

MODULE 4 - WINDOWS



Referred Text Book:
The Essential Guide to User Interface Design (Second Edition)
Author: Wilbert O. Galitz

WINDOW

- A window is an area of the screen, defined by a border that contains a particular view of some area of the computer or some portion of a person's dialog with the computer.



Primary Window of Microsoft's Window



TOPICS TO BE COVERED

1. A window's characteristics.
2. A window's components.
3. A window's presentation styles.
4. The types of windows.
5. Window management.
6. Organizing window's functions.
7. Window operations.
8. Web system.
9. Characteristics of device-based controls.



1. A WINDOW'S CHARACTERISTICS

A window is seen to possess the following characteristics:

- A name or title, allowing it to be identified.
- A size in height and width (which can vary).
- A state, accessible or active, or not accessible. (Only active windows can have their contents altered.)
- Visibility—the portion that can be seen. (A window may be partially or fully hidden behind another window, or the information within a window may extend beyond the window's display area.)
- A location, relative to the display boundary.
- Presentation, that is, its arrangement in relation to other windows.
- It may be tiled, overlapping, or cascading.
- Management capabilities, methods for manipulation of the window on the screen.
- Its highlight, that is, the part that is selected.
- The function, task, or application to which it is dedicated.



Windows are useful in the following ways:

I. Presentation of Different Levels of Information

- Deeper levels are possible in additional windows.
- A document table of contents can be presented in a window

II. Presentation of Multiple Kinds of Information

- Variable information needed to complete a task can be displayed simultaneously in adjacent windows.
- **Example:** An order-processing system window could collect a customer account number in one window and retrieve the customer's name and shipping address in another window. A third window could collect details of the order, so on.

III. Sequential Presentation of Levels or Kinds of Information

- Steps to accomplish a task can be sequentially presented through windows. Successive windows are presented until all the required details are collected.
- **Example:** A requested type of coverage in an insurance application might require the collection of specific details about that type of coverage. This information can be entered into a window presented to collect the unique data. The windows disappear after data entry, and additional windows appear when needed.



IV. Access to Different Sources of Information

- Independent sources of information may have to be accessed at the same time from different host computers, operating systems, applications, files, or areas of the same file.
- **Example:** A writer may have to refer to several parts of a text being written at the same time.

V. Combining Multiple Sources of Information

- Text from several documents may have to be reviewed and combined into one.
- Pertinent information is selected from one window and copied into another.

VI. Performing More Than One Task

- While waiting for a long, complex procedure to finish, another can be performed.
- Tasks of higher priority can interrupt less important ones. The interrupted task can then be resumed without the necessity to “close down” and “restart.”

VII. Reminding

- Windows can be used to remind the viewer of things likely to be of use in the near future.
- **Examples:** A history of the path followed or the command choices to that point, or the time of an important meeting, etc.



VIII. Monitoring

- Changes, both internal and external, can be monitored.
- Data in one window can be modified and its effect on data in another window can be studied.
- External events, such as changes in stock prices, out of normal range conditions, or system messages can be watched while another major activity is carried out.

IX. Multiple Representations of the Same Task

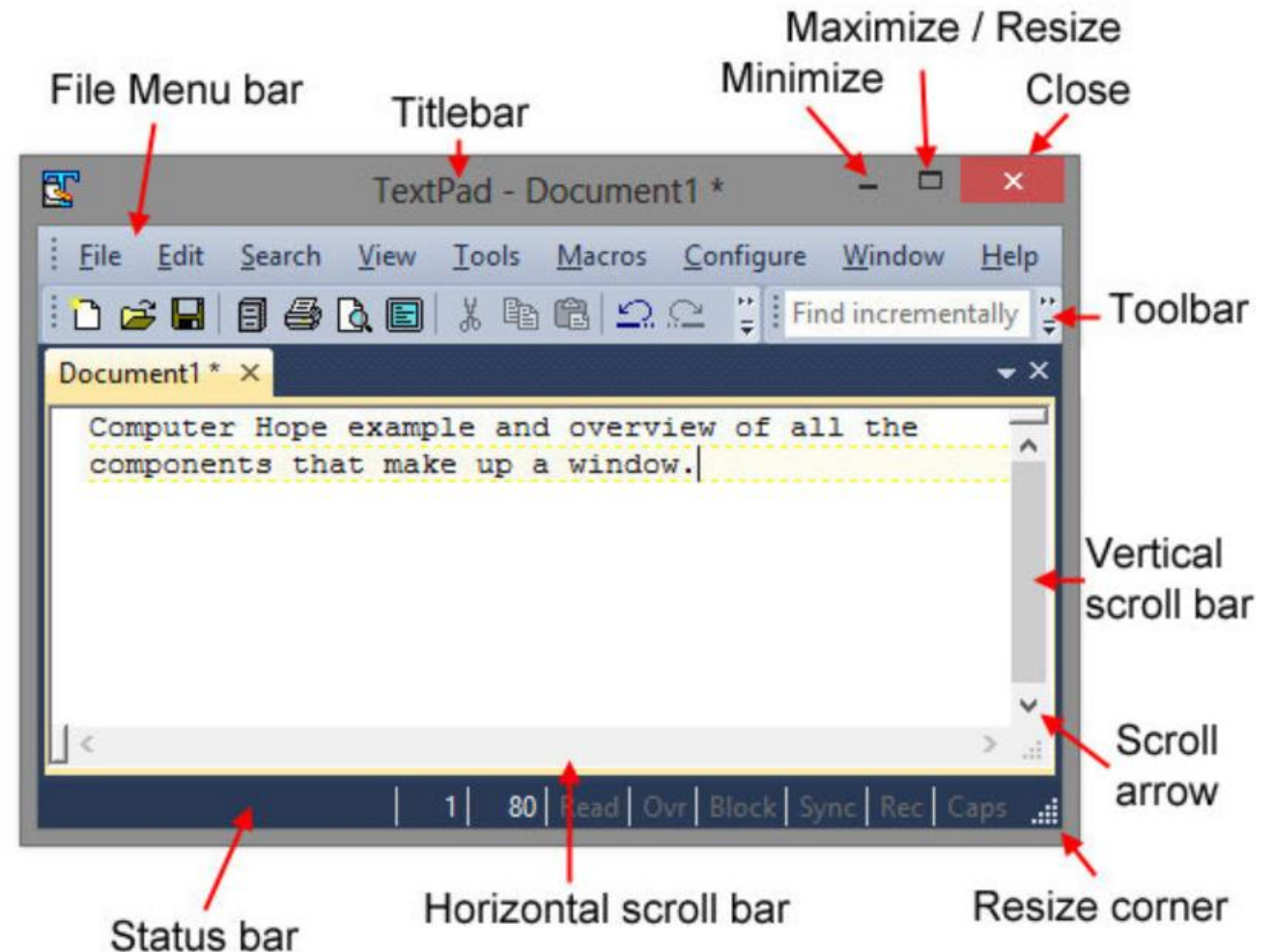
- The same thing can be looked at in several ways—**Example:** A maintenance procedure may be presented in the form of textual steps and illustrated graphically at the same time.



2. A WINDOW'S COMPONENTS

Following are the different components of Windows:

1. Frame
2. Title Bar
3. Title Bar Icon
4. Windows Sizing Button
5. Menu Bar
6. Status Bar
7. Scroll Bars
8. Split Box
9. Toolbar
10. Command Area
11. Size Grip
12. Work Area



1. Frame

- Also called as border. It's a boundary usually rectangular in shape, that distinguish it from other windows.
- Windows filling an entire screen may use the screen edge as the border.
- If a window is resizable, it may contain control points for sizing it. If the window cannot be resized, the border coincides with the edge of the window.

2. Title Bar

- Also referred to by some platforms as the caption, caption bar, or title area.
- The title bar contains a descriptive title, identifying the purpose or content of the window.
- The title bar also serves as a control point for moving the window and as an access point for commands that apply to a window.

For example: As an access point, when a user clicks on the title bar using the secondary mouse button, the pop-up or shortcut menu for the window appears.



3. Title Bar Icon

- Located at the left corner of the title bar in a primary window, this button is used in Windows to retrieve a pull-down menu of commands that apply to the object in the window.
- Microsoft suggests that:
 - If the window contains a tool or utility, a small version of the application's icon should be placed.
 - If the application creates, loads, and saves documents, a small version of the icon that represents its document or data file type should be placed.
 - Even if the user has not yet saved the file, display the data file icon rather than the application icon, and again display the data file icon after the user saves the file.

4. Window Sizing Buttons

- Located at the right corner of the title bar, these buttons are used to manipulate the size of a window.
 - The minimize button
 - The maximize button
 - The restore button—typically inscribed with a pair overlapping boxes. It replaces the maximize button, since the window can no longer be increased in size
 - A close button



5. Menu Bar

- A menu bar is used to organize and provide access to actions, so some times also referred as action bar.
- It is located horizontally at the top of the window, just below the title bar.
- A menu bar contains a list of topics or items that, when selected, are displayed on a pull-down menu beneath the choice.

6. Status Bar

- Information of use to the user can be displayed in a designated screen area called as status bar also referred as a message area or message bar.
- Microsoft Windows suggests using the status bar in the bottom location.

7. Scroll Bars

- A scroll bar is an elongated rectangular container consisting of a scroll area , a slider box and anchors at each end.
 - Vertical scrolling : The scroll bar is positioned at the far right side of the work area, extending its entire length.
 - Horizontal scrolling : It is accomplished through a scroll bar located at the bottom of the work area.



8. Split Box

- A window can be split into two or more pieces or panes by manipulating a split box located above a vertical scroll bar or to the left of a horizontal scroll bar.
- A split window allows the user to:
 - Examine two parts of a document at the same time.
 - Display different, yet simultaneous, views of the same information.

9. Toolbar

- They are sometimes called command bars. Toolbars are designed to provide quick access to specific commands or options.
- Specialized toolbars are sometimes referred as ribbons, toolboxes, rulers, or palettes.

10. Command Area

- In situations where it is useful for a command to be typed into a screen, a command area can be provided.
- The desired location of the command area is at the bottom of the window.
- If a horizontal scroll bar is included in the window, position the command area just below it. If a message area is included on the screen, locate the command area just above it..



11. Size Grip

- A size grip is a Microsoft Windows special handle included in a window to permit it to be resized.
- If the window possesses a status bar, the grip is positioned at the bar's right end. Otherwise, it is located at the bottom of a vertical scroll bar, the right side of a horizontal scroll bar.

12. Work Area

- The work area is the portion of the screen where the user performs tasks.
- The work area may consist of an open area for typing, or it may contain controls (such as text boxes and list boxes) or customized forms (such as spreadsheets).
- The work area may also be referred to as the client area.



3. A WINDOW'S PRESENTATION STYLES

The presentation style of a window refers to its spatial relationship to other windows.

There are two basic styles:

1. Tiled Windows
2. Overlapping Windows

Picking a Presentation Style

-
- Use tiled windows for:
 - Single-task activities.
 - Data that needs to be seen simultaneously.
 - Tasks requiring little window manipulation.
 - Novice or inexperienced users.
 - Use overlapping windows for:
 - Switching between tasks.
 - Tasks necessitating a greater amount of window manipulation.
 - Expert or experienced users.
 - Unpredictable display contents.
-



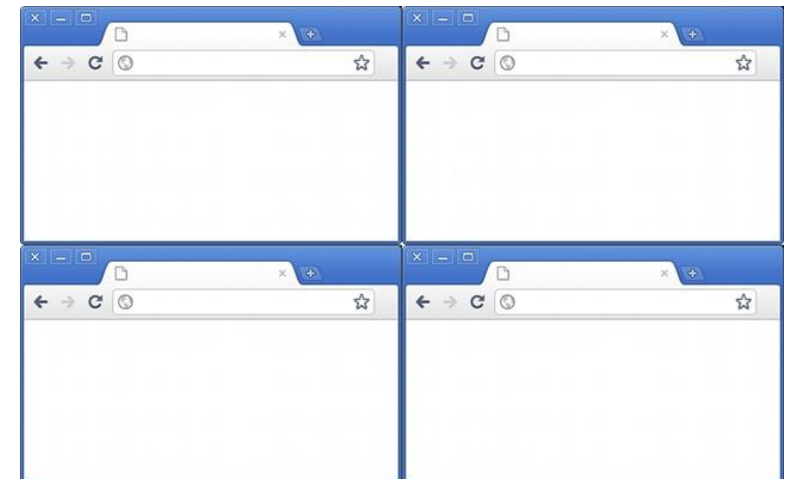
1. Tiled Windows

- Tiled windows appear in one plane on the screen and expand or contract to fill up the display surface, as needed.
- Most systems provide two-dimensional tiled windows, adjustable in both height and width.

General Structure of Tiled Window



Examples



Advantage's of Tiled Windows:

- i. The system usually allocates and positions windows for the user, eliminating the necessity to make positioning decisions.
- ii. Open windows are always visible, eliminating the possibility of them being lost and forgotten and also information being hidden.
- iii. They are easier, according to studies, for novice or inexperienced people to learn and use.
- iv. They yield better user performance for tasks where the data requires little window manipulation to complete the task.
- v. They are less complex than overlapping windows

Disadvantage's of Tiled Windows:

- i. Only a limited number of windows can be displayed in the screen area available.
- ii. When a single window is opened or closed, existing windows size changes. The movement can be disconcerting.
- iii. As the number of displayed windows increases, each window can get very tiny.
- iv. The changes in sizes and locations made by the system are difficult to predict.
- v. The configuration of windows provided by the system may not meet the user's needs.
- vi. They are perceived as crowded and more visually complex because window borders are flush against one another, and they fill up the whole screen.
- vii. They permit less user control because the system actively manages the windows.



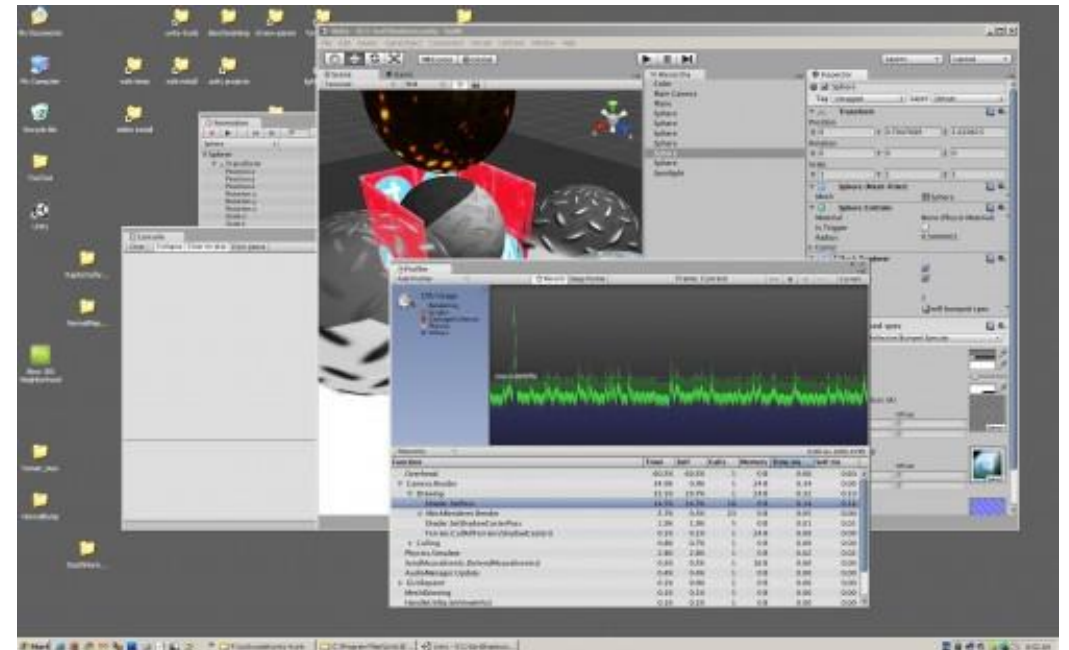
2. Overlapping Windows

- Overlapping windows may be placed on top of one another like papers on a desk.
- They possess a three-dimensional quality, appearing to lie on different planes.
- Users can control the location of these windows, sizes of the windows as well as the plane in which they appear.

General Structure of Overlapping Window



Example



Advantage's of Overlapping Windows:

- i. Visually, their look is three-dimensional, resembling the desktop that is familiar to the user.
- ii. Greater control allows the user to organize the windows to meet his or her needs as a result screen space conservation is not a problem, because windows can be placed on top of one another.
- iii. Windows can maintain larger sizes.
- iv. Windows can maintain consistent sizes and positions.
- v. There is less pressure to close or delete windows no longer needed.
- vi. Larger borders can be maintained around window information, and the window is more clearly set off against its background
- vii. They yield better user performance for tasks where the data requires much window manipulation to complete the task

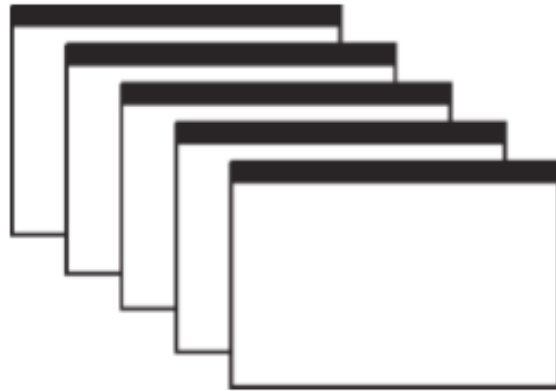
Disadvantage's of Overlapping Windows:

- i. More control functions require greater user attention and manipulation.
- ii. Information in windows can be obscured behind other windows.
- iii. Windows themselves can be lost behind other windows and be presumed not to exist.
- iv. Overlapping windows represent a three-dimensional space is not always realized by the user.
- v. Control freedom increases the possibility for greater visual complexity and crowding.



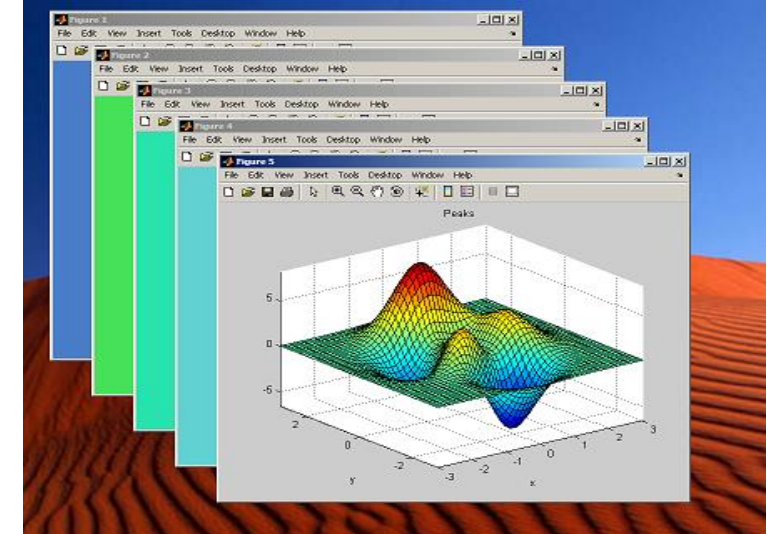
Cascading Windows

- It is a special type of **overlapping window** where the windows are automatically arranged in a regular progression.
- Each window is slightly offset from others, as illustrated.



- Advantages of this approach include the following:
 - i. No window is ever completely hidden.
 - ii. Bringing any window to the front is easier.
 - iii. It provides simplicity in visual presentation and cleanness.

Example



4. TYPES OF WINDOW'S

- The type of window used will depend on the nature and flow of the task.
- The Microsoft Windows windowing scheme has two basic windows:
 1. Primary Windows
 2. Secondary Windows
 - i. Dialog Boxes
 - ii. Property Sheets
 - iii. Property Inspectors
 - iv. Message Boxes
 - v. Palette Windows
 - vi. Pop-up Windows



1. Primary Window

- The primary window is the first one that appears on a screen when an activity or action is started.

-
- Proper usage:
 - Should represent an independent function or application.
 - Use to present constantly used window components and controls.
 - Menu bar items that are:
 - Used frequently.
 - Used by most, or all, primary or secondary windows.
 - Controls used by dependent windows.
 - Use for presenting information that is continually updated.
 - For example, date and time.
 - Use for providing context for dependent windows to be created.
 - Do not:
 - Divide an independent function into two or more primary windows.
 - Present unrelated functions in one primary window.
-

Example: Microsoft
Windows Primary
Window



Components of Primary Windows

PRIMARY WINDOW

Purpose:	To perform a major interaction.
Components:	<p>Frame or border.</p> <p>Title bar.</p> <ul style="list-style-type: none">–Access point for commands that apply to the window, with commands displayed in a pop-up menu. <p>Title Bar icon.</p> <ul style="list-style-type: none">–Small version of the icon of the object being viewed.–Access point for commands that apply to the object being displayed in the window, with commands displayed in a pop-up window. <p>Title bar text.</p> <p>Title bar buttons to: close/minimize/maximize /restore a window.</p> <p>Menu bar.</p> <p>Status bar.</p> <p>Scroll bar.</p> <p>Size grip.</p>



2. Secondary Window

- Secondary windows are supplemental windows. Secondary windows may be dependent upon a primary window or displayed independently of the primary window.

-
- Proper usage:
 - For performing subordinate, supplemental, or ancillary actions that are:
 - Extended or more complex in nature.
 - Related to objects in the primary window.
 - For presenting frequently or occasionally used window components.
 - Important guidelines:
 - Should typically not appear as an entry on the taskbar.
 - A secondary window should not be larger than 263 dialog units x 263 dialog units.
-

Example: Microsoft
Windows Secondary
Window



Components of Secondary Windows

SECONDARY WINDOWS

Purpose:	To obtain or display supplemental information related to the objects in the primary window.
Components:	Frame or border. Title bar. Title bar text. Close button. What's This? button. —Context-sensitive Help about components displayed in the window; this is optional.
Kinds:	Modal and modeless.



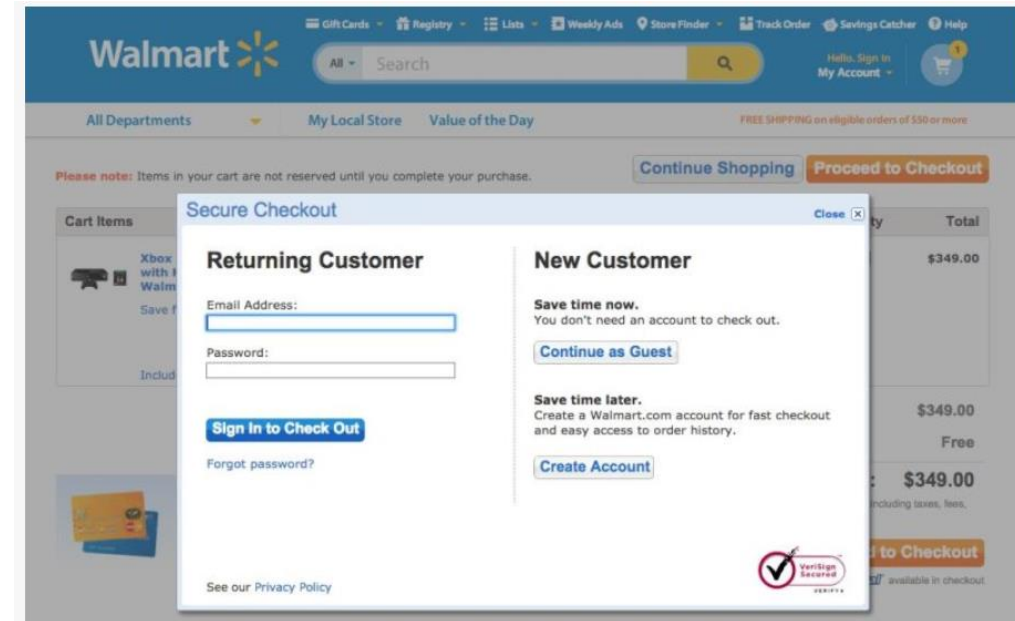
KINDS OF SECONDARY WINDOWS

-
- Modal:
 - Use when interaction with any other window must not be permitted.
 - Use for:
 - Presenting information.
 - For example, messages (sometimes called a message box).
 - Receiving user input.
 - For example, data or information (sometimes called a prompt box).
 - Asking questions.
 - For example, data, information, or directions (sometimes called a question box).
 - Use carefully because it constrains what the user can do.
 - Modeless:
 - Use when interaction with other windows must be permitted.
 - Use when interaction with other windows must be repeated.
-



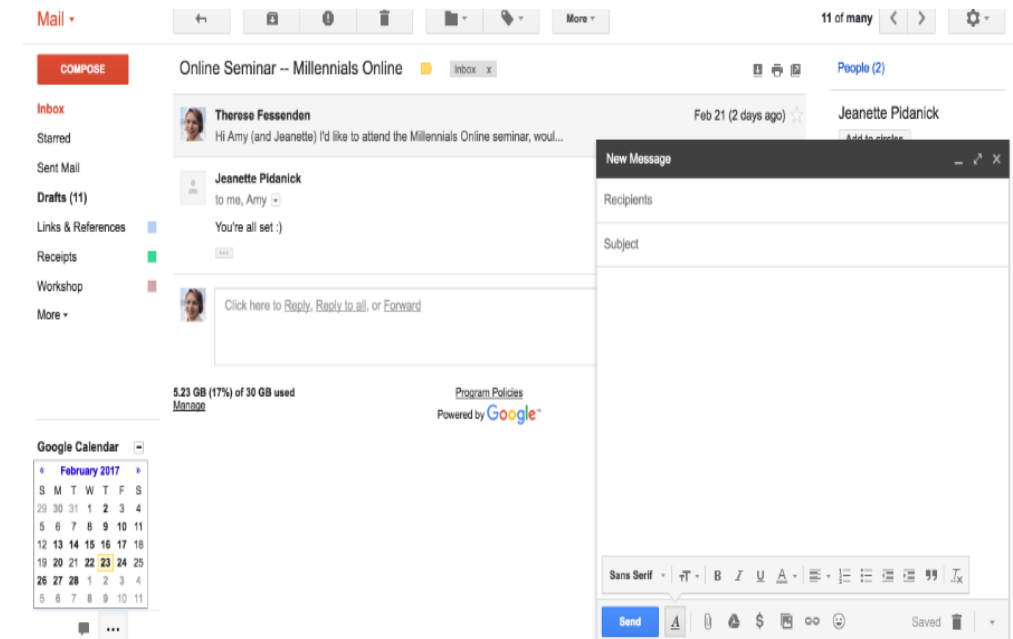
Example for Modal Secondary Window:

Walmart.com using the modal windows which requires users to have an account for checking out.



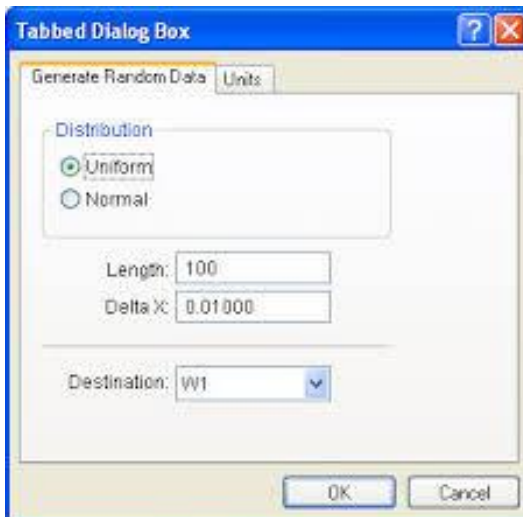
Example for Modeless Secondary Window:

Google Mail uses nonmodal windows as the default method for composing new email messages. Users can continue working with this window open, minimize the composed email without losing it.



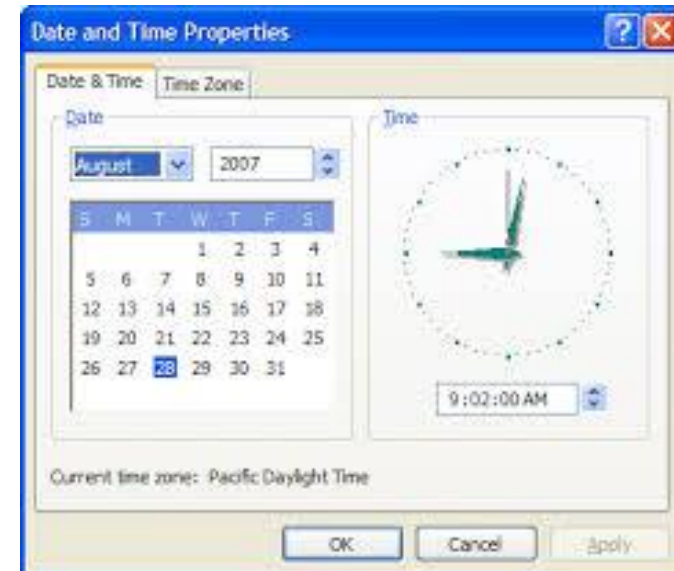
1. Dialog Boxes

- Use for presenting brief messages.
- Use for requesting specific, transient actions.
- Use for performing actions that:
 - Take a short time to complete.
 - Are not frequently changed.
- Command buttons to include:
 - OK.
 - Cancel.
 - Others as necessary.



2. Property Sheets

- Use for presenting the complete set of properties for an object.
- Categorize and group within property pages, as necessary.
 - Use tabbed property pages for grouping peer-related property sets.
 - The recommended sizes for property sheets are:
 - 252 DLUs wide x 218 DLUs high
 - 227 DLUs wide x 215 DLUs high
 - 212 DLUs wide x 188 DLUs high
 - Command buttons to include:
 - OK.
 - Cancel.
 - Apply.
 - Reset.
 - Others as necessary.
 - For single property sheets, place the commands on the sheet.
 - For tabbed property pages, place the commands outside the tabbed pages.



3. Property Inspectors

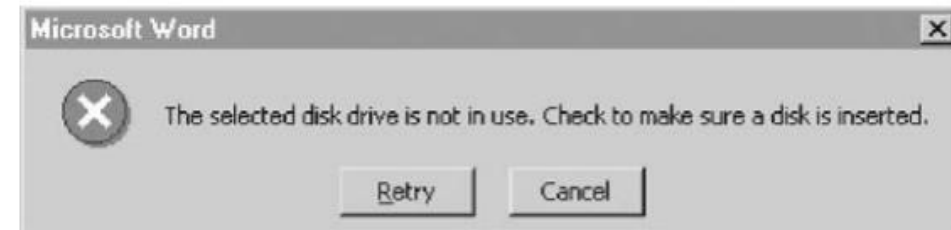
-
- Use for displaying only the most common or frequently accessed object properties.
 - Make changes dynamically.
-



Microsoft Windows property inspector.

4. Message Boxes

-
- Use for displaying a message about a particular situation or condition.
 - Command buttons to include:
 - OK.
 - Cancel.
 - Help.
 - Yes and No.
 - Stop.
 - Buttons to correct the action that caused the message box to be displayed.
 - Enable the title bar close box only if the message includes a cancel button.
 - Designate the most frequent or least destructive option as the default command button.
-



Microsoft Windows message box.



5. Palette Windows

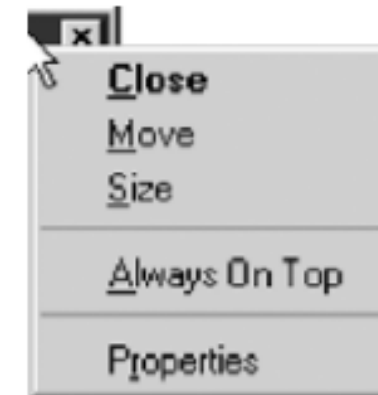
-
- Use to present a set of controls.
 - Design as resizable.
 - Alternately, design them as fixed in size.
-



Microsoft Windows palette window.

6. Pop-up Windows

-
- Use pop-up windows to display:
 - Additional information when an abbreviated form of the information is the main presentation.
 - Textual labels for graphical controls.
 - Context-sensitive Help information.
-



Microsoft Windows pop-up window.



5. WINDOW MANAGEMENT

- The right way to present an application's collection of related tasks or processes are decided by windows management scheme.
- It includes considering a number of design factors, such as the intended users and their skill level, the application and its objects or tasks, and the most effective use of display space.
- There are four window management schemes:
 1. Single- document interface
 2. Multiple-document interface
 3. Workbooks
 4. Projects



1. Single-Document Interface

-
- Description:
 - A single primary window with a set of secondary windows.
 - Proper usage:
 - Where object and window have a simple, one-to-one relationship.
 - Where the object's primary presentation or use is as a single unit.
 - To support alternate views with a control that allows the view to be changed.
 - To support simultaneous views by splitting the window into panes.
 - Advantages:
 - Most common usage.
 - Window manipulation is easier and less confusing.
 - Data-centered approach.
 - Disadvantage:
 - Information is displayed or edited in separate windows.
-



2. Multiple-Document Interface

-
- **Description:**
 - A technique for managing a set of windows where documents are opened into windows.
 - Contains:
 - A single primary window, called the parent.
 - A set of related document or child windows, each also essentially a primary window.
 - Each child window is constrained to appear only within the parent window.
 - The child windows share the parent window's operational elements.
 - The parent window's elements can be dynamically changed to reflect the requirements of the active child window.
 - **Proper usage:**
 - To present multiple occurrences of an object.
 - To compare data within two or more windows.
 - To present multiple parts of an application.
 - Best suited for viewing homogeneous object types.
 - To clearly segregate the objects and their windows used in a task.
 - **Advantages:**
 - The child windows share the parent window's interface components (menus, toolbars, and status bars), making it a very space-efficient interface.
 - Useful for managing a set of objects.
 - Provides a grouping and focus for a set of activities within the larger environment of the desktop.
 - **Disadvantages:**
 - Reinforces an application as the primary focus.
 - Containment for secondary windows within child windows does not exist, obscuring window relationships and possibly creating confusion.
 - Because the parent window does not actually contain objects, context cannot always be maintained on closing and opening.
 - The relationship between files and their windows is abstract, making an MDI application more challenging for beginning users to learn.
 - Confining child windows to the parent window can be inconvenient or inappropriate for some tasks.
 - The nested nature of child windows may make it difficult for the user to distinguish a child window in a parent window from a primary window that is a peer with the parent window but is positioned on top.
-



3. Workbooks

-
- **Description:**
 - A window or task management technique that consists of a set of views organized like a tabbed notebook.
 - It is based upon the metaphor of a book or notebook.
 - Views of objects are presented as sections within the workbook's primary windows; child windows do not exist.
 - Each section represents a view of data.
 - Tabs can be included and used to navigate between sections.
 - Otherwise, its characteristics and behavior are similar to those of the multiple-document interface with all child windows maximized.
 - **Proper usage:**
 - To manage a set of views of an object.
 - To optimize quick navigation of multiple views.
 - For content where the order of the sections is significant.
 - **Advantages:**
 - Provides a grouping and focus for a set of activities within the larger environment of the desktop.
 - Conserves screen real estate.
 - Provides the greater simplicity of the single-document window interface.
 - Provides greater simplicity by eliminating child window management.
 - Preserves some management capabilities of the multiple-document interface.
 - **Disadvantage:**
 - Cannot present simultaneous views.
-



4. Projects

-
- **Description:**
 - A technique that consists of a container: a project window holding a set of objects.
 - The objects being held within the project window can be opened in primary windows that are peers with the project window.
 - Visual containment of the peer windows within the project window is not necessary.
 - Each opened peer window must possess its own menu bar and other interface elements.
 - Each opened peer window can have its own entry on the task bar.
 - When a project window is closed, all the peer windows of objects also close.
 - When the project window is opened, the peer windows of the contained objects are restored to their former positions.
 - Peer windows of a project may be restored without the project window itself being restored.
 - **Proper usage:**
 - To manage a set of objects that do not necessarily need to be contained.
 - When child windows are not to be constrained.
 - **Advantages:**
 - Provides a grouping and focus for a set of activities within the larger environment of the desktop.
 - Preserves some management capabilities of the multiple document interface.
 - Provides the greatest flexibility in the placement and arrangement of windows.
 - **Disadvantage:**
 - Increased complexity due to difficulty in differentiating peer primary windows of the project from windows of other applications.
-



6. ORGANIZING WINDOW FUNCTIONS

Poor functional organization usually occurs because of one of, or a combination of, these factors:

- i. Emphasis on technical ease of implementation rather than proper analysis of user tasks.
- ii. Focus on applications, features, functions, or data types instead of tasks.
- iii. Organization of the design team into applications, with little cross-team communication.
- iv. Blindly mimicking the manual world and carrying over manual inefficiencies to the computer system.



Recommendations for organizing windows include :

- Organize windows to support user tasks.
- Minimize the number of windows needed to accomplish an objective.
- Support the most common tasks in the most efficient sequence of steps.
- Use primary windows to:
 - Begin an interaction and provide a top-level context for dependent windows.
 - Perform a major interaction.
- Use secondary windows to:
 - Extend the interaction.
 - Obtain or display supplemental information related to the primary window.
- Use dialog boxes for:
 - Infrequently used or needed information.
 - “Nice-to-know” information.



7. WINDOW OPERATIONS

General Guidelines

- Design easy to use and learn windowing operations.
 - Direct manipulation seems to be a faster and more intuitive interaction style than indirect manipulation for many windowing operations.
 - Minimize the number of window operations necessary to achieve a desired effect.
 - Make navigating between windows particularly easy and efficient to do.
 - Make the setting up of windows particularly easy to remember.
 - In overlapping systems, provide powerful commands for arranging windows on the screen in user-tailorable configurations.
-



Different Window operations and the guidelines for each are discussed below:

1. Active Window
2. Opening a Window
3. Sizing Windows
4. Window Placement
5. Window Separation
6. Moving a Window
7. Resizing a Window
8. Window Shuffling
9. Keyboard Control/Mouseless Operation
10. Closing a Window
11. Other Operations



1. Active Window

-
- A window should be made active with as few steps as possible.
 - Visually differentiate the active window from other windows.
-

3. Sizing Windows

-
- Provide large-enough windows to:
 - Present all relevant and expected information for the task.
 - Avoid hiding important information.
 - Avoid crowding or visual confusion.
 - Minimize the need for scrolling.
 - But use less than the full size of the entire screen.
 - If a window is too large, determine:
 - Is all the information needed?
 - Is all the information related?
 - Otherwise, make the window as small as possible.
 - Optimum window sizes:
 - For text, about 12 lines.
 - For alphanumeric information, about seven lines.
-

2. Opening a Window

-
- Provide an iconic representation or textual list of available windows.
 - If opening with an expansion of an icon, animate the icon expansion.
 - When opening a window:
 - Position the opening window in the most forward plane of the screen.
 - Adapt the window to the size and shape of the monitor on which it will be presented.
 - Designate it as the active window.
 - Set it off against a neutral background.
 - Ensure that its title bar is visible.
 - When a primary window is opened or restored, position it on top.
 - Restore all secondary windows to the states that existed when the primary window was closed.
 - When a dependent secondary window is opened, position it on top of its associated primary window.
 - Position a secondary window with peer windows on top of its peers.
 - Present layered or cascaded windows with any related peer secondary windows.
 - When a dependent secondary window is activated, its primary window and related peer windows should also be positioned at the top.
 - If more than one object is selected and opened, display each object in a separate window. Designate the last window selected as the active window.
 - Display a window in the same state as when it was last accessed.
 - If the task, however, requires a particular sequence of windows, use a fixed or consistent presentation sequence.
 - With tiled windows, provide an easy way to resize and move newly opened windows.
-

4. Window Placement

-
- Considerations:
 - In placing a window on the display, consider:
 - The use of the window.
 - The overall display dimensions.
 - The reason for the window's appearance.
 - General:
 - Position the window so it is entirely visible.
 - If the window is being restored, place the window where it last appeared.
 - If the window is new, and a location has not yet been established, place it:
 - At the point of the viewer's attention, usually the location of the pointer or cursor.
 - In a position convenient to navigate to.
 - So that it is not obscuring important or related underlying window information.
 - For multiple windows, give each additional window its own unique and discernible location.
 - A cascading presentation is recommended.
 - In a multiple-monitor configuration, display the secondary window on the same monitor as its primary window.
 - If none of the above location considerations apply, then:
 - Horizontally center a secondary window within its primary window just below the title bar, menu bar, and any docked toolbars.
 - If the user then moves the window, display it at this new location the next time the user opens the window.
 - Adjust it as necessary to the current display configuration.
 - Do not let the user move a window to a position where it cannot be easily repositioned.
 - Dialog boxes:
 - If the dialog box relates to the entire system, center it on screen.
 - Keep key information on the underlying screen visible.
 - If one dialog box calls another, make the new one movable whenever possible.
-

5. Window Separation

-
- Crisply, clearly, and pleasingly demarcate a window from the background of the screen on which it appears.
 - Provide a surrounding solid line border for the window.
 - Provide a window background that sets the window off well against the overall screen background.
 - Consider incorporating a drop shadow beneath the window.
-

6. Moving a Window

-
- Permit the user to change the position of all windows.
 - Change the pointer shape to indicate that the move selection is successful.
 - Move the entire window as the pointer moves.
 - If it is impossible to move the entire window, move the window outline while leaving the window displayed in its original position.
 - Permit the moving of a window without its being active.
-



7. Resizing a Window

- Permit the user to change the size of primary windows.
 - Unless the information displayed in the window is fixed or cannot be scaled to provide more information.
 - Change the pointer shape to indicate that the resizing selection is successful.
 - The simplest operation is to anchor the upper-left corner and resize from the lower-right corner.
 - Also permit resizing from any point on the window.
 - Show the changing window as the pointer moves.
 - If it is impossible to show the entire window being resized, show the window's outline while leaving the window displayed in its original position.
 - When window size changes and content remains the same:
 - Change image size proportionally as window size changes.
 - If resizing creates a window or image too small for easy use, do one of the following:
 - Clip (truncate) information arranged in some logical structure or layout when minimum size is attained, or
 - When no layout considerations exist, format (restructure) information as size is reduced, or
 - Remove less useful information (if it can be determined), or
 - When minimum size is attained, replace information with a message that indicates that the minimum size has been reached and that the window must be enlarged to continue working.
 - Permit resizing a window without its being active.
-

8. Window Shuffling

- Window shuffling must be easy to accomplish.

Window shuffling should be easy to perform in as few steps as possible. One method is to permit the toggling of the two most recently displayed windows. Another is to permit rapid window shuffling and the swapping of the front window and the second or back window

9. Keyboard Control/Mouseless Operation

- Window actions should be capable of being performed through the keyboard as well as with a mouse.
 - Keyboard alternatives should be designated through use of mnemonic codes as much as possible.
 - Keyboard designations should be capable of being modified by the user.
-



10. Closing a Window

-
- Close a window when:
 - The user requests that it be closed.
 - The user performs the action required in the window.
 - The window has no further relevance.
 - If a primary window is closed, also close all of its secondary windows.
 - When a window is closed, save its current state, including size and position, for use when the window is opened again.
-

11. Other Operations

-
- Permit primary windows to be maximized, minimized, and restored.

Maximizing. Maximizing a window increases the size of the window to its largest optimum size. The system default setting for the maximum size is as large as the display. This should be adjustable, as necessary.

Minimizing. Minimizing a window reduces it to its smallest size.

Restoring. Restoring returns a window to its previous size and position after the user has maximized or minimized it.



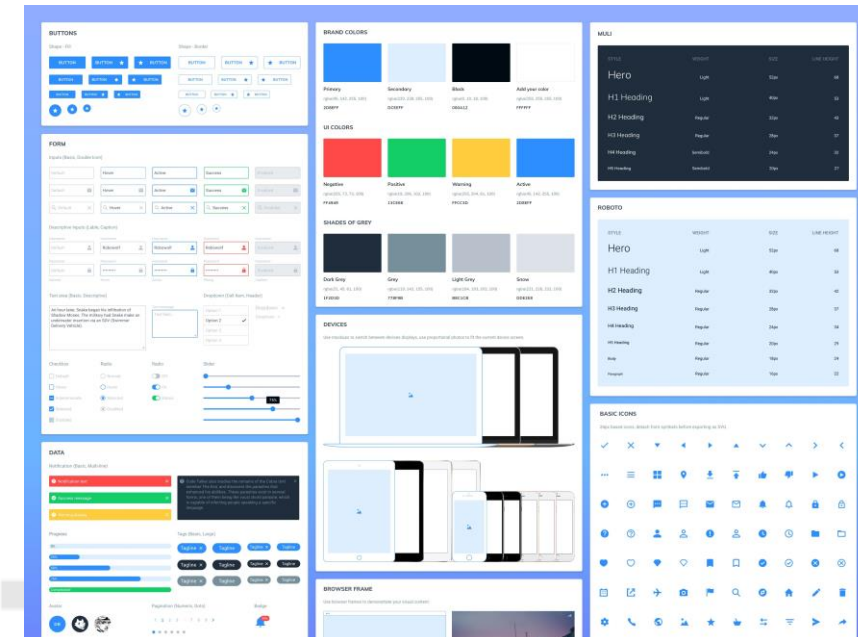
8. WEB SYSTEM

- Web systems have limited windowing capabilities.
- The “Frame” concept does provide window-like ability, and JavaScript does provide “Pop-up windows”

1. Frames:

Example

- Description:
 - Multiple Web screen panes that permit the displaying of multiple documents on a page.
 - These documents can be independently viewed, scrolled, and updated.
 - The documents are presented in a tiled format.
- Proper usage:
 - For content expected to change frequently.
 - To allow users to change partial screen content.
 - To permit users to compare multiple pieces of information.
- Guidelines:
 - Use only a few frames (three or less) at a given time.
 - Choose sizes based upon the type of information to be presented.
 - Never force viewers to resize frames to see information.
 - Never use more than one scrolling region on a page.



Advantages of Frames:

1. They decrease the user's need to jump back and forth between screens, thereby reducing navigation-related cognitive overhead.
2. They increase the user's opportunity to request, view, and compare multiple sources of information.
3. They allow content pages to be developed independently of navigation pages.

Disadvantages of Frames:

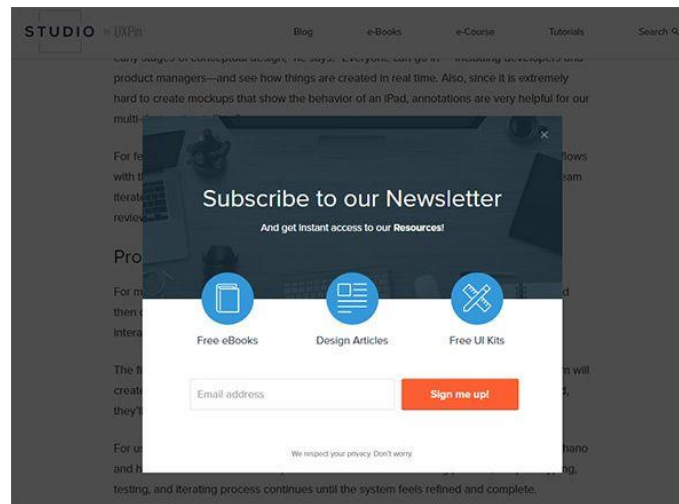
1. The difference between a single Web page and a page with frames is not always obvious to the user.
2. Frames will not work on older browsers.
3. Frames-based pages behave differently from regular Web pages.
 - Page-printing difficulties and problems can exist.
 - Page interaction can be clumsy.
 - URLs cannot be e-mailed to other users
4. They suffer some of the shortcomings of tiled screens:
 - Only a limited number can be displayed in the available screen area.
 - They are perceived as crowded and more visually complex because frame borders are flush against one another and they fill up the whole screen.



2. Pop-Up Windows :

- JavaScript pop-up windows began appearing on the Web in 1996 in the form of advertising pop-ups, polluting web screens of almost all the web users.
- Anecdotal evidence suggests that when a pop-up window begins to appear, most people close them before they are rendered.
- So, if a pop-up window is used, it may never be completely seen or read by the user. Use them with extreme caution

Example



9. CHARACTERISTICS OF DEVICE BASED CONTROLS

- Device-based controls, often called input devices, are the mechanisms through which people communicate their commands to the system.
- Following are the various devices providing device-based controls:
 - i. Trackball
 - ii. Joystick
 - iii. Graphic tablet
 - iv. Light pen
 - v. Touch screen
 - vi. Voice
 - vii. Mouse
 - viii. Keyboard



i. Trackball

-
- Description:
 - A spherical object (ball) that rotates freely in all directions in its socket.
 - Direction and speed is tracked and translated into cursor movement.
 - Advantages:
 - Direct relationship between hand and pointer movement in terms of direction and speed.
 - Does not obscure vision of screen.
 - Does not require additional desk space (if mounted on keyboard).
 - Disadvantages:
 - Movement is indirect, in a plane different from the screen.
 - No direct relationship exists between hand and pointer movement in terms of distance.
 - Requires a degree of eye-hand coordination.
 - Requires hand to be removed from keyboard keys.
 - Requires different hand movements.
 - Requires hand to be removed from keyboard (if not mounted on keyboard).
 - Requires additional desk space (if not mounted on keyboard).
 - May be difficult to control.
 - May be fatiguing to use over extended time.
-



ii. Joystick

■ Description:

- A stick or bat-shaped device anchored at the bottom.
- Variable in size, smaller ones being operated by fingers, larger ones requiring the whole hand.
- Variable in cursor direction movement method, force joysticks respond to pressure, movable ones respond to movement.
- Variable in degree of movement allowed, from horizontal-vertical only to continuous.

■ Advantages:

- Direct relationship between hand and pointer movement in terms of direction.
- Does not obscure vision of screen.
- Does not require additional desk space (if mounted on keyboard).

■ Disadvantages:

- Movement indirect, in plane different from screen.
 - Indirect relationship between hand and pointer in terms of speed and distance.
 - Requires a degree of eye-hand coordination.
 - Requires hand to be removed from keyboard keys.
 - Requires different hand movements to use.
 - Requires hand to be removed from keyboard (if not mounted on keyboard).
 - Requires additional desk space (if not mounted on keyboard).
 - May be fatiguing to use over extended time.
 - May be slow and inaccurate.
-



iii. Graphic Tablet

■ Description:

- Pressure-, heat-, light-, or light-blockage-sensitive horizontal surfaces that lie on the desktop or keyboard.
- May be operated with fingers, light pen, or objects like a stylus or pencil.
- Pointer imitates movements on tablet.

■ Advantages:

- Direct relationship between touch movements and pointer movements in terms of direction, distance, and speed.
- More comfortable horizontal operating plane.
- Does not obscure vision of screen.

■ Disadvantages:

- Movement is indirect, in a plane different from screen.
 - Requires hand to be removed from keyboard.
 - Requires hand to be removed from keyboard keys.
 - Requires different hand movements to use.
 - Requires additional desk space.
 - Finger may be too large for accuracy with small objects
-



iv. Light Pen

■ Description:

- A special surface on a screen sensitive to the touch of a special stylus or pen.

■ Advantages:

- Direct relationship between hand and pointer movement in terms of direction, distance, and speed.
- Movement is direct, in the same plane as screen.
- Requires minimal additional desk space.
- Stands up well in high-use environments.
- More accurate than finger touching.

■ Disadvantages:

- Hand may obscure part of screen.
 - Requires picking it up to use.
 - Requires moving the hand far from the keyboard to use.
 - Very fatiguing to use for extended period of time.
-



v. Touch Screen

-
- **Description:**
 - A special surface on the screen sensitive to finger or stylus touch.
 - **Advantages:**
 - Direct relationship between hand and pointer location in terms of direction, distance, and speed.
 - Movement is direct, in the same plane as screen.
 - Requires no additional desk space.
 - Stands up well in high-use environments.
 - **Disadvantages:**
 - Finger may obscure part of screen.
 - Finger may be too large for accuracy with small objects.
 - Requires moving the hand far from the keyboard to use.
 - Very fatiguing to use for extended period of time.
 - May soil or damage the screen.
 - **Design Guidelines:**
 - Screen objects should be at least $3/4" \times 3/4"$ in size.
 - Object separation should be at least $1/8"$.
 - Provide visual feedback in response to activation. Auditory feedback may also be appropriate.
 - When the consequences are destructive, require confirmation after selection to eliminate inadvertent selection.
 - Provide an instructional invitation to begin using.
-



vi. Voice

-
- **Description:**
 - Automatic speech recognition by the computer.
 - **Advantages:**
 - Simple and direct.
 - Useful for people who cannot use a keyboard.
 - Useful when the user's hands are occupied.
 - **Disadvantages:**
 - High error rates due to difficulties in:
 - Recognizing boundaries between spoken words.
 - Blurred word boundaries due to normal speech patterns.
 - Slower throughput than with typing.
 - Difficult to use in noisy environments.
 - Impractical to use in quiet environments.
-



vii. Mouse

■ Description:

- A rectangular or dome-shaped, movable, desktop control containing from one to three buttons used to manipulate objects and information on the screen.
- Movement of screen pointer mimics the mouse movement.

■ Advantages:

- Direct relationship between hand and pointer movement in terms of direction, distance, and speed.
- Permits a comfortable hand resting position
- Selection mechanisms are included on mouse.
- Does not obscure vision of the screen.

■ Disadvantages:

- Movement is indirect, in a plane different from screen.
 - Requires hand to be removed from keyboard.
 - Requires additional desk space.
 - May require long movement distances.
 - Requires a degree of eye-hand coordination.
-



viii. Keyboard

-
- Description:
 - Standard typewriter keyboard and cursor movement keys.
 - Advantages:
 - Familiar.
 - Accurate.
 - Does not take up additional desk space.
 - Very useful for:
 - Entering text and alphanumeric data.
 - Inserting in text and alphanumeric data.
 - Keyed shortcuts—accelerators.
 - Keyboard mnemonics—equivalents.
 - Advantageous for:
 - Performing actions when less than three mouse buttons exist.
 - Use with very large screens.
 - Touch typists.
 - Disadvantages:
 - Slow for non-touch-typists.
 - Slower than other devices in pointing.
 - Requires discrete actions to operate.
 - No direct relationship between finger or hand movement on the keys and cursor movement on screen in terms of speed and distance.
-

