Accessibility Utilities

1- Magnifier: feature that magnifies a portion of the screen to make reading easier.

2- On –screen keyboard

3- Speed recognition

4- Narrator: Basic speech program that reads everything on the screen.

System Update

Keep operating system up to date with fixes (service patches) or protections against external environment changes.

Troubleshooting

The trouble can stem from an error in the boot cycle, the failure of a command to work in a running program, or the addition of hardware or software.

Troubleshooting

1- Computer fails to start: (boot disk).

2- Improperly shutting down.

3- Configuration problem.

4- System slowdown