UNIT 4
UI Design Process

Develop System Menus and Navigation Schemes

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Unit Outcomes

- **Describe the Structure, function, and content of system menus.**
- **Explain the characteristics, components, and types of windows.**
- **Choose Screen based Controls, text, graphics, and color for an interface.**

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Introduction to Menus

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Introduction

- A system is designed to perform many functions and hold a large amount of information.
- Details about this information and functionality should be provided to the users.
- This is done by displaying a list of choices to the user at different points while using the system.
- This listing of choices is known as Menus.

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Introduction

- **Menus are a major form of navigation through a system that assists the user in developing a mental model of the system.**
- **Its an effective way of communication which uses human capabilities of recognition.**
- **Menu design is an important issue of an interface designer.**

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Structure of Menus

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Menu Structure

- Menus can be very simple or very complex.
- They may hold small dialog boxes with only one of two choices or they may provide hierarchical tree schemes with many branches and levels of depth.
- The structure of a menu defines the amount of control given to the user in performing a task.

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Menu Structure

- Some of the common structures are Single Menu, Sequential Linear Menu, Simultaneous Menu, Hierarchical or sequential Menu, Connected Menu, and Event Trapping Menu.

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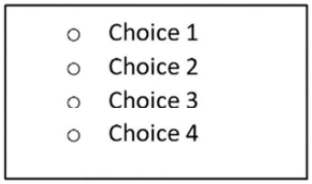
Single Menu

- **A single screen or window is provided to get the user's input or request an action to be performed.**
- **Example: The internet screen requesting the user to "Stay Connected" or "Disconnect"**



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Sequential Linear Menus

- **Sequential linear menus are displayed on a series of screens with only one path.**
- **These menu screens are used for specifying parameters or for entering data and they are presented in a preset order.**
- **The user should answer all the options.**
- **The length of the path may be short or long based on the type of information being collected.**

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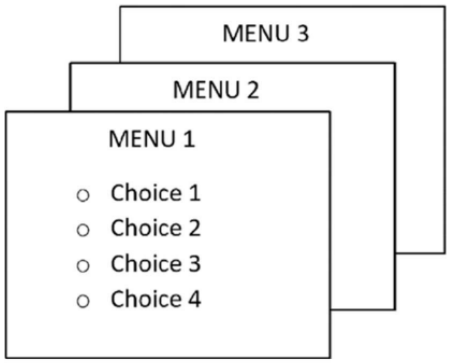
Sequential Linear Menus



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Simultaneous Menus

- **All menu options are available simultaneously on a single screen.**
- **The menu may be completed in the order desired by the user.**
- **Some choices can be skipped and returned later.**
- **All alternatives are visible for reminding of choices, comparing choices, and changing answers.**
- **A large collection of menus can result in screen clutter and use of scrolling or paging may be required to view all the options.**

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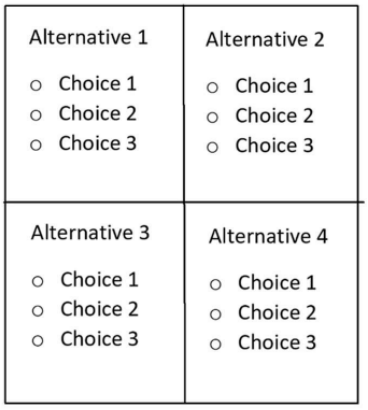
Simultaneous Menus



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Hierarchical or Sequential Menus

- **A hierarchical structure of menus is used when many relationships exist between menu alternatives.**
- **Also, every menu option is related to a previous option.**
- **As we go down the levels of hierarchy, there is an increasing refinement of choices.**
- **Choices refine from options to sub-options, from categories to subcategories, from pages to sections to subsections, and so on.**

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Hierarchical or Sequential Menus

- **Hierarchical menus are used in menu bars with their associated pull-downs, and in Web sites with their navigation links.**
- **As the order and structure of branching in a hierarchy are preset and the normal order of flow is one-way from top to bottom, an unfamiliar user may go down the wrong paths.**

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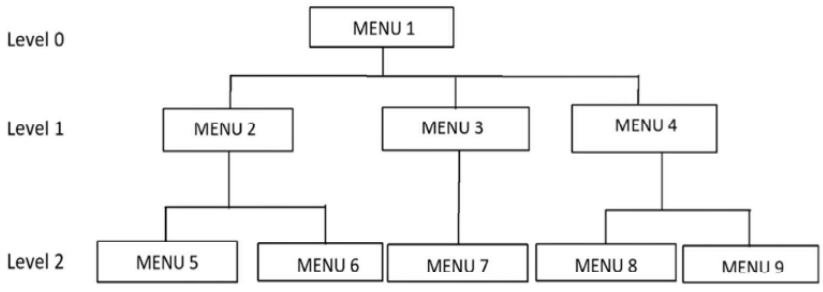
Hierarchical or Sequential Menus



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Connected Menus

- Connected menus are networks of menus all interconnected in some manner.
- Movement through the structure of menus is not restricted to a hierarchical tree but is permitted between most of the menus in the network.
- There is no top-down traversal of the menu system.
- The user choices can wander between any two menus of interest.

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Connected Menus

- This menu system may be:
  - cyclical, with movement in either direction between menus
  - acyclical, with movement permitted in only one direction
- The menus are linked by multiple paths.
- The user has full control over the navigation flow.

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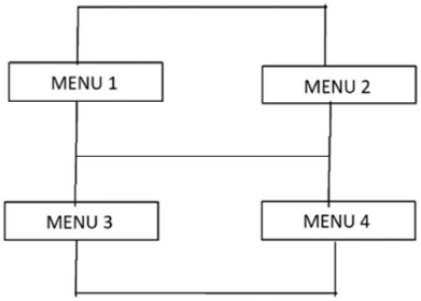
Connected Menus



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Event-Trapping Menus

- **The menus are provided in two layers: background and foreground.**
- **The background layer is always present with control over the system's state and parameters while the user is working on a foreground task.**
- **Event-trapping menus are a set of simultaneous menus imposed on hierarchical menus.**
- **Example: In a graphical system, the menu bar is of simultaneous type, and its pull-downs are of hierarchy type.**

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Event-Trapping Menus

These menus have three functions:

- **During bolding a piece of text, they change some parameters in the current environment.**
- **When performing a spell check, without leaving the current environment, they take the user out of this environment to perform a function.**
- **During an Exit function, they may exit the current environment and allow the user to move to a totally new environment.**

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Functions of Menus
&
Menu Content

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Functions of Menus

Menus can be used to perform following four important functions:

- **Navigating to a new menu: This function helps the user to move towards an objective or goal**
- **Execute an action or procedure: Whenever a user selects a menu, an action or a procedure is performed, such as opening or closing a file, copying text, or sending a message.**

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Functions of Menus

- **Displaying information: Selecting a menu results in the display of information, such as specific information in a database or browsing the web.**
- **Input data or parameters:**
  - **Every selection is a piece of input data for the system or a parameter value.**
  - **This input data can be provided by a single menu or over a hierarchy of menus**

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Menu Content

A menu consists of four elements: Context, Title, Choice descriptions, Complete Instructions.

Context:

- **A menu context keeps the user, oriented.**
- **Navigation feedback is necessary to tell the users about their position, their past choices, and information about how far they must navigate.**

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Menu Content

Title:

- **A title provides the context for the current set of choices and it must reflect the choice selected on the previously displayed menu.**

Choice descriptions:

- **These can appear in the form of a mnemonic, a number, an alphabetized listing of choices, single words or phrases, or full sentences.**
- **They describe the experience of the user.**

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Menu Content

Completion instructions:

- **These can guide the users to make choices.**

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Formatting of Menus

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Consistency

To increase system usability, menu formatting which includes presentation, organization and choice order, phrasing, choice selection, and navigation must be consistent throughout a graphical system or a Web site.

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Display

Menus can be displayed based on the frequency of use.

- **More frequently referenced menus are continually displayed on the screen in a place not obstructing other menus.**
- **Less frequently used menus are popped up or pulled down on demand.**

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Presentation

- The screen designer should ensure that a menu and its choices are easily recognizable by the user.
- This can be done by presenting them with a unique and consistent structure, location, and/or display technique.
- The visual qualities of the menu choices should be different from the other system components.

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Organisation

Some important guidelines for organizing the menus on the screen are as follows:

- The main menu should be provided.
- Either all or only relevant alternatives should be displayed.
- Inactive choices should be deleted.
- The menu structure should be matched with the task structure.
- The number of menu levels should be minimized for clarity and better performance.

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Organisation

- Number of menu choices presented on the screen should be limited.
  - Without logical groupings of elements, choices should be ranging from 4 to 8.
  - With logical groupings of elements, choices should be ranging from 18 to 24
  - Menus should never be designed to be scrolled.

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Complexity

Two sets of menus should be provided:

- One Simple for a novice user
- Another Complex for an expert user

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Item Arrangement

- The menu choices should be aligned into single column wherever possible.
- They should be oriented from top-to-bottom for reading and the descriptions should be left-justified.
- In the case of the horizontal orientation of descriptions, they must be organized left-to-right for reading.

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Ordering

- List of choice order should follow a natural order.
- Lists of choices associated with numbers should follow a numeric order.
- Textual lists with fewer than 7 menus should be ordered based on:
  - Sequence of occurrence
  - Frequency of occurrence
  - Importance
  - Semantic similarity

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Groupings

- Items that are logical, distinctive, meaningful, and mutually exclusive should be grouped together.
- Grouping of similar items should be within a category and dissimilar items across categories.
- Not more than seven groupings should be presented on a single screen.
- The categorized groupings should be ordered in a meaningful way.

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Groupings

- Separate the groupings by wider spacing or a ruled line.
- Frequently chosen items should be given faster access.

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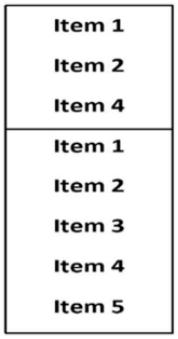
Selection Support Menus

- **Different menu types can be selected based on the amount of time they are accessed.**

Split Menus: should be used when a small set of items is selected between 31 percent and 89 percent of the time and the other items are selected with lower frequencies.



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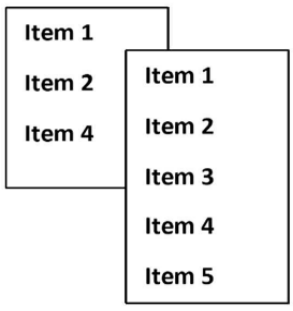
Selection Support Menus

Folded Menus: should be used when a small, discrete set of functions is accessed most of the time.



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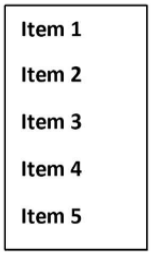
Selection Support Menus

Traditional Menus: should be used when there is no small, discrete set of items that are used 30 percent of the time or more.



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Phrasing the Menu

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Introduction

- There are three important pieces of information a Menu should communicate to the user:
  - The nature and purpose of the menu
  - The presented choices
  - The method of choosing them
- Phrasing the menu means writing the content of menu components, the menu's title, the choice descriptions, and instructions.

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Menu Titles

- The main menu should be short, simple, clear, having a distinctive title, describing the purpose of the entire series of choices.
- The submenu titles must be worded the same as the menu choice previously selected to display them.
- The title should be located at the top of the listing of choices, should be spelled completely and an upper-case font used.

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Menu Choice Descriptions

- These should be meaningful, familiar, fully spelled out, concise, and distinctive.
- They can be single words, compound words, or multiple words or phrases.
- A sentence or headline style should be used.
- The description wording should be task-oriented, not data-oriented.
- The menu choice and its menu title must never have the same wording.

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Menu Choice Descriptions

- Identical choices on different menus should be worded identically.
- Choices should not be numbered.

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Menu Instructions

- **For new or inexperienced users, menu completion instructions should be placed before the parts of the menu to which they apply and present them in a mixed-case font in sentence style.**
- **For expert users, these instructions should be placed in a consistent location, displaying them in a unique type style and/or color.**

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Website Navigation

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Wayfinding

- **Web site navigation helps users to find what they want on a Web site.**
- **A simple and clear navigational structure forms the backbone upon which other system features are built.**
- **Wayfinding is a process where the people navigate to a destination using the available spatial and environmental information.**

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Wayfinding

The process of wayfinding is performed in four stages:

- **Orientation**
- **Route decision**
- **Route monitoring**
- **Destination recognition**

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Wayfinding

Orientation:

- **In this stage, the current location relative to nearby objects and the destination is determined.**
- **Orientation is aided by dividing a space into small parts and providing landmarks and meaningful titles.**

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Wayfinding

Route decision:

- **In this stage, a path to the destination is chosen.**
- **To make route decisions faster, the number of navigational choices are minimized and prompts are provided at decision points.**

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Wayfinding

Route Monitoring:

- **In this stage, the chosen route must be monitored to confirm that it is leading to the proper destination.**
- **Locations with paths that have clear beginnings, middles, and ends are connected.**
- **A person should be able to find his or her progress as the path is followed.**

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Wayfinding

Destination Recognition:

- **To recognize a destination, clear and consistent identities should be provided and once the destination is found, it must be easily recognized.**

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Website Navigation Problems, Goals and Design

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Website Navigation Problems

- **Today the Web and its navigation is the most complex computer interface issue faced by designers.**

Following are some of the Website navigational issues and problems, both technical and usage-related:

Technical Issues: Following are the two technical issues:

- **First Problem:**
  - **A website is composed of pages that are linked to each other.**

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Website Navigation Problems

- Moving between the pages is not in any sequential order like in a graphical system.
- In a graphical system, the user must deal with only one operating system whose navigational characteristics are standard and consistent.
- A Web user must deal with two navigational systems, one of the browsers being used and the second of the Web site being viewed.

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Website Navigation Problems

- Moving around the Web site requires links within the Web site which are in the form of textual links or command buttons.
- The actual data and the controls used to display it are separate and not as one seamless entity as in graphical systems.

Second Problem:

- As the web is rapidly evolving and expanding, the Web sites also tend to grow.

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Website Navigation Problems

- A reasonable structure and menu scheme earlier are slowly dissolving into a confusing mass of listings and linked pages today.
- This has resulted in unrelated information that is presented in random order.

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Website Navigation Problems

Usage Problems: The two user problems in Web navigation are the heavy mental loads imposed and the feeling of spatial disorientation in using the Web.

- Many links are presented on a page which create the following problems:
  - No clear meaning about the links is provided.
  - Very few clues to where each link lead and about how much information will be found at the other end is provided.

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Website Navigation Problems

- The relationship between the currently displayed page with the next page is not provided.

- A feeling of disorientation is experienced by the user because all links on a page are not always meaningful, which leads to trial-and-error behavior.

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Website Navigation Goals

The web interface should be designed so that throughout the interaction during the navigation process on the web, the user should know the following:

- Where he/she is currently.
- From where did he/she come?
- Where can he go from the current location
- How can he reach the destination quickly?

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Website Navigation Design

A website designer should remember two things while designing a Web site navigation scheme:

- **He should never assume that users know more about a site than himself.**
- **Any page could be an entry point into the Web site.**

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Website Navigation Aids

In order to help Web site navigation and learning, the designer should provide the following:

- **A map or overview of the menu hierarchy.**
- **Indication for clicking**
- **Display the next level of choices and all alternatives when a currently viewed choice is selected.**
- **Color-changing feature of a link after it has been clicked.**

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Website Navigation Aids

- **Feedback regarding one's current location**
- **Navigation history**
- **Match link text (or label) to the destination page heading.**

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Website Organisation

The guidelines to organize the content on a website are given as follows:

- **The content should be divided into logical fragments, units, or chunks.**
- **Establish a hierarchy of generality or importance. i.e. from general to more specific information.**

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Website Organisation

- A hierarchical tree is the most recommended organization scheme.
- Conclusions should be stated and links to supporting details should be provided.
- Number the categories of information and link them to detailed listings.
- Summarize the information and provide links to full-length details.
- The contents should be structured so that there is a relationship among content fragments, units, or chunks.

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Website Organisation

- If possible, restrict the hierarchy level to two and requiring not more than two clicks to reach deepest content.

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Navigation Page Design

Following are the guidelines to design the Navigation page:

- **Appropriate menu types should be used, such as Sequential menus for simple forward-moving tasks and Simultaneous menus for tasks where back button usage is more.**
- **Confine navigation-only pages to one screen wherever possible.**
- **Limit text content.**
- **Horizontal scrolling of the pages should not be provided.**

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Components of a Web Navigation System

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Navigation Links

- Links are used to move between the information fragments on the website.
- These links are present within a framework of controls or tools such as the browser's command buttons, textual phrases, Web site navigation bars, and Website command buttons.

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Navigation Links

A link,

- Acts like a menu choice.
- When a link is selected, the connection information is displayed, or results in a file are opened or downloaded.
- A movement link will transport the user to another location within a page, to a new site page, or to another Web site.

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Navigation Links

Following are the guidelines to create a link: All navigation elements must be,

- **Sensible in the absence of site context as a user can enter the site from anywhere.**
- **Available all the time.**
- **Easily identifiable and distinctive.**
- **Consistent in appearance, function, and ordering**

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Navigation Links

- **Should have a textual label or description.**
- **Offer multiple navigation paths.**

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Kinds of Links

There are three kinds of links provided on Web sites:

- **Internal: these links provide navigation within a Web site and allow the user to move within the site's pages.**
- **Anchor: these links are used when a page is very long. Here the list of the page contents is presented at the top of the page and the links to the corresponding information or section within the page.**
- **External: these links point to new pages on other Web sites.**

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Navigational Elements

Navigational elements consist of three components:

- **Textual phrases**
- **Images**
- **Command buttons**

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Navigational Elements

Textual Phrase Links: Some important features of Textual phrases are as follows:

- **They are words or short pieces of highlighted text.**
- **They are easily recognizable as clickable, download faster, are more understandable than images, and are preferred by users.**
- **They can be easily modified visually to indicate they have already been clicked.**

MENU 1

Choice 1
Choice 2
Choice 3
Choice 4

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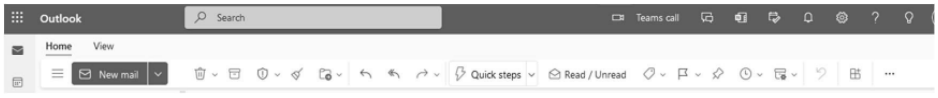
Navigational Elements

Images:

- **These links are Graphical images or icons and can appear in an array in the form of a navigation bar.**
- **They may appear at some relevant places within a page.**



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Navigational Elements

Command Buttons and Toolbars:

- **Command buttons and toolbars are used to perform some actions.**
- **They appear in an array in the form of a navigation bar and can be individually located at relevant places in a page.**

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Types of Links

There are three types of Links in a website:

- **Internal links within a page: if the pages are long, use anchor links to internal page content.**
- **Internal links within a Web site: here include links on all pages to the website homepage, next page and previous page, and other important pages. Also, information should be included about new or changed content and link to Web site exit.**

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Types of Links

- **External links: these links are provided to relevant information on other websites, related content, reference information, or any background reading.**

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Writing Link Labels

Following are the guidelines for writing link labels:

- **Labels should be meaningful**
  - **They should contain action words**
  - **Should be understandable**
  - **Should clearly indicate the link destination**
- **Links embedded inside a text should be descriptive**
- **Link labels should assist link understanding.**

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Number of Links

- **Every page should contain at least one link.**
- **Pages should not have many links, they should be important, pertinent, and interesting.**
- **Provide less relevant link in a list.**

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Kinds of Graphical Menus

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Introduction

- Graphical menus are used to perform certain tasks.
- These menus should be appropriate based on the situation and the following factors:
  - Consider the number of items to be presented in the menu.
  - Consider the frequency of usage of the menu.
  - Consider the frequency of changes to the menu.

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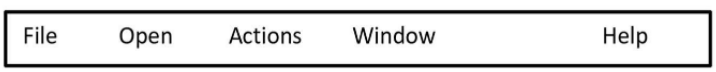
Menu Bar

- Menu bar is used to identify and provide access to common and frequently used application actions.
- They are also used for actions that take place in a wide variety of different window.



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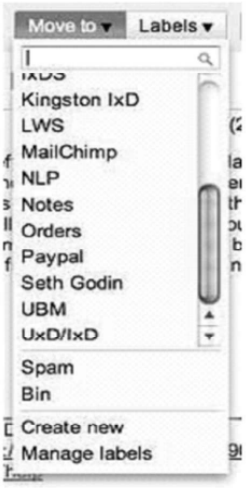
Pull-Down Menu

- These are used for frequently used application actions taking place in a wide variety of different windows.
- These are around five to ten in number and these options do not change very often.



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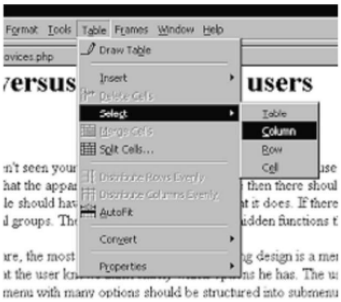
Cascading Menu

These type of menus are used to simplify a higher-level menu, for providing easier browsing of a higher-level menu, for mutually exclusive choices and to restrict to one–two cascades.



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Pop-Up Menu

- These are used for frequent users requiring very few menu items.
- Also preferred when a small amount of screen space is to be used with items which do not change frequently.

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Tear-Off Menu

- This menu is like a pull-down menu but it can be positioned anywhere on the screen for a constant referral.
- It is also called as a pushpin, detachable, or roll-up menu
- This type of menu is used when menu items are not selected frequently or sometimes selected very heavily.

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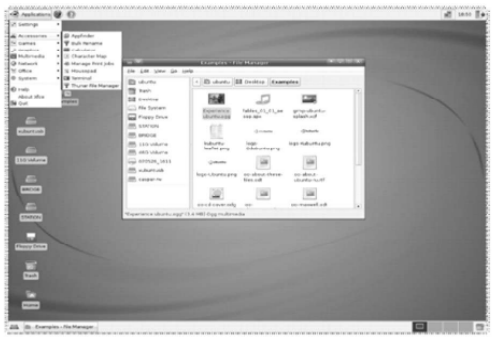
Iconic Menu

- These are used to designate available applications to users.
- The menu items or objects are displayed in a graphic or pictorial form.



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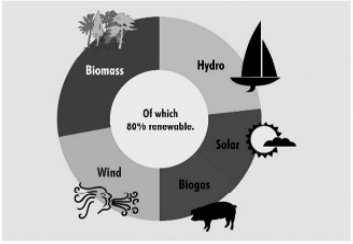
Pie Menu

- It is a circular representation of menu items.
- It is used for mouse-driven selections with one or two-level hierarchies, short choice listings, and data conducive to the format.



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UNIT 4
UI Design Process

Selection of Proper Kinds of Windows

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Characteristics and Uses of Window

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Introduction

- A window is an area on a computer screen that contains a portion of the user's dialog or a particular view of a portion of the screen.
- It is rectangular in shape defined by a border and can be moved independently on the screen.
- A window may be small with a single message or field or very large consuming the whole area of the screen.
- A window may contain one or more windows within itself.

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Window Characteristics

A window has the following characteristics:

- It has a name or title for identification.
- It has a variable size (in height and width).
- It can have an active or a passive state. Only active window contents are editable.
- It may be fully visible or may be partially hidden behind another window.
- The contents of the window can extend beyond its display area.

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Window Characteristics

- A window can be manipulated through certain methods available within the limitations of the management capabilities.
- It is designed to perform a task, function, or application.

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Use of Windows

Windows are useful in the following ways:

- Presentation of different levels of information: As an example, a table of contents can be displayed on one window, and a specific topic from the contents can be simultaneously displayed on another window.

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Use of Windows

- **Presentation of multiple kinds of information: As an example, in an order-processing system:**
  - **One window could collect a customer's account number.**
  - **Second window can retrieve the customer's name and shipping address.**
  - **Third window could collect details of the order**
  - **Fourth window could present factory availability and shipping dates for the required items and so on.**

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Use of Windows

- **Sequential Presentation of levels or Kinds of information: In the case of multiple steps used for performing a task, the steps can be presented on multiple windows in a sequential manner.**
- **Access to Different Sources of Information:**
  - **When there is information to be displayed from independent sources, multiple windows can be used.**
  - **Information could be residing on different computers, operating systems, applications, files, or different areas of the same file.**

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Use of Windows

- **Combining Multiple Sources of Information: Information from multiple windows can be copied and combined in a single window.**
- **Performing more than one task: When a long task is being performed, another task can start and these tasks can be shown on two different windows.**
- **Monitoring: When data in one window is modified, its effect on data in another window can be studied.**

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Use of Windows

- **Multiple representations of the same Task: Different versions of the same thing can be viewed on multiple windows simultaneously.**

For Example: Different graphical representations of the same data.

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Constraints in Window System Design

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Introduction

- Though Windows User Interface is very popular, still they have problems with respect to resizing windows, pointing to small icons or boxes at the window borders, moving and closing windows, and so on.
- Three factors contribute to these problems are as follows:
  - Historical Considerations
  - Hardware Limitations
  - Human Limitations

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Historical Considerations

- Research in Window User Interface development has been always towards solving hardware problems and user considerations have been neglected.
- Hence, very few design guidelines are available to the designers.
- Due to the non-availability of user performance data, comparing the design alternatives is not possible.

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Hardware Limitations

- Hardware limitations do not allow the designers and the users to make use of the potential of windowing capabilities.
- Some of the limitations are screen size, slower processing speeds, smaller memory sizes, poor screen resolution, and graphics capability.
- A drain on the computer's resources can limit feedback and animation capabilities and reduce the system's usability.

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Human Limitations

- A windowing system requires learning to use the different operations.
- Windows management operations have become more necessary than the user task.
- The non-window screens generated more errors but screens containing overlapped windows also resulted in more task completion time.

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Human Limitations

- If the arrangement of windows on the screen is eliminated, then task completion time will be reduced.
- Window manipulations should happen implicitly as a part of user task actions and not explicitly by the user.

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Components of a Window

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Components of a Window

- There are many components on a window screen.
- Some appear on all windows, and some appear on certain kinds of windows under certain conditions.
- The different window components are as given below:
  - Frame: It is used to define boundaries to a window and separate it from other windows. A resizable window will contain control points for sizing it.

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Components of a Window

- **Title bar: The title bar is also called the caption, caption bar, or title area. It is the top edge of the window, inside its border, and extends its entire width. It contains a descriptive title identifying the purpose or content of the window.**
- **Title bar icon: It is a button on the top left corner of a window used to retrieve a pull-down menu of commands that apply to the object in the window.**

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Components of a Window

- **Window sizing button: This button is used to manipulate the size of a window. It is located at the right corner of the title bar.**
- **Menu bar:**
  - **A menu bar is used to organize and provide access to actions.**
  - **It is located horizontally at the top of the window below the title bar. It contains a list of topics or items.**
  - **When an item is selected, a pull-down menu is displayed for a list of choices for that item.**

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Components of a Window

- **Status bar:**
  - **In Microsoft windows, this is located at the bottom of a window.**
  - **It is used to display information about the current state of what is shown in the window.**
  - **It can be a descriptive message about a selected menu or toolbar button.**
  - **It may also be used to explain menu and control bar items as the items are highlighted by the user.**

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Components of a Window

- **Scroll bar: These can be horizontal or vertical bars used to display information that is not displayed on a window screen that is not visible.**
- **Split Box: Splitting a window allows multiple views of an object.**
  - **It is located above a vertical scroll bar or to the left of a horizontal scroll bar.**
  - **A window can be split into two or more separate viewing areas that are called panes.**

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Components of a Window

- **Toolbar:**
  - **Toolbars provide quick access to specific commands or options.**
  - **There are specialized toolbars known as ribbons, toolboxes, rulers, or palettes.**
  - **Toolbars may be in a fixed position on a window, maybe movable, or could be contained in a pop-up window.**

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Components of a Window

- **Command area: It is located at the bottom left area of the window and is used to type a command into the screen.**
- **Work area: It is the portion of the screen where the user performs tasks.**

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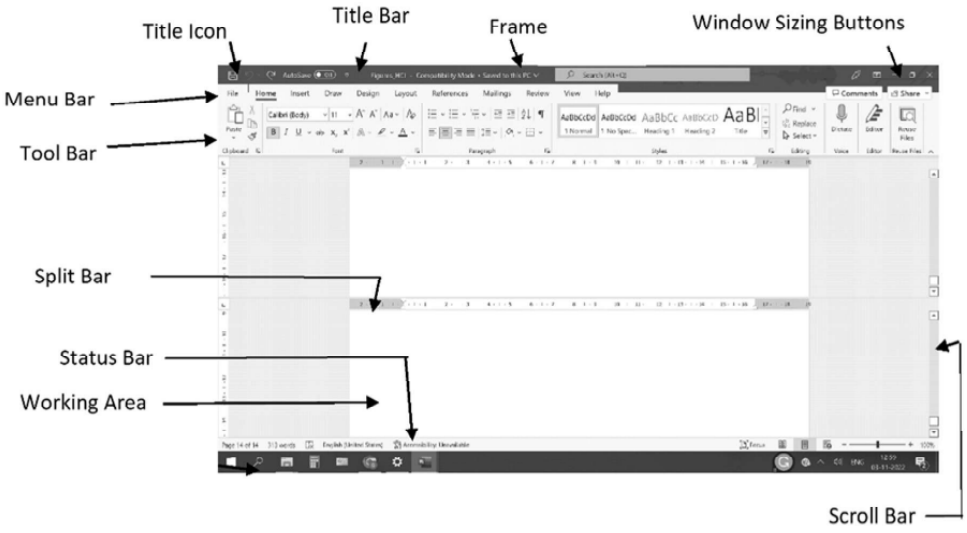

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Window Presentation Styles

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Tiled Windows

- Tiled windows appear in one plane on the screen as a two-dimensional figure.
- They can expand or contract to fill up the display surface, as required.

Advantages:

- The users need not make the windows positioning decisions as the system makes it.

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Tiled Windows

- Open windows are always visible so cannot be forgotten by the users.
- Information on any open window is always visible.
- For novice or inexperienced users they are easier to use.
- The task performance is better when the data needs less window manipulation.

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Tiled Windows

Disadvantages:

- **Only few windows can be displayed based on the available screen area.**
- **As windows change in size or they are opened and closed, existing windows change in size. This can be annoying to the user.**
- **These changes in sizes are unpredictable.**
- **As the system manages the windows, the configuration of windows provided by the system may not meet requirements of the user's.**

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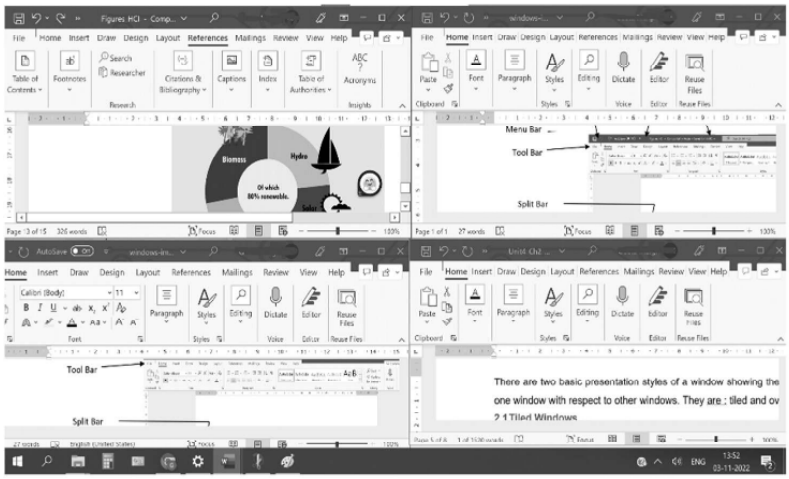

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Overlapping Windows

- These windows are placed one on top of another and give a three-dimensional look.
- The location of these windows and the plane in which they appear can be controlled by the users.

Advantages:

- Windows organization can be controlled by the users according to their requirements.

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Overlapping Windows

- Windows can maintain larger, consistent sizes and positions.
- As windows can be placed on top of one another, screen space conservation is not needed.

Disadvantages:

- Overlapped windows are operationally more complicated than tiled windows.
- Information in windows can be hidden behind other windows.

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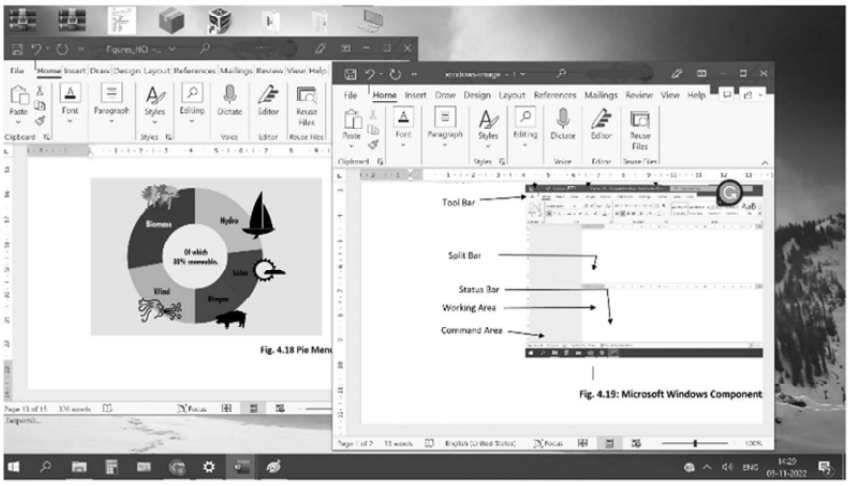

Fig. 4.18 Pie Menu

Fig. 4.19: Microsoft Windows Component

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Cascading Windows

This is a special type of overlapping windows arranged in a regular progression.

Advantages:

- **No window is completely hidden.**
- **It is easier to bringing any window to the front.**
- **Looks clean visually.**

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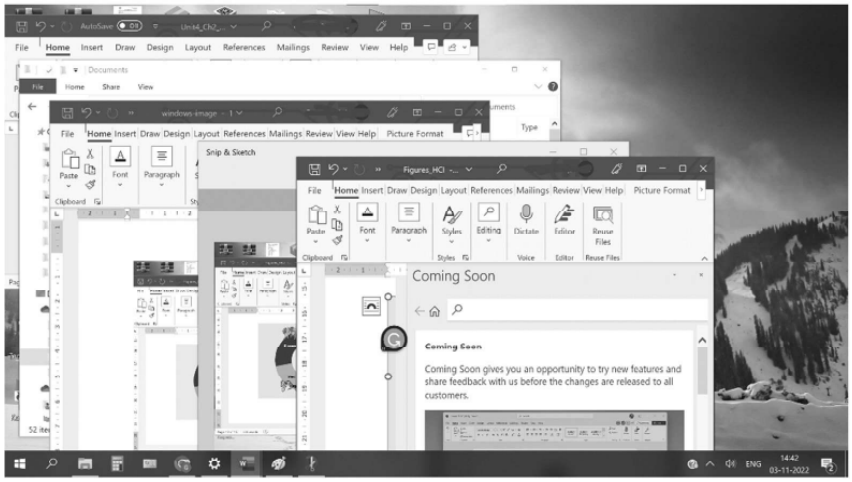

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UNIT 4
UI Design Process

Selection of Proper Interaction Devices and Screen-Based Controls

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Selecting a Proper Input Device

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Introduction

- Interaction devices are the mechanisms or devices through which people interact with the computer.
- Input and output devices are used for interaction.
- The standard input device used for communicating is the Keyboard.
- Pointing devices such as Mouse, Trackball and Joystick can also be used to provide input.

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Introduction

- Other advanced devices like Light pen and Graphics Tablet, use of fingers on Touch Screen devices, and human voice for Voice Recognition systems are being used.
- The standard output device has been the Monitor or Screen for displaying a wide range of visual elements and data.
- Earlier monitors used Cathode Ray Tube (CRTs) for construction, later they were replaced by the Liquid Crystal Displays (LCDs) screens.

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Introduction

- Another important output device is the Speaker for audio output.

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Functions of Input Devices

Following are the tasks performed by the input devices:

- **Pointing to an object on the screen.**
- **Selecting the object or identifying it as the focus of attention.**
- **Dragging an object across the screen.**
- **Drawing some free-form figures on the screen.**
- **Tracking or following a moving object.**
- **Orienting or positioning an object.**
- **Entering or manipulating data or information.**

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Guidelines for Selecting Proper Input Device

Sl.No.	Type or Characteristics of Application	Input Device/s
1	• Heavy text entry and manipulation tasks • Movement through structured arrays consisting of few discrete objects	Keyboard
2	Pointing, Selecting, Dragging and Drawing	Mouse, Graphics Tablet
3	Selecting and Tracking	Joystick
4	Pointing, Selecting and Tracking	Trackball
5	Pointing and Selecting	Touch Screen

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Guidelines for Selecting Proper Input Device

Sl.No.	Type or Characteristics of Application	Input Device/s
6	• Minimal training is required • Targets are large, discrete and spread out • Less frequently used • Desk space is at a premium • Little or no text input requirement	Touch Screens
7	User preference is typing	Keyboard

The input devices should be selected on the Characteristics of the environment, hardware, and device in relation to the application.

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Selecting a Proper Output Device

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Background

- The earlier monitors were constructed using a raster-scan Cathode Ray Tube (CRT).
- These were prone to flickering but technological advancements have resulted in flicker-free CRTs with high resolution.
- With the advent of Liquid Crystal Displays (LCD), display technology has further improved and resulted in much smaller, thinner, and lighter screens.

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Background

- These displays are cheaper and consume less power in comparison to CRT displays.

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Guidelines for Selecting a Screen

Following factors should be considered while choosing the screen:

- **Image: Here the details to be included in the image are considered.**
  - **Example: A high-resolution screen will be desirable for highly graphic applications involving images and photographs.**
  - **A lower-resolution screen may suffice for text work and larger letter sizes.**

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Guidelines for Selecting a Screen

- **Colors: Here the number of colors needed is considered.**
  - **The number of colors can range from monochrome to millions.**
  - **The type of application will determine this requirement.**
- **Size: Larger the screen size, the more information can be displayed and so is advantageous.**
  - **Size will depend upon the needs of the application and the needs of the user.**

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Guidelines for Selecting a Screen

- Example: Larger screens are needed for applications used by visually impaired people.
- Smaller screens are needed for hand-held devices.

- **Portability:** Here the portability of the device and the usage space available are considered.
  - Example: LCD screens are preferred over CRTs where the device has to be portable and the environment is crowded.

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Guidelines for Selecting a Speaker

- The quality of the sound being presented speaker will define the quality of the speaker.
- Today, computer sounds have advanced from a simple beep to the reproduction of speech, music, and sound effects.

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Choosing Proper Screen-Based Controls

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Introduction

- **Screen controls are the elements of a screen body.**
- **These are also called widgets.**
- **Widgets are graphic objects that represent the properties or operations of other objects.**

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Functions of a Widget

The important functions of widgets are as follows:

- **They allow the user to enter or select a particular value on the screen**
- **They allow the user to change or edit a particular value.**
- **They are used to display only a particular piece of text, value, or graphic.**
- **They allow a command to be performed.**
- **Can contain a contextual pop-up window.**

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Control Principles

- **There are three principles on which controls are based:**
  - **A control must,**
    - **Look the way it works**
    - **Work the way it looks**
  - **A control must be used exactly as its designers intended.**
  - **A control must be presented in a standard manner.**
- **The look of the control must be obviously seen on the screen.**
- **It should be designed to be Clickable and Enterable.**

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Rules for Controls

Microsoft Windows has presented three simple rules for controls:

- **Elements that appear raised on the screen can be pressed.**
- **Elements that are recessed cannot be pressed.**
- **Elements that are presented on a flat white background can be opened, edited, or moved.**

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Types of Controls

Based on their functionality, Screen-based controls can be categorized into two:

- **Operable Controls: These can be manipulated, changed, and set.**
- **Presentation Controls: These are purely informational and used to write permanent information on a screen. They provide details about other screen elements or controls and are used to give structure to the screen.**

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Operable Controls

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Operable Controls

Operable controls are classified into five types:

- **Buttons**
- **Text entry/Read-only Controls**
- **Selection Controls**
- **Combination entry/selection Controls**
- **Specialized Controls**

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Buttons

- Buttons are square or rectangular-shaped control.
- They have a label inside that indicates the action to be performed and the label consists of text, graphics, or both.

Use of Buttons:

- To start actions: They can be used to save a document, quit a system, or delete text.
- To change properties

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Buttons

- To display a pop-up menu: They can be used to display a menu of options, such as colors or fonts.

Proper Usage:

- In Web applications or page design, buttons should be only used to cause an action to occur.
- They should never be used to retrieve or show information.

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Text Entry/Read-Only Controls

- A Text Entry control contains text, that is entered or modified using the keyboard.
- Most useful when data entry is unlimited, difficult to classify, and variable in length.
- A Read-Only control contains text or values being presented for reading or display purposes only.
- These controls are known as fields.
- In graphical system terminology, they are called text boxes.

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Selection Controls

- This type of control presents all the possible alternatives, conditions, or choices existing for an entity, property, or value on the screen.
- The user selects the required item from all the choices.
- Some selection controls present all the alternatives which are visible on a screen and for some other controls, users may require a scrolling action to view all the alternatives.

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Types of Selection Controls

Following are the types of Selection Controls:

- **Radio buttons**
- **Check boxes**
- **List boxes**
- **Drop-down/pop-up list boxes**

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Radio Buttons

- **A radio button consists of two parts: a small circle, or a rectangle and a choice description beside it.**
- **The option is highlighted when the choice is selected.**
- **This control is used to set one item from a set of 2 to 8 mutually exclusive options.**

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Radio Buttons

Proper Usage:

- **It is used for setting attributes, properties, or values.**
- **Used when choices are mutually exclusive and when enough screen space is available.**

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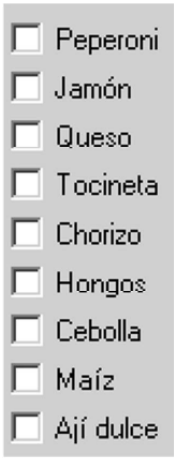
Check Boxes

- **A Check box consist of two parts: a square box and choice description.**
- **Each option/choice acts as a switch that is either on or off.**
- **When an option is selected (on), a "X" or tick mark appears in the square box to highlight the option.**



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Check Boxes

- Otherwise, the square box is unselected or empty (off).
- Each box can be switched on or off independently.
- Check boxes are used to set one or more options either as on or off.

Proper Usage:

- It is used for setting attributes, properties, or values.
- Most useful when data or choices are discrete, small and fixed in number.

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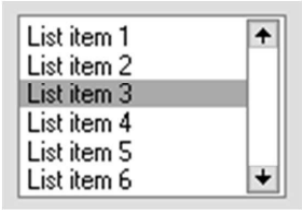
List Boxes

- This control is permanently displayed on the screen and contains a list of attributes or objects.
- A single selection or multiple selections can be made.
- The choice may be text, pictorial representations, or graphics.
- Selections are done using a mouse to point and click.



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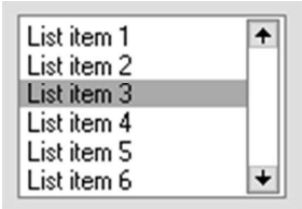
List Boxes

- In case of a large list of values scrolling feature is provided.
- No text entry field exists.



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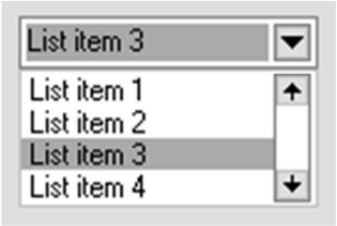
Drop-Down/Pop-Up List Boxes

- It is a rectangular control showing one item with a small button to the right side.
- When the button is not selected, a single selection box is available, but when the button is selected, a larger associated box appears, containing a list of choices from which we may select.



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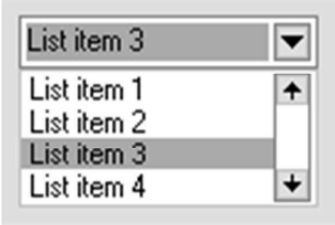
Drop-Down/Pop-Up List Boxes

- Selections are done using a mouse to point and click and no text entry field exists.
- This control is used to select one item from a large list of mutually exclusive options when the screen space is limited.



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Combination Entry / Selection Controls

- This control can be used both as a text field and a selection field.
- So, information may be keyed into the field or selected and placed within it.
- Different types of combination entry/selection fields are as given below:
  - Spin boxes
  - Attached combination boxes
  - Drop-down / Pop-up combination boxes

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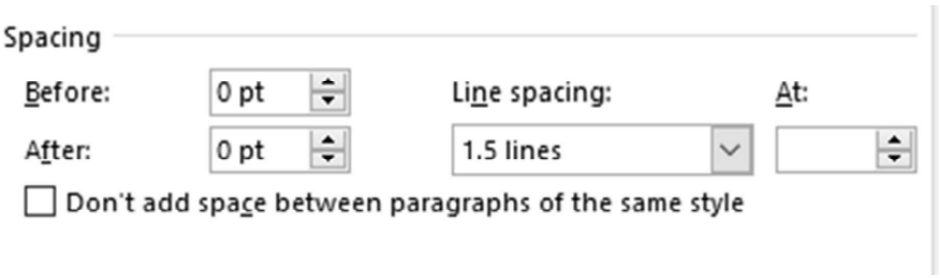

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Presentation Controls

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Static Text Fields

- These are read-only textual information.
- These are used for the following purposes:
  - To identify a control by displaying a control caption.
  - To clarify a screen by providing instructional or prompting information.
  - To present descriptive information.

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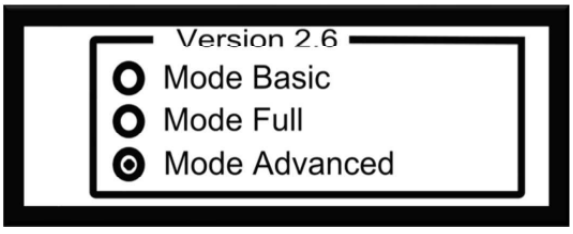
Group Boxes

- These are rectangular frames that hold a control or a group of controls.
- On the frame's upper-left corner, an optional caption may be included.
- It is used to visually relate a group of related controls.



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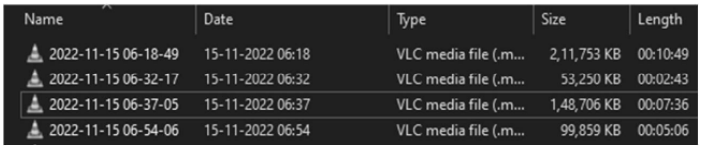
Column Headings

- This control is read-only textual information that serves as a heading above columns of text or numbers.
- The information can be divided into two or more parts.
- It is used to identify a column of information contained in a table.



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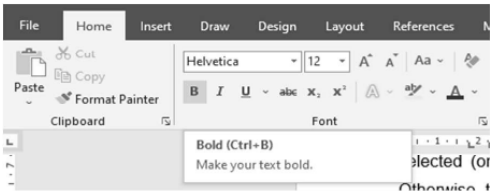
ToolTips

- These are small pop-up windows containing descriptive text that appear when a pointer is moved over a control or element when it is not possessing a label.
- It is used to provide descriptive information about a control or screen element.



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Balloon Tips

- **This control is a small pop-up window that contains information in a word balloon.**
- **It appears beside the item to which they apply, generally above or to left.**
- **It is used to provide an additional descriptive or status information about a screen element.**

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Progress Indicators

- **This control is a rectangular bar that indicates the percentage of completion of a process.**
- **It is used to provide feedback concerning the completion of a lengthy operation.**

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Control Selection Criteria

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Selecting the Proper Controls

- For the success of an interface, the controls provided should be appropriate.
- Important guidelines for the selection of controls are given below:
  - Choose familiar controls
  - Choose the task
  - Reduce the number of “clicks”
  - Display as many control choices as possible.

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Control Selection Criteria

The factors on which the selection of the proper control depends are as given below:

- **The structure and characteristics of the property or data.**
- **The nature of the task.**
- **The nature of the user.**
- **The limitations of the display screen.**

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Data Considerations

- **The property or data is checked if it is mutually exclusive or not.**
- **This will determine if entry/selection of it will require single or multiple items.**
- **For meaningful specification and categorization, the data is checked if it is discrete or continuous.**
- **For identifying its scope, data is tested if it is limited or unlimited.**
- **Data is checked for its length to understand for the number of items.**

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Task Considerations

- These issues reflect the nature of the job
- The frequency of an item being entered or selected, and the item being modified is checked.

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User Considerations

These issues reflect the characteristics of the user.

- The amount of training in control operation needed and to be provided is an important consideration.
- The knowledge of the data and the flexibility to learn in by the user is to be checked.
- The frequency of usage of the system by the user and his typing skills are considered.

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Display Considerations

- **These issues reflect the characteristics of the screen and hardware.**
- **Here the amount of screen space available to display the various controls is to be considered.**

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UNIT 4
UI Design Process

Writing Clear Text and Messages

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Words, Sentences, Messages, and Text

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Introduction

- The basic form of communication between the user and the computer is the wording on the interface and its screen.
- For effective communication, clear and meaningfully crafted words, messages, and text are very essential.
- It will enhance system usability.

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Introduction

- Out of the many aspects of interface design, knowing the user is the first step in choosing the proper words and creating acceptable messages and text.
- The understandability of written material is measured by its readability quality.

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Readability

- Readability is defined as the degree to which prose can be understood, based on the complexity of its words and sentences.
- Readability is determined by the following important factors:
  - Word length
  - Word commonality
  - Sentence length
  - The number of syllables in a sentence

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Readability

- Other parameters like Information organization, layout, and formatting also affect the reading process.
- To measure the readability of text, readability formulas have been developed.
- Today many computer-based readability formulae are available.
- The reading formulae are based on two important factors:
  - The number of syllables or (letters) in a word.
  - The number of words in a sentence.

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Readability Guidelines

The guidelines to be followed for better readability are:

- The written material presented to the user must have a readability level below the reading skill level of the intended audience.
- Follow all the principles for clear writing and text presentation.

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Guidelines for Choosing Words

- **Jargon, words, and terms whose meaning is not understood by a computer professional should not be used.**
- **Abbreviations and acronyms should be avoided.**
- **Word contractions, suffixes, and prefixes should not be used.**
- **Short, familiar, complete, and consistent words should be used.**
- **Positive terms and standard alphabetic characters for words should be used.**

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Guidelines for Choosing Words

- **Appropriate punctuation should be used for abbreviations, acronyms, and mnemonics.**

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Guidelines for Writing Sentences and Messages

- **Sentences and messages must be brief and simple.**
- **They should be limited to not more than twenty words per sentence, and not more than six sentences per paragraph.**
- **They should be written at an eighth-grade level or less for the general population.**
- **They should be directly and immediately usable and structured so that the main topic is near the beginning.**

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Guidelines for Writing Sentences and Messages

- **Sentences and messages must be written in:**
  - **An affirmative statement**
  - **An active voice**
  - **The temporal sequence of events**
- **Sentences and messages must be of the proper tone as given below:**
  - **Non-authoritarian**
  - **Non-threatening**
  - **Non-punishing**

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Kinds of Messages

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Kinds of Messages

- **Screen messages are classified into types: System and Instructional messages.**
- **System messages:**
  - **These are generated by the system to inform the user about the state of the system and its activities.**
  - **They are presented within message boxes.**

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Kinds of Messages

- **Instructional messages:**
  - **These messages are also referred to as prompting messages.**
  - **They tell the user how to work with the screen and complete it.**
  - **They may be provided in message boxes or within the screen itself.**

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Types of System Messages

Based on the purpose, System messages are classified into five types as follows:

- **Status messages: used for providing information about the progress of an operation.**
- **Informational messages or notification messages: used to provide information about the state of the system.**
- **Warning messages: They provide warning of an undesired situation.**

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Types of System Messages

- **Critical messages: These are provided to call the attention of the users to take an action before the system can proceed.**
- **Question messages: These are messages to ask a question and then offer a choice of options for selection.**

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Message Box Text

- **A message box should have a title and the content, or a message.**
- **Microsoft has provided a set of guidelines for a Message Box which are given as follows:**

Title Bar Text:

- **The source of the message which is the name of the object or application to which it refers should be indicated in the title bar.**
- **A warning or caution message type should not be included in the title.**
- **The title should be in mixed case.**

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Message Box Text

Message Box Text:

- **The content should be clear, concise, and understandable by the user.**
- **It should describe the condition causing the message box to be displayed.**
- **Use complete sentences with ending punctuation.**
- **For fast comprehension, contractions, technical jargon, and system-oriented information should be avoided.**

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Message Box Text

- **A very brief and necessary background information should be provided for the message to be understood.**
- **A help button can be provided to supplement the amount of information in the message box text.**
- **Should not exceed two or three lines of text.**
- **Use a relevant icon to identify the type of message to the left of the text, and center the message text in a window.**

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Presenting and Writing Text

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Background

- The Textual element that appears on a screen can include the following elements: Field captions, Headings, Words, Sentences, Messages, and Instructions.
- Here, the text refers to the body text.
- It is a large compilation of words where the smallest element is a paragraph and the maximum length is unlimited as its size is defined by the purpose of the text.

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Guidelines for Presenting Text

Element/Format of the Text	Guidelines for Presentation
Prose Text	Should be displayed in mixed upper-case and lower-case letters
Font	Should use plain and simple fonts, choosing a minimum point size of 12 to 14
Justification	• Should always be Left-justified • Words should not be hyphenated
Line Length	For fast readers, 75-100 characters and for average reading speeds, 50-60 characters per line is acceptable
Line Ending	It should coincide with grammatical boundaries

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Guidelines for Presenting Text

Element/Format of the Text	Guidelines for Presentation
Line Spacing	For increasing legibility, line spacing can be increased
Content	• New topics should begin with a heading. • Two paragraphs should be separated by atleast one blank line. • Fresh topics should start on new line. • Highlight the important things by Bold typeface, indent margins, or boxes.

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Guidelines for Writing Text

- **The guidelines for writing the text are divided into two parts: Sentences and paragraphs and Style.**

Sentences and Paragraphs:

- **Shorter sentences consisting of familiar words should be used.**
- **Separate ideas should be written in separate paragraphs.**
- **The paragraphs should be kept short.**

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Guidelines for Writing Text

Style:

- **Active writing style should be used.**
- **A subjective opinion should be used.**
- **Also, specific examples should be given.**

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Content and Text for Web Pages

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Introduction

- **The way the content is presented on a Web page decides the level of satisfaction of its user and finally the use of that Web page.**
- **A well-written content reduces user errors and the number of times the user reads it.**

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Guidelines for Words, Sentences

Guidelines for words, sentences, messages, and text to be included as a part of the text content on a web page are as follows:

- **Words: Minimize the usage of Web specific words like “click here”, “use this website”, follow this link”, as these divert the attention of the user away from the content.**

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Guidelines for Presenting Web Page Text

- **The web page text must be legibly written.**
- **The text should be having a good contrast with respect to the background.**
- **The preferred combination is Black and White.**

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Guidelines for Writing Web Page Text

Style:

- **The style should reflect the needs of the site users.**
- **Use the inverted pyramid organization.**
- **Use a smaller number of words and be concise.**
- **Paragraphs should be short and contain one main idea.**

Links:

- **Minimize embedded links and use them at the beginning or end of paragraphs.**

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Guidelines for Writing Web Page Text

Scanning: Make the reading of the text easy by using:

- **Bullets for a list**
- **Tables**
- **Headings and subheadings**
- **Highlighted important points**
- **Short paragraphs**

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Guidelines for Writing Web Page Text

International Audience:

- **Needs of the international audience should be considered.**

Testing:

- **A proper testing of readability must be done.**

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Writing Link Labels

The guidelines for the link labels are as follows:

- **Links should be meaningful and descriptive.**
- **Standalone links should not exceed one sentence in length.**
- **Embedded links should be integrated smoothly into the text.**
- **Provide link labels for understanding.**

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Writing Link Titles

- They should provide the name of site if it is different from the current site.
- They should provide the name of the subsection of the site if it is within the same site.
- Restrict the length of the characters of the title to 60.

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Page Title

A page title,

- Should be meaningful
- Its first word should describe the context of the page
- Should be different from other page titles.
- Should use mixed case font style.

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Error Messages

- Precise error messages should be provided to help the user during two situations:
  - One, when an incomplete or incorrectly data is keyed in
  - Second, when there are requests are given for documents that are not found or do not exist.
- Message should be easily noticeable.

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UNIT 4
UI Design Process

Creating Meaningful Graphics, Icons, and Images and Choosing Colors

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Representation, Characteristics and Kinds of Icon

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Introduction

- The use of graphics in Interface and Screen design started in the 1970s.
- Graphical User Interface (GUI) systems have advanced over the last three decades and today have replaced text-based systems.
- The important graphical feature of a GUI system is the use of icons and their associated actions.
- The icons represent the objects, such as applications, office tools, and storage locations with a symbol.

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Introduction

- Relevant actions will be applied to these objects.
- The Web allowed the use of other media such as images, photographs, videos, diagrams, drawings, and spoken audio.
- These media and icons were combined in various ways and the term multimedia was coined to describe these combinations.

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Icons

- An Icon is a pictorial image used to represent objects and an associated action, with which users can interact with.
- Icons can be used individually or in groups on a Windows toolbar.

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Representation of an Icon

An Icon can represent the following entities:

- **Object: Example: A document**
- **Object Attributes: Example: Color or Style**
- **Actions: Example: To copy or to paste**
- **System states: Example: Ready or busy**
- **Message types: Example: Warning or critical**

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Kinds of Icons

The different ways an Icon can be used are given as follows:

- **A resemblance icon: This icon means what it looks like.**
  - **Example: A book icon can indicate a dictionary or a library.**
- **A symbolic icon: This icon is an abstract image that represents something.**
  - **Example: The Sun icon can represent a sunny day.**

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Kinds of Icons

- **An exemplar icon: This icon represents an example or characteristic of something.**
  - **Example: A cup and a fork indicate a food-safe item.**
- **An arbitrary icon: This icon has no physical or analogous correspondence and must be learned to understand it.**
  - **Example: Wi-fi or power button symbol.**

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Characteristics of an Icon

There are three characteristics of an Icon that determines its effectiveness and usability:

- **Syntactics: This refers to an icon's physical structure**
  - **Example: If it is square, round, red, green, big, or small.**
- **Semantics: This gives the icon's meaning.**
  - **Example: It could be a file, a wastebasket, or some other object**

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Characteristics of an Icon

- **Pragmatics: This shows how the icons are physically produced and depicted.**
  - **Example: Screen resolution for displaying the icon clearly.**

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Choosing Icons, Drawing and Creating Icon Images

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Choosing Icons

- Choosing an icon design is an important process in interface design.
- For a system to be more effective, meaningful, and recognizable, icons play an important role.
- They will speed learning and recall.
- On the other hand, a poor design will lead to errors, delays, and confusion.

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Guidelines to design Icons

- Each icon should be unique and not like any other icon.
- It should clearly indicate its action.
- Even in a small 16-pixel square, it should be recognizable.
- Should look good in monochrome and color both.
- They should use colors from the system palette.

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Creating Icon Images

Guidelines for creating Icon images are as given below:

- **The shapes of the icons should be concrete and make them self-evident in understanding their purpose.**
- **They should reflect the objects that they represent without much detailing.**
- **The shapes of the icons should be of proper emotional tone.**
- **Each icon should be visually and conceptually distinct.**

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Drawing Icon Images

Guidelines for drawing Icon images are as follows:

- **When the size of the icon is changed, the shape of the icon should not change, it should remain consistent.**
- **As triangular arrows are used to indicate drop-down controls, cascade symbols for menus, and scroll arrows, they should not be used in drawing icons.**
- **Use proper scale and orientation for the figures with respect to other related objects and they properly fit on the screen.**

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Drawing Icon Images

- **Use meaningful attributes when indicating varying attributes.**

  For Example: When the status of a document is to be shown as incomplete, showing it with a different shade is more effective than filling the figure.

- **Always provide a label to an icon to make it meaningful and understandable.**

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Icon Audition and Animation, The Icon Design Process

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Icon Animation

- An animated icon unlike the static icon moves on the screen.
- Animation can be used to create feedback and visual interest.
- They can bring life to screen.
- Animation can take two forms: Static and Dynamic
- Static icon: The appearance of this icon does not change until an event occurs.

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Icon Animation

- Dynamic icon: The movement of this icon is independent of an event, but changes appearance to represent functions, processes, states, and state transitions.

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Guidelines to Create Animated Icons

- **Icons should be interruptible and independent of user interaction with the system.**
- **Animation should be created only if needed and should not use it for decoration.**
- **Also provide the user with the option of turning it on or off, as desired.**
- **For a smooth movement of the icons, Microsoft suggests that images should be presented at a speed of at least 16 frames/sec.**

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Audition / Auditory Icons

- **Auditory icons are icons that produce sounds replicating everyday sound-producing events.**
- **The objects make sounds as they are touched, dragged, opened, activated, bumped against one another, and thrown away.**
- **These icons produce auditory feedback.**

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Audition / Auditory Icons

These icons are used to provide information during the following processes:

- **Previous and possible interactions**
- **Indicating an ongoing process**
- **For navigation**

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The Icon Design Process

- **Define the icon's purpose and use: the design team can collect various ideas considering real-world metaphors.**
- **Evaluate the collected ideas and make a sketch of them.**
- **Make a monochrome drawing using an icon editing utility or a drawing package.**
- **Test for various user factors such as their expectations, recognition, legibility and learning.**
- **Register these icons in the system's registry.**

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Multimedia and Graphics guidelines

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Multimedia

- **Multimedia is the use of a computer to present and combine text, graphics (images, drawings, diagrams, and photographs), audio, and video with links and tools which allows the user to interact, and communicate.**
- **Multimedia can catch the user's attention and create interest in the screen content, entertain, and convey information faster than on a screen with only textual information.**

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Multimedia

- In Web applications, multimedia can make the content more accessible to people with disabilities.
- Today, good interface design uses multimedia in a very conservative and appropriate manner.
- The main objective of multimedia should be good interaction design and not a “sparkle only” added to a screen.

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Graphics

The purpose of Graphics contained in Web pages can be classified as follows:

- Navigational: Links on a web page will help the user to navigate.
- Representational: Some items in the text can be represented with an image.
- Organizational: The relationships among items that are mentioned in the text can be shown in the form of a diagram.

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Graphics

- **Explanative: An explanation of a process working can be shown through animation.**
- **Decorative: Pictures can add a visual appeal to the screen content and can emphasize content.**

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Graphics guidelines

- **Graphics should be used to supplement the textual content and not as a substitute for it.**
- **Use only when conveying information using text is not effective.**
- **Use graphics to enhance navigation by,**
  - **Presenting a site overview**
  - **Identifying site pages**
  - **Identifying content areas**

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Graphics guidelines

- **Limit the use of graphics that take a long time to load.**
- **Graphics usage should be coordinated with all other page elements.**
- **Graphics should not look decorative or like an advertisement.**

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Images, Photographs, Videos and Diagrams

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Images

The guidelines to choose and add images to screen content are as follows:

- **Images should be appropriately chosen to convey their intended messages.**
- **Standard images emulating real-world objects should be used.**
- **Legible images with descriptive text or labels should be provided.**
- **Minimize the number and size of presented images.**

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Images

- **Restrict the single image size to 5KB and page image size to 20kB.**
- **Minimize the number of colors in an image.**
- **Provide images in GIF and JPEG format.**

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Photographs / Pictures

The guidelines to choose and add pictures to screen content are as follows:

- **A picture is selected when every aspect of the image is relevant.**
- **On the first page a small version of the image is displayed.**
- **JPEG format of the picture should be used.**
- **The image should include few people and objects in less complicated settings.**
- **The image should be shot in close-up with a clean background.**

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Videos

Videos are to be used in the following situations:

- **To show time-varying events or things.**
- **To convey human behavior and emotions.**
- **To give a personal message or grab attention.**

Disadvantages:

- **They are expensive to create**
- **Slow to download**
- **Are difficult to discern details in them.**

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Videos

The guidelines to create and use videos are as follows:

- **A video should never be automatically downloaded onto a page.**
- **Create shorter segments of a complete video.**
- **Provide controls, for playing, pausing, and stopping.**
- **If available, use existing video or use audio or a slide show with audio.**

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Diagrams

Diagrams are used on screen in the following situations:

- **To show the structure and relationships of objects.**
- **To show the flow of a process or task and indicate temporal or spatial order.**

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Types of Diagrams

- Flow charts
- Cause and effect charts
- Gantt charts
- Entity relationship diagrams
- Organization charts
- Network diagrams

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Drawings, Animation and Audition

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Drawings

- Diagrams should be used when some selective parts of an object need to be represented or highlighted.
- Provide simple drawings showing minimal detail and a link to a complete drawing.

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Animation

The guidelines to create and use animations are as follows:

- Animations should be used only when it is an integral part of the content and reinforces it.
- The animation segments should be short.
- They should be designed to be able to be stopped by the user anywhere so that the image frames can be studied in detail.
- They should also be capable of being replayed and ended entirely to avoid visual distraction.

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Audition

The guidelines to create and use auditions are given as follows:

- **When words are spoken, the content should be simple and the speed of narration should be about 160 words per minute.**
- **The narration should be slowed down when used to introduce new ideas or concepts.**
- **Off-screen narration should be used if the narrator is new to the topic being narrated.**

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Audition

- **Audio segments should be short and of high quality.**
- **Audio controls should be provided.**
- **The background audio should be played softly.**

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Interactive Voice Response (IVR)

- **IVR systems are widely used today as an extension to audio-only in multimedia enable systems.**
- **They synthesize both grammatical and statistical models of speech recognition to interpret spoken words reliably and accurately.**
- **They have been implemented successfully in applications where the vocabulary of the speaker can be restricted.**
- **The younger adults are more comfortable using such systems than older people.**

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Choosing Proper Colors

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Background

- The use of colors in screen design has taken large steps in the last forty years.
- Earlier textual-based screens used only a few colors. Later with the evolution of graphical screens, the number of color usage increased.
- The effective use of colors has taken place recently due to the advancement of technology and an understanding of what constitutes good design.

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Background

- Today colors on screens are being used much more effectively.
- Adding color to a screen increases its dimensionality and usability.
- Also, they add realism to the screen and draw the attention of the user.

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Uses of Colors

- They assist in formatting a screen.
- Can use colors to relate or group elements
- Associate information that is separated on the screen
- Highlighting important information.
- They can be as a visual code for identifying the following:
  - Different screen components.
  - The logical structure of ideas, processes, or sequences.
  - Sources and Status of information

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Uses of Colors

- Colors can be used to,
  - Portray natural objects in a realistic way
  - Increase the screen appeal

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Possible Problems with Colors

- **Adding color to a screen will not always improve the performance of the system.**
- **Proper usage of colors for a good design should be the goal of a screen designer.**

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Possible Problems with Colors

Some of the problems with using colors on a screen are:

- **High attention-getting capacity**
- **Interference with the use of other screens**
- **Varying sensitivity of the eye to different colors**
- **Color connotations**
- **Cross-Disciplinary and cross-cultural differences**

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Choosing the Colors

- **The primary use of screen colors is to communicate information from the screen to the user.**

Following are the factors to be considered while choosing colors for the display:

- **The human visual system**
- **Possible problems caused by the colors**
- **The display environment**
- **User task**

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Choosing the Colors

- **Use of the colors**
- **The hardware on which the colors will be displayed**

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Choosing Colors for Categories of Information

Different parts of the screen can have different colors for providing the following information:

- **Selective attention**
- **Status information**
- **Sequencing of information**
- **Grouping of related information**

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Choosing Colors for Categories of Information

Following are the common guidelines for choosing colors for categories of information:

- **To indicate necessary actions, warm colors like red, orange, and yellow should be used.**
- **To indicate status information, cool colors like blue, green, purple, and violet should be used.**
- **Certain colors are to be used based on their location on the screen**

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Choosing Colors for Categories of Information

- Use contrasting colors for the background and foreground.
- In situations where an ordering of colors is needed, such as from high to low, by levels of depth, and so on, arrange colors by their spectral position.
- When colored text is added, the width of the lines is doubled and the font style should be bold type.

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Choosing Colors for People with Color-Viewing Deficiencies

- Color combinations that can be easily differentiated should be used.
- The foreground and background colors should have high contrast.
- Light colors from the end of the spectrum should not be combined with the dark colors from the end of the spectrum.

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Choosing Colors for Textual Graphic Screens

- The colors selected for displaying data, text, and symbols for textual graphical screens should have good visibility, proper meaning, contrast, and harmony.
- Effective foreground/background combinations of colors should be used.
- Use effective color combinations for the foreground.
- Background color should be chosen first.
- More than four colors should not be displayed at one time.

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Choosing Colors for Statistical Graphics Screens

- Statistical or data graphics is the visual, spatial, or physical representation of information.
- Some of the commonly used statistical graphics are bar graphs, line graphs, scatterplots, and pie charts.
- For such graphics, color can add more legibility and meaningfulness.

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Choosing Colors for Statistical Graphics Screens

Following are the common guidelines to be followed while choosing colors for statistical graphics screens:

- **Emphasis: Here emphasis should be given to the data area, by using brighter colors and highlighting the data.**
- **Number of colors: more than six colors should not be used at one time.**
- **Backgrounds: a neutral background color should be used. Also, it should complement the image on the foreground.**

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Choosing Colors for Statistical Graphics Screens

- **Size: Image should be of adequate size and for changing images, use white, yellow and red colors on dark backgrounds.**
- **Status: For different status the colors to be chosen are as below:**
  - **Normal status: Green, white or blue**
  - **Caution status: Gold or Yellow**
  - **Emergency: Red**

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Choosing Colors for Web Pages

- **Purpose: There should be a meaningful purpose for choosing a color.**
- **Palette: Use a 216-color browser-safe color palette.**
- **Presentation:**
  - **Use a minimum number of colors**
  - **Consider the context before choosing a color**
  - **Use lighter colors for the background and darker colors for the foreground text and headings.**
  - **Larger areas on the screen should have uniform colors.**

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Choosing Colors for Web Pages

- **Links:**
  - **Use blue color for unselected/unvisited links.**
  - **Use purple color for selected/visited links.**
  - **The non-link text should not be in link colors.**
- **Testing: All the colors should be tested.**

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