Operating Systems and Windows
What is an Operating System?

• The **most important** program that runs on your computer. It **manages** all other programs on the machine.

• Every PC **has to have one** to run other applications or programs. It’s the first thing “loaded”.
Operating System

• It performs basic tasks, such as:
  • Recognizing input from the keyboard or mouse,
  • Sending output to the monitor,
Operating System

• Keeping track of files and directories on the disk, and

• Controlling peripheral devices such as disk drives and printers.
Is There More Than One Type of OS?

• Generally, there are four types, based on the type of computer they control and the sort of applications they support.

1. Single-user, single task

This type manages the computer so that one user can effectively do one thing at a time.
Types of Operating Systems

2. Multi-user, multi-task

Allows two or more users to run programs at the same time. Some operating systems permit hundreds or even thousands of concurrent users.
Types of Operating Systems

3. Real Time Operating Systems

RTOS are used to control machinery, scientific instruments, and industrial systems.

There is typically very little user-interface capability.

Resources are managed so that a *particular operation executes precisely the same every time*.
4. Single-user, Multi-tasking

This is the type of operating system *most desktops and laptops use today*.

*Microsoft’s Windows* and *Apple’s MacOS* are both examples of operating systems that will let a *single user have several programs in operation at the same time*. 
OS’s Manage Applications

• Operating systems provide a software platform on top of which other “application” programs can run.

• The application programs must be written to run on a particular operating system.

• So, your choice of operating system determines what application software you can run.
Besides managing hardware and software resources on the system, the OS must manage resources and memory.

There are two broad tasks to be accomplished.
1. Each process **must have enough memory** in which to execute, and

*It can neither run into the memory space of another process,*

*Nor be run into by another process.*
1. The different types of memory in the system must be used properly so that each process can run most effectively.
• **Cache** - A section of a computer's memory which *temporarily retains recently accessed data* in order to speed up repeated access to the same data.

• It provides **rapid access** without having to wait for systems to load.
Random access memory (RAM) is the best known form of computer memory.

- RAM is considered "random access" because you can access any memory cell directly if you know the row and column that intersect at that cell.
RAM Memory

- The more RAM your computer has, the faster programs can function. The two main types are called DRAM and SRAM. SRAM is faster than DRAM, but, more expensive.

Remember, that if the power is turned off, then all data left in RAM, that has not been saved to the hard drive, is lost.
Virtual Memory

• **Virtual Memory** – a method of using hard disk space to provide extra memory. It simulates additional RAM.

• In Windows, the amount of virtual memory available, equals the amount of **free RAM** plus the amount of **disk space** allocated to the **swap file**.

![System Properties dialog box showing Virtual Memory settings](image)
A swap file is an area of your hard disk that is set aside for virtual memory. Swap files can be either temporary or permanent.
Okay – So Now What?
When you **turn on the power** to a PC, the first program that **runs** is a set of **instructions** kept in the computer's read-only memory (ROM).
OS - Wake up Call

• It checks to make sure everything is **functioning properly**.

• It **checks** the CPU, memory, and basic input-output systems (BIOS) for errors.
• Once successful, the software will begin to **activate** the computer's disk drives.

• It then **finds** the first piece of the operating system: the **bootstrap loader**.
OS - Booting the PC

• The **bootstrap loader** is a small program that has a single function: It **loads the operating system** into memory and allows it to begin operation.
OS - Booting the PC

• The bootstrap loader **sets up** the small *driver* programs that interface with and control the various hardware.

• It **sets up** the divisions of
  • memory
  • user information, and
  • applications.
OS - Booting the PC

• It establishes the data structures needed to communicate within and between the subsystems and applications of the computer.

• Then it turns control of the computer over to the operating system.
Your Desktop may look like this...
Windows Desktop

...Or like this.
How Do I Tell The OS What I Want To Do?

• You must continue to give the operating system commands that are accepted and executed.

• The first command was pushing the “ON” button which started the “boot” process.
Enter Commands

• Commands can be entered several ways:

  • Through a keyboard.

  • Pointing or clicking on an object with a mouse. (Graphical User Interface or GUI)

  • Sending a command from another program.
Windows and Mac are GUI’s

• Microsoft Windows and Apple Macintosh operating systems are “graphical user interfaces” or GUI’s.

GUI is defined as: A picture used in place of a word or words to issue commands.
• GUI interfaces have standards that are usually the same or similar in all systems and applications.

• Standards apply to:
  • Pointers and pointing devices
  • Icons, desktops, windows and menus
Windows - GUI Pointers

• **GUI** uses *pictures, symbols, or icons* rather than words to *represent* some object or function. For example:

• A **pointer** or **mouse pointer** is a small arrow or other symbol that moves on the screen as you move a mouse.

• An **I-Beam pointer** is used by many desktop publishing systems and word processors to *mark* blocks of text and *move* the insertion point.
GUI – Cursors / Pointers

• The term “cursor” typically is used to show where your typing will appear. Otherwise, the term “pointer” is the better choice.

<table>
<thead>
<tr>
<th>Pointer Shapes</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Normal Select</td>
<td>Vertical Resize</td>
</tr>
<tr>
<td>Help Select</td>
<td>Horizontal Resize</td>
</tr>
<tr>
<td>Working In Background</td>
<td>Diagonal Resize 1</td>
</tr>
<tr>
<td>Busy</td>
<td>Diagonal Resize 2</td>
</tr>
<tr>
<td>Precision Select</td>
<td>Move</td>
</tr>
<tr>
<td>Text Select</td>
<td>Alternate Select</td>
</tr>
<tr>
<td>Handwriting</td>
<td>Drag - make copy</td>
</tr>
<tr>
<td>Unavailable</td>
<td>Drag - make shortcut</td>
</tr>
</tbody>
</table>
Windows - GUI Icons

• **Icon** - A small picture that represents a command, object, file, or window.

• **Point and click** with a mouse to execute a command or convert the icon into a window.

• **Icons are moveable** around the display screen, just like moving things around on your desk.
• One type of icon is an **object icon**. It allows you to open applications and documents on your PC.

![Object Icons](image)

• You can create and use a **shortcut icon** to open any application quickly. You don’t have to use the Start Menu to access a program or document.

![Shortcut Icons](image)
• You can divide the screen into different areas.
• In each window, you can run a different program or display a different file.
• You can move windows around the display screen, and change their shape and size at will.
**Windows - GUI Menus**

- **Menu** - is an on-screen list of options for using a program. It can also be a list of categories with many other menu options under it. Menus can "pop up" or "pull down."

![Windows GUI Menus](image)
• Because the formats are well-defined, different programs that run under a common GUI can share data. This makes it possible, for example, to copy a graph created by a spreadsheet program into a document created by a word processor.
Windows - Taskbar

Taskbar – shows you the windows or programs that are currently open on the desktop. You can switch between windows by clicking on the applicable button.
• **System Tray** – shows you running programs that were **started automatically** by the operating system, like anti-virus programs, the clock and volume controls. These programs are running in the background.
**Quick Launch Toolbar** – contains one-click *buttons*, or *shortcuts*, which open programs. You can customize this toolbar however you like.
• The **start button** allows you to easily access your computer programs or configure Windows. By default the start button is located at the bottom left side of the screen.
Parts of a Window

Title bar icon
Title text
Title bar
Windows buttons
Menu bar
Scroll box
Window frame
Vertical scroll bar
Scroll arrow
Status bar
Size grip
• At the top edge of the window, inside its border, is the **title bar** which extends across the width of the window. It contains the title of the application or document.

• A small icon in the far left corner of the title bar represents the **object being viewed** in the window.
Minimize, Maximize and Resize Windows

• The title bar contains three little buttons in the upper right-corner of the window and are used to manage the window size or close it altogether.
Minimize - Maximize

• The first button is the **minimize button** and it will hide the window. The window can be opened again by clicking its button on the taskbar.

• The second button is **maximize**, which makes the window take up all the screen space. Clicking again turns the window back to the size it was. The double-box image is known as the **restore button**.
• The last button will **close** a window. If it is the last window of a certain type of program, it will **exit** or **quit** that program.
Move a Window

- You can move a window to any location on the desktop by “clicking and dragging” the title bar with your mouse.
  - This is also referred to as “drag and drop”.

- You can also drag and drop icons to move the location of files or shortcuts.
• **Menu bar** - The horizontal bar near the top of a window that displays the names of menus from which you can access features and perform tasks for the current application.
Types of Menu Items

• **Arrow**: another menu will cascade from it.

• **Three dots**: a dialog box will open, containing choices for you to make.
Types of Menu Items

• **Checkmark:** clicking this item will toggle the feature on or off.

• If a **keyboard shortcut** is shown in the menu, you can use those keys to run the command without having to open the menu.
• **Scroll bar** - the narrow rectangular bar at the far right of windows.

  • **Clicking** on the up or down arrow enables you to move up and down through a document.

  • A **movable square** indicates your **location** in the document.
Windows Frame & Resizing

• You can also resize a window by a *click and drag* move.

*Put the mouse cursor on the edge of a window (that is not maximized) and when the pointer changes to a double arrow, click and drag for the new size. Some windows have a handle on them for resizing.*
Status Bar

- **Status bar** – is located at the bottom of a window and contains information about formatting options, errors, prompts, messages, or the status of an application.
1. List box
2. Spin control box
3. Slide
4. Drop-down list
5. Radio button
6. Checkbox
7. Text box
Windows – Start Menu

• **Start Menu** – gives you access to all programs and functions on your PC, including “help” files and “search” capabilities.
Access **Windows HELP** through the **Start** menu.
Windows HELP

- Windows XP HELP menu
Windows has a number of internal programs as part of the operating system that help keep you organized and your PC healthy.

Here are a few:
My Computer – inside this icon you can find every folder and file that your PC has access to.
THE recycle BIN.
Recycle Bin – Deleted files and folders go here first, where they wait to be permanently deleted by you, or by rules that you set up. This is a temporary storage area on your hard drive.
Windows – My Docs

• My Documents – a place to store the documents and files you create. Clicking on this opens an explorer window displaying the detail.

• It’s wise to keep the files you create separate from the program files, so when you backup your data, it’s all located in one location. You can then backup just this area of your storage.
My Documents – Explorer Window
Network Neighborhood – serves as a window into the network resources you have on your PC.

If you are connected to a network you will see all the other PC’s linked to your network and you can share files, printers or other hardware.
Network Neighborhood
• If you have multiple users on a PC with separate “profiles” or user logons, use the logoff process to close out of your profile or to switch users.
• There is a “graceful” way of shutting down your PC that will save your program settings and files.

• *This shutdown process basically puts the operating system to bed.*
Which Explorer?

• *Tip: Don't confuse Windows Explorer with Internet Explorer.*

• *Windows Explorer* is the program that lets you **explore** things "inside" your own computer.

• *Internet Explorer* lets you **explore** things "outside" your computer -- namely things on the Internet.