

USN : 

**CMR Institute of Technology, Bangalore**  
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**  
**III - INTERNAL ASSESSMENT**

Semester: 8-CBCS 2017  
 Subject: USER INTERFACE DESIGN (17CS832)  
 Faculty: Ms Savitha N J

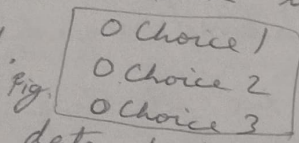
Date: 18 Jul 2021  
 Time: 01:00 PM - 02:30 PM  
 Max Marks: 50

Instructions to Students :				
Answer all 5 questions				
<i>Answer All Questions</i>				
Q.No		Marks	CO	BT/CL
1	Explain in brief structure of menus and functions of menus	10	CO3	L2
2	Explain the different types of windows and window operations	10	CO4	L2
3	Briefly explain the different kinds of Tests	10	CO5	L3
4	Explain the following selection controls with an example for each: 1. Radio Buttons 2. Check Boxes 3. List Boxes 4. drop down / pop up list boxes 5. palettes	10	CO5	L2
5	Explain special operable controls 1. Sliders 2. Tabs 3. Date Picker 4. Tree View 5. Scroll Bars	10	CO5	L2

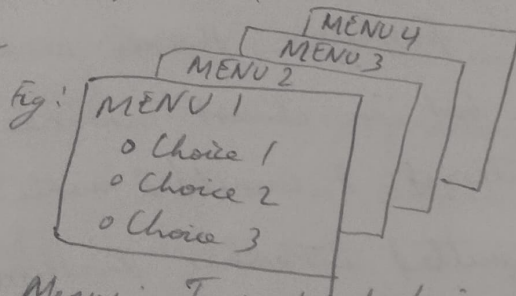
Q) Explain the structure of menus (Jan 2019) (July 2020) (Nov 2020).

Ans) Structure of Menus: Menus vary in form from very simple to very complex. They may range from small dialog boxes requesting the user to choose between one of two alternatives, to hierarchical tree schemes with many branches and level of depth. A menu's structure defines the amount of control given to the user in performing a task. The most common structures are the following:

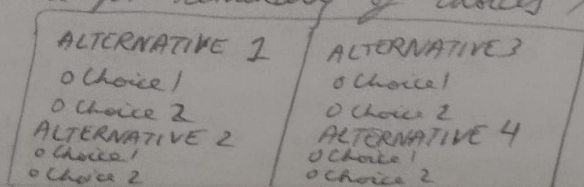
Single Menu: - Simplest form of menu, a single screen or window is presented to seek the user's input or request an action to be performed. A single menu may be iterative if it requires data to be entered into it and this data input is subject to a validity check that fails. The menu will then be represented to the user with a message requesting reentry of valid data.



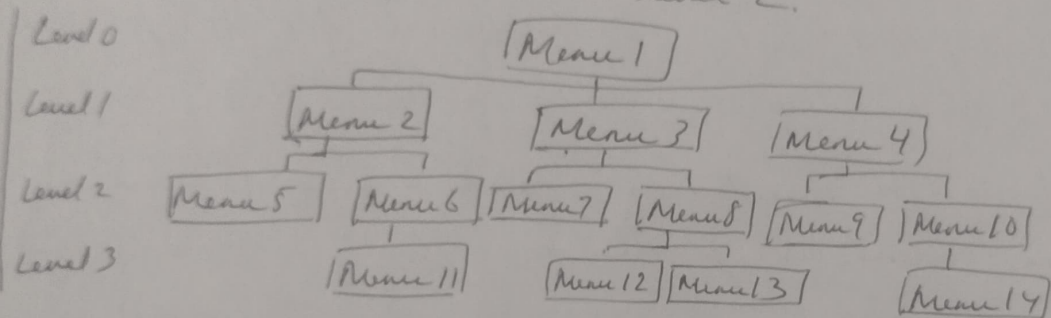
Sequential Linear Menus: Are presented on a series of screens possessing only one path. The menu screens are presented in a preset order and generally their objective is for specifying parameters or for entering data. The length of path may be short or long, depending upon the nature of the information being collected. All the menus are important to the process at hand and must be answered in some manner by the user.



Simultaneous Menus: Instead of being presented on separate screens, all menu options are available simultaneously. The menu may be completed in the order desired by the user, choices being skipped & returned to later. All alternatives are visible for reminding of choices, comparing choices and changing answers.



Hierarchical Menus: A hierarchical structure results in an increasing refinement of choice as menus are stepped through, for example, from options, to suboptions, from categories to subcategories, from pages to sections to subsections and so on. A hierarchical structure can best be represented by as an inverse tree, leading to more and more branches as one moves downwards through it. Hierarchical structures are characterized by depth and breadth (depth being the number of choice levels that one must traverse to reach the destination, breadth being the number of alternatives found at each level. A hierarchical menu is illustrated in the figure below. The top level of the tree is considered level 0 with subsequent levels numbered sequentially beginning with number 1. Starting at the top, level 0, two selections, or mouse clicks are required to reach level 2.



Connected Menus: Networks of menus all interconnected in some manner. Movement through a structure of menus is not restricted to a hierarchical tree, but is permitted between most or all menus in the network. From the user's perspective, there's no top-down traversal of the menu system but an almost unhindered wandering between any two menus of interest. A connected menu may be cyclical, with movement permitted in either direction between menus, or acyclical, with movement permitted only in one direction. These menus vary in connectivity, the extent to which menus are linked by multiple paths. The biggest advantage of a connected menu network is that it gives the user full control over the navigation flow. Its disadvantage is its complexity and its navigation

It may be daunting for an inexperienced user. Example figure:

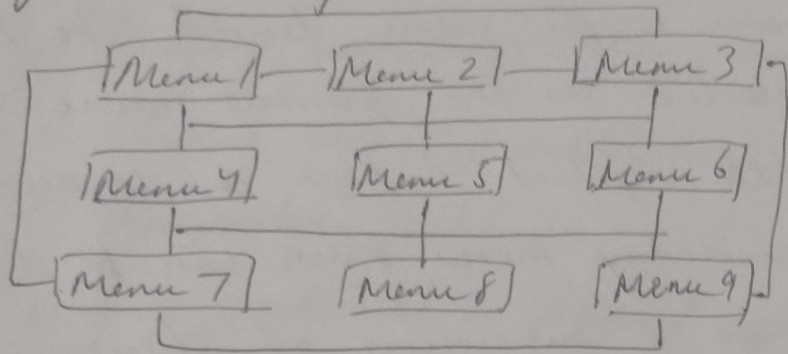


Fig: Connected Menus

Event-trapping Menus: Provide an ever-present background of control over the system's state and parameters while the user is working on a foreground task. They are, in essence, a set of simultaneous menus imposed on a hierarchical menu. In a graphical system, for example, existing together are a simultaneous menu, the menu bar, and a hierarchy — the menu bar and its pull downs. Event-trapping menus generally serve one of three functions (1) They may immediately change some parameter in the current environment (bold a piece of text), (2) they may take the user out of the current environment to perform a function without leaving the current environment (perform a spell check), or (3) they may exit the current environment and allow the user to move to a completely new environment (Exit).

(July 2020)

(Nov 2020)

Q) Explain the functions of menus.

Sol) Navigation to a new menu: Each user selection causes another menu in a hierarchical menu tree to be displayed. The purpose of each selection is to steer the user toward an objective or goal. Selection errors may lead the user down wrong paths and cost time and perhaps aggravation. However, these errors are usually nondestructive and, usually, undoable.

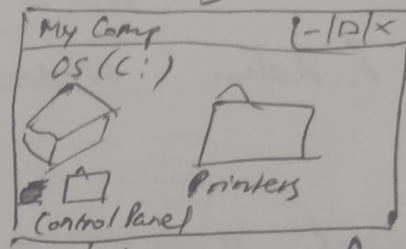
Execute an Action or Procedure: A user selection directs the computer to implement an action or perform a procedure. The action may be something like opening or closing a file, copying text, or sending a message. In some cases execution may only occur after a hierarchical menu tree is navigated. In other cases actions may be performed as successive ~~hierarchical~~ hierarchical menus are encountered & traversed. Selection errors may or may not have serious consequences, depending upon the nature of the action. Occidental selection of critical irreversible actions must be prevented in interface design.

Displaying Information: The main purpose of selecting a menu choice may simply be to display information. The user may be searching for specific information in a database or browsing the Web. The user's primary focus is on the information desired and less on the selection function. In many cases, information retrieval may occur only after a hierarchical menu tree is navigated. The content material & user's interest will determine the paths followed. Users may spend considerable time and effort understanding & processing unneeded information in order to evaluate subsequently displayed menu choices. Wrong turns in the process will again cost time and perhaps aggravation but these errors are nondestructive & usually undoable.

Data or Parameter Input: Each selection specifies a piece of input data for the system or provides a parameter value. Data or values may be input on a single menu or spread over a hierarchy of menus. The user's focus is primarily on the information being provided, and again, less on the selection function. Selection errors can easily be corrected if detected by the system.

Sol) Types of windows can be divided into 1. Primary 2. Secondary which can be further divided

## 1) Primary Windows



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

## 2) Secondary Window

- Proper Usage: - For performing subordinate, supplemental or ancillary actions that are:
  - Extended or more complex in nature
- Related to objects in the primary window - for presenting frequently or occasionally used window components.

Important guidelines: - Should typically not appear as an entry on the taskbar.

- A secondary window should not be larger than 263 dialog units X 263 dialog units. Secondary windows are supplemental windows. Secondary windows may be dependent upon a primary window or displayed independently of the primary window. They structurally resemble a primary window, possessing some of the same action controls (Close button) and possibly a What's This? button.

- A dependant secondary window is one common type. It can only be displayed from a command on the interface of its primary window. It is typically associated with a single data object and appears on top of the active window when requested. It is movable and scrollable. If necessary, it uses the primary window's menu bar. Most systems permit the use of multiple secondary windows to complete a task. In general, dependant secondary windows are closed when the primary window closes and hidden when their primary window is hidden or minimized.

- An independant secondary window can be opened independently of a primary window - for example, a property sheet displayed when the user clicks the Properties command on the menu of a desktop icon. An independant secondary window can typically be closed without regard to the state of any primary window unless there is an obvious relationship to the primary window.

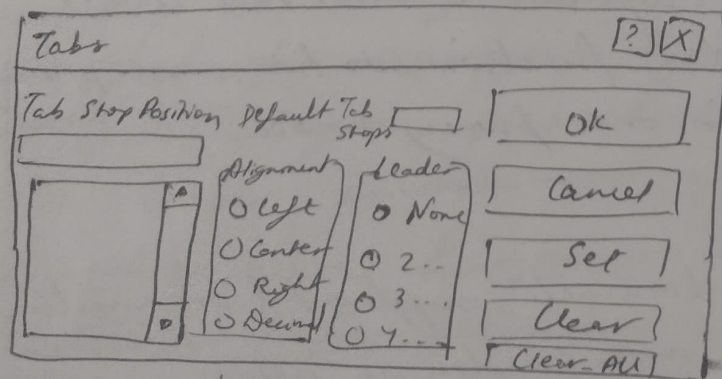
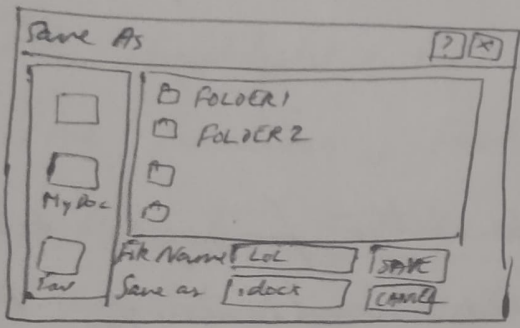


Fig: Microsoft secondary window



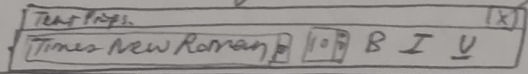
Dialog Box :- used for presenting brief messages

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



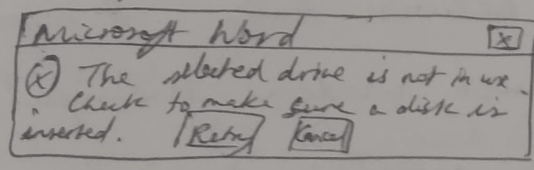
Property Inspectors - used for displaying only the most common or frequently accessed object properties

- Make changes dynamically



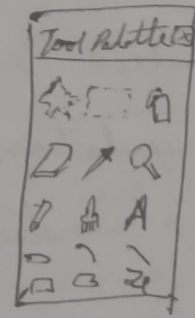
Message Boxes :- Use for displaying a message about a particular situation or condition. Command buttons to include: OK, Cancel, Help, Yes and No, Stop

- buttons to correct the action that caused the message box to be displayed.
- Enable the title bar close box only if the message includes a cancel button
- Designate the most frequent or least destructive option as the default command button



Palette Windows

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



Pop-up Windows

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

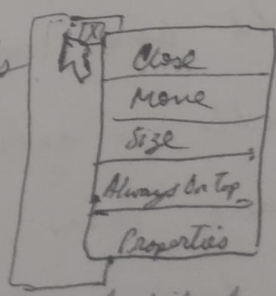


Fig: Microsoft Windows pop-up window

Q) Characteristics of Windows (only asked in Assignment)

Sol) Window Characteristics

- ~~A window is seen~~ A name or title, allowing it to be identified
- A size in height and weight (which can vary)
- A state, accessible or active, or not accessible (only active windows can have their contents altered)
- Visibility - the portion that can be seen. (A window may be partially or fully hidden behind another window, or the information within a window may extend beyond the window's display area)
- A location, relative to the display boundary

- Presentation, that is, its arrangement in relation to other windows. It may be tiled, overlapping, or cascading
- Management capabilities, methods for manipulation of the window on the screen
- Its highlight, that is, the part that is selected
- The function, task or application to which it is dedicated

### 5c The Attraction of Windows -

- Presentation of Different Levels of Information
- ~~Access to different~~ Presentation of Multiple Kinds of Information
- Sequential Presentation of Levels or kinds of Information
- Access to Different Sources of Information
- Combining Multiple Sources of Information
- Performing More Than One Task
- Reminding, Monitoring
- Multiple representations of the same task
- Constraints in Window System Design
- Historical Considerations - lack of guidelines, Standardization
- Hardware Limitations - screens are not large enough, the slower processing speeds and smaller memory sizes
- Human Limitations - full screens with screens containing overlapping windows
- Other Limitations - include the necessity for window borders

Otherwise, generally the same as those of programmed facades  
Disadvantages: - Generally the same as for programmed facades

Q) Explain Cognitive Walkthroughs, Think ~~&~~ aloud Evaluations and Usability tests conducted in UID (July 2019). Write a note on Think-Aloud-Evaluations and usability test (Jan 2020) Briefly explain the different kinds of tests (Nov 2020)

Sol) ① Think-Aloud Evaluations → What are tests? I'll explain it later

Description: - Users perform specific tasks while thinking out loud  
- Comments are recorded and analyzed

Advantages: - Utilizes actual representative tasks  
- Provides insights into the user's reasoning

Disadvantages: - May be difficult to get users to think out loud

Guidelines: - Develop: • Several core or representative tasks  
• Tasks of particular concern - Limit session to 60 to 90 mins.

## ② Usability Test

Description: - In interface evaluation under real-world or controlled conditions  
- Measures of performance are derived for specific tasks  
- Problems are identified

Advantages: - Utilizes an actual work environment  
- Identifies serious or recurring problems

Disadvantages: - High cost for establishing facility

- Requires a test conductor with user interface expertise  
- Emphasizes post-time system usage  
- Poorly suited for detecting inconsistency problems

### ③ Cognitive Walkthroughs

Description :- Reviews of the interface in the context of tasks users <sup>perform</sup>

Advantages :- Allow a clear evaluation of the task flow early in the <sup>design process</sup>

- Do not require a functioning prototype
- Low cost
- Can be used to evaluate alternate solutions
- Can be performed by developers
- More structured than a heuristic evaluation
- Useful for assessing "exploratory learning"

Disadvantages :- Tedious to perform

- May miss inconsistencies & general and recurring problems

Guidelines :- Needed to conduct the walkthrough are -

- A general description of proposed system users and what relevant knowledge they possess
- A specific description of one or more core or representative tasks to be performed
- A list of the correct actions required to complete each of the tasks
- Review: • several core or representative tasks across a range of functions
- Proposed tasks of particular concern.
- Developers must be assigned roles of:
  - Scribe to record results of the action
  - Facilitator to keep the evaluation moving
- Start with simple tasks
- Don't get bogged down demanding solutions
- Limit session to 60 to 90 minutes

④ Guidelines Review: Description :- A review of the interface in terms of an organization's standards & design guidelines

- Advantages :-
- Can be performed by developers
  - Low cost

- Can identify general & recurring problems
- Particularly useful for identifying screen design & layout problems

Disadvantages: - May miss severe conceptual, navigation & operational problems

⑤ Heuristic Evaluation: Description - A detailed evaluation of a system by interface design specialists to identify problems

- Advantages:
- Easy to do
  - Relatively low cost
  - Does not waste user's time
  - Can identify many problems

- Disadvantages:
- Evaluators must possess interface design expertise
  - Evaluators may not possess an adequate understanding of the tasks and user communities.
  - Difficult to identify systemwide structural problems
  - Difficult to uncover missing units and interface elements
  - Difficult to identify the most important problems among all problems uncovered
  - Does not provide any systematic way to generate solutions to the problems uncovered

Evaluation Process: • Preparing the session: - Select evaluators

- Prepare or assemble:
  - A project overview
  - A checklist of heuristics
- Provide briefing to evaluators to:
  - Review the purpose of the evaluation session
  - Review the evaluation process
  - Present the project overview and heuristics
  - Answer any evaluator questions
  - Provide any special evaluator training that may be necessary
- Conducting the session: - Have each evaluator review the system alone
  - The evaluator should:
    - Establish own process or method of reviewing the system
    - Provide usage scenarios, if necessary

- Compare his or her findings with the list of usability principles.

- Identify any other relevant problems or issues

- Make atleast two passes through the system

- Detected problems should be related to the specific heuristics they violate

- Comments are recorded either: By evaluator or By an observer

- The observer may answer questions and provide hints

- Restrict the length of the session to no more than 2 hours

- After the session: - Holding a debriefing session including observers and design team members where:

- Each evaluator presents problems detected and the heuristics it violated

- A composite problem listing is assembled

- Design suggestions for improving the problematic aspects of the system are dismissed.

- After the debriefing session: • Generate a composite list of violations as a ratings form

- Request evaluators to assign severity ratings to each violation

- Analyze results and establish a program to correct violations and deficiencies

⑥ Classic Experiments: Description: - An objective comparison of 2 or more prototypes identical in all aspects except for one design issue

- Advantages: - Objective measures of performance are obtained

- Subjective measures of user satisfaction may be obtained

- Disadvantages: - Requires a rigorously controlled experiment to conduct the evaluation

- The experiment conductor must have expertise in setting up, running, and analyzing the data collected

- Requires creation of multiple prototypes

- Guidelines: - State a clear and testable hypothesis

- Specify a small number of independent variables to be manipulated

- Carefully choose the measurements

- Judiciously select study participants and carefully or randomly assign them to groups

- Control for biasing factors

- Collect the data in a controlled environment

- Apply statistical methods to data analysis
- Resolve the problem that led to conducting the experiment

## ⑦ Focus Groups

- Descriptions: - A discussion with users about interface design prototypes or tasks
- Advantages:
  - Useful for - obtaining initial user thoughts
  - Trying out ideas
  - Easy to set up and run
  - Low cost
- Disadvantages:
  - Requires experienced moderator
  - Not useful for establishing:
    - How people really work
    - What kinds of usability problems people have
- Guidelines - Restrict group size to 8 to 12
  - Limit to 90 to 120 minutes ~~session~~ in length
  - Record session for later detailed analysis

**Tests**: A test is a tool used to measure something. The "something" may be:

- Conformance with a requirement
- Conformance with guidelines for good design
- Identification of design problems
- Ease of system learning
- Retention of learning over time
- Speed of task completion
- Speed of need fulfillment
- Error rates
- Subjective user satisfaction

A test is usually formal; it is created and applied intentionally and with a purpose. It is usually based upon some kind of criteria, an understanding of what a good <sup>result</sup> would be. Several testing techniques, at varying levels of sophistication and cost, are available to exercise the system.



Q) Explain Radio buttons and List boxes selection controls (July 2019)

Explain the following controls with an ex. for each i) Radio buttons ii) Check boxes iii) Tools Tips iv) Progress indicators (Jan 2020)

Q) Define Selection Control. Briefly explain about Radio buttons (Nov 2020)

Selection control: Presents on the screen all the possible alternatives or choices that may exist for an entity, property or value. The relevant item or items & selected from those displayed. Some selection controls present all the alternatives together, visibly on a screen; others may require an action to retrieve the entire listing and/or scrolling to view all the alternatives. Selection controls include:

① Radio buttons: Description: - A two-part control consisting of:

- Small circles, diamonds or rectangles
  - Choice descriptions
  - When a choice is selected - The option is highlighted and any existing choice is automatically unhighlighted & deselected
  - Purpose - to set one item from a small set of mutually exclusive options (2 to 8)
  - Advantages:
    - Easy-to-access choices
    - Easy-to-compare choices
    - Preferred by users
  - Disadvantages:
    - Consume screen space
    - Limited number of choices
  - Proper use:
    - For setting attributes, properties or values
    - For mutually exclusive choices (only one can be selected)
    - Where adequate screen space is available
    - Most useful for data choices that are:
      - Discrete
      - Small in and fixed in number
      - Not easily remembered
- In need of a textual description to meaningfully describe the alternatives  
 • Most easily understood when the alternatives can be seen together & compared to one another

Choice Descriptions: • Provide meaningful, fully spelled-out choice descriptions clearly describing the values or effects set by the radio buttons

- Display in a single line of text
- Display using mixed-case letters, using the sentence style
- Position descriptions to the right of the button. Separate them by at least one space from the button
- When a choice is conditionally unavailable for selection, display the choice description grayed out or dimmed
- Include a 'None' choice if it adds clarity

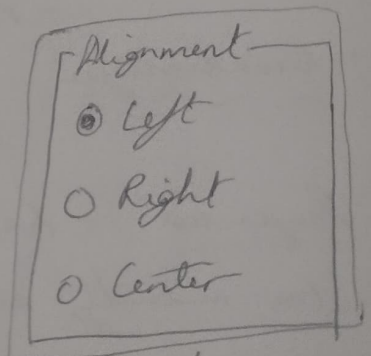
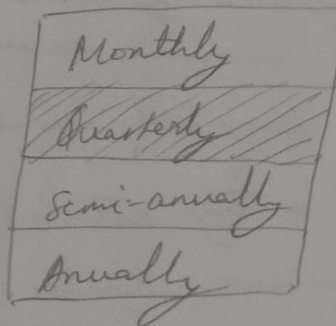
Size: Show a minimum of two choices, a maximum of height

Defaults: When the control possesses a state or effect that has been predetermined to have a higher probability of selection than the others, designate it as the default and display its button filled in

- When the control includes choices whose states cannot be predetermined, display all the buttons without setting a dot, or in the intermediate state
- When a multiple selection includes choices whose states vary display the buttons in another unique manner, or in mixed value state.

Fig: Radio Buttons

- Monthly
- Quarterly
- Semi-annually
- Annually



Structure: • A columnar orientation is the preferred manner of presentation

- Left-align the buttons and choice descriptions

- Red
- Green
- Yellow
- Blue

If vertical space on the screen is limited, orient the buttons horizontally

Provide adequate <sup>separation</sup> ~~space~~ between choices so that the buttons are associated with the proper description

Ex:  Green  Blue  Red  Yellow

Enclose the buttons in a border to visually strengthen the relationship they process.

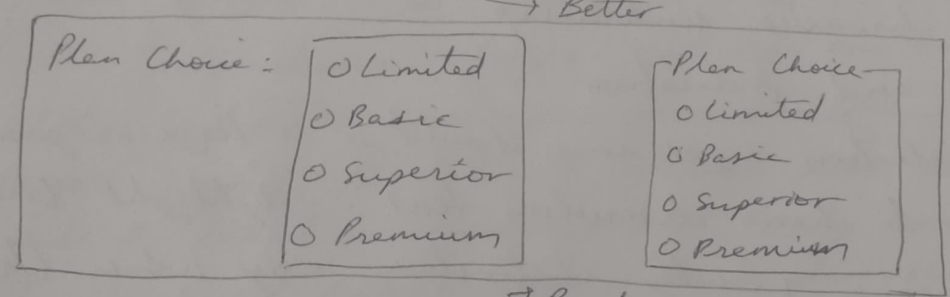
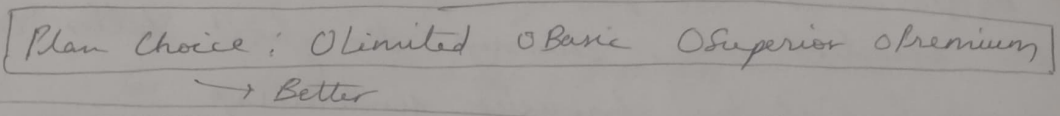
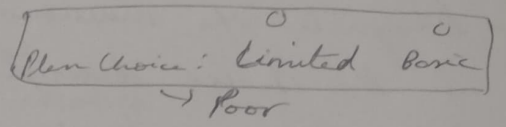
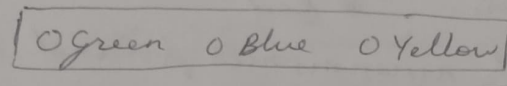
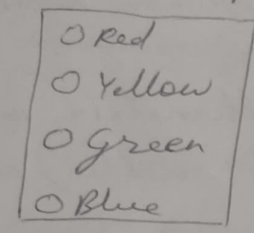


Fig: Ways to, and not to, present radio buttons

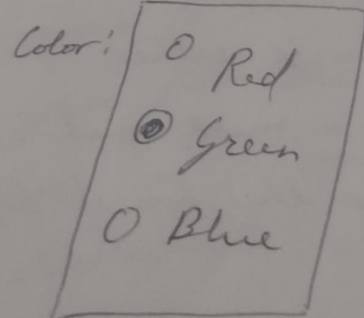
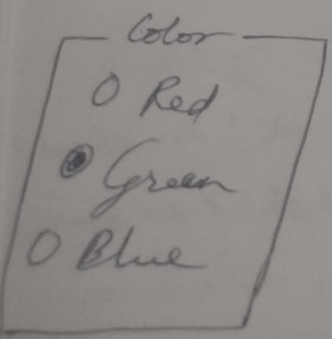
Organization: Arrange selections in expected order or follow other patterns such as frequency of occurrence, sequence of use, or importance

- ~~For~~ For selections arrayed top to bottom, begin ordering at the top
- For selections arrayed left to right, begin ordering at the left
- If, under certain conditions, a choice is not available, display it subdued or less brightly than the available choices.

Captions: Structure - Provide a caption for each radio button control

Display: - Fully spelled out - In mixed-case letters, capitalizing the first letter of all significant words.

Orientation (Columnar):



Color: Color:  Red

Red  Green

Green  Blue

Blue

Horizontal orientation;

Color:  Green  Blue  Yellow

Color  
 Green  Blue  Yellow

### Keyboard Equivalents:

- Assign a keyboard mnemonic to each choice description
- Designate the mnemonic by underlining the applicable letter in the choice description. • Red
- Assign unique keyboard mnemonics for each alternative in the standard way, choosing the first letter (or another) and designating it by character underlining

### Selection Method and Indication

- Pointing: - The selection target area should be as large as possible
- Include the button & choice description text: - Highlight the selection choice in some visually distinctive way when the cursor's resting on it and the choice is available for selection
- This cursor should be as long as the longest choice description plus one space at each end. Do not place cursor over small buttons.

Red  
 Yellow  
 Blue

Activation: - When a choice is selected, distinguish it visually from the unselected choices.

- A radio button should be filled in with a solid dark dot or made to look depressed or higher through use of shading
- When a option is selected, any other selected choice must be <sup>deselected</sup>

② Check Boxes: Description: - A two part control consisting of a square box and choice description

- Each option acts as a switch & can be either "on" or "off"
- When an option is selected (on), a mark such as "X" or "check" appears within the square box, or the box is highlighted in some other manner.

- Otherwise the square box is unselected or empty (off)
- Each box can be:
  - Switched on or off independently
  - Used alone or grouped in sets

• Purpose: - to set one or more options as either on or off

- Advantages: - Easy to assess choices  
- Easy to compare choices  
- Preferred by users.

- Disadvantages: - Consume screen space  
- Limited number of choices  
- Single check boxes difficult to align with other screen controls

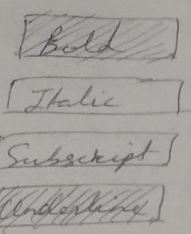
• Proper usage: - For setting attributes, properties or values  
- For nonexclusive choices (more than one can be selected)

- Where adequate screen space is available
- Most useful for data & choices that are:
  - Discrete,
  - Small & fixed in number,
  - Not easily remembered
- In need of textual description to describe meaningfully
- Most easily understood when the alternatives can be seen together and compared to one another
- Never changed in content. - can be used to affect other controls
- Use only when both states of a choice are clearly opposite & unambiguous

• Choice Descriptions: • Provide meaningful, fully spelled-out choice descriptions clearly describing the values or effects set by the check boxes

- Display them in a single line of text
- Display them using mixed-case letters in sentence style
- Position descriptions to the right of the check box. Separate by at least one space from the box
- When a choice is unavailable for selection under a certain condition, display the choice description usually dimmed

- Bold
- Italic
- Subscript
- Underline



- Bold
- Italic
- Subscript
- Underline

Fig: Check boxes

Size - Show a minimum of one choice, a maximum of eight

Defaults - When the control possesses a state or affect that has been preset, designate it as the default and displays its check box marked

When a multiple selection includes choices whose states vary display the button in another unique manner or mixed value state

Structure - Provide groupings of related check boxes

A columnar orientation is the preferred manner of presentation for multiple related check boxes

Left align the check boxes and choice descriptions

If vertical space on the screen is limited, orient the boxes horizontally

Provide adequate separation between boxes so that the buttons are associated with the proper description. - A distance equal to 3 spaces is usually sufficient

Enclose the boxes in a border to visually strengthen the relationship they possess.

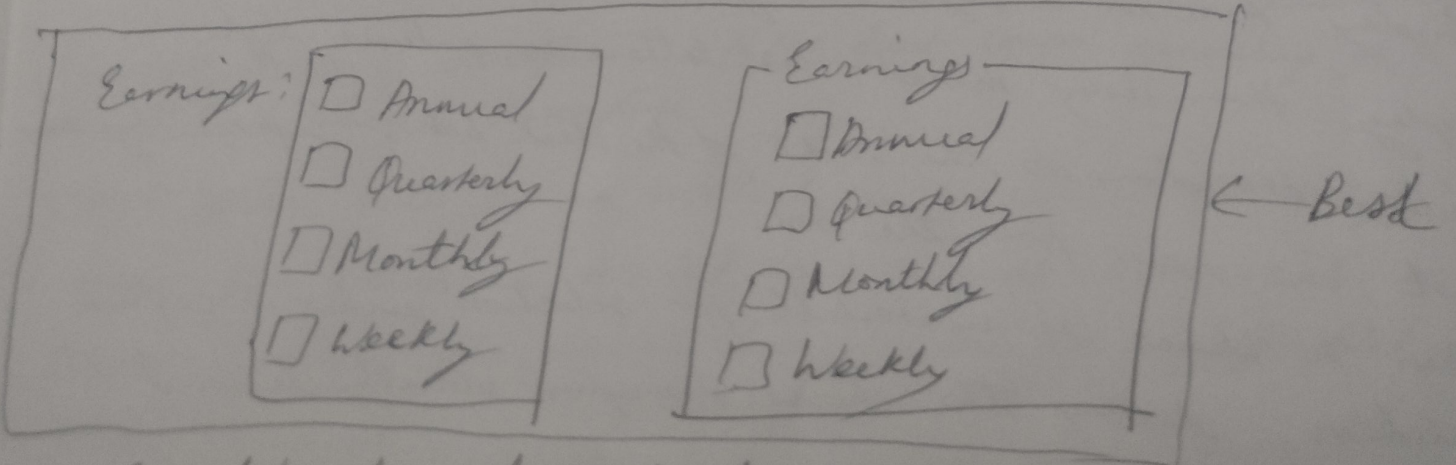
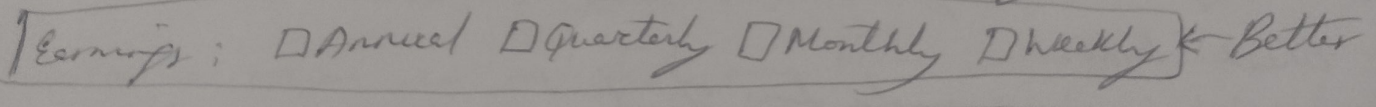
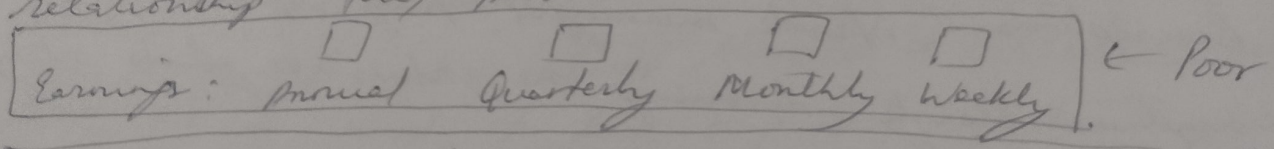


Fig: Ways to, and not to, present check boxes

Organization: • Arrange selections in the logical order or follow other patterns such as frequency of occurrence, sequence of use or importance

- For selections arrayed ~~at~~ top to bottom, begin ordering at the top
- For selections arrayed left to right, begin ordering at the left
- If, under certain conditions, a choice is not available, display it subdued or less brightly than the available choices.

Related Control: • Position any control related to a check box immediately to the right of the choice description.

- If a check box description also acts as the label for the control that follows it, end the label with an arrow (>).

Day of Week >

Month of Year >

check boxes.

Captions: • Structure: - Provide a caption for each grouping of related, check boxes.

- Exception: In screens containing only one check box grouping, the screen title may serve as the caption

• Display - Fully spelled out

• In mixed-case letters capitalizing the first letter of all significant words

Columnar Orientation: - With a control border, position the caption:

- upper-left justified within the border.

Font:  
 Bold  
 Italic  
 Underline

• Alternatively, the caption may be located to the left of the topmost choice description

Font:  
 Bold  
 Italic  
 Underline

- without an enclosing control border, position the caption: • Left-justified above the choice descriptions separated by one space line

Font:  
 Bold  
 Italic

Alternatively, the caption may be located to the left of the topmost choice description

Font:  
 Bold  
 Italic  
 Underline

Horizontal Orientation:

Font:  Bold  Italic  Underline

Alternatively, within an enclosing border left-justified within the border

Font:  Bold  Italic  Underline

Font:  
 Bold  Italic  Underline

Keyboard Equivalents: - Assign a keyboard mnemonic to each <sup>check</sup> block  
• Designate the mnemonic by underlining the applicable letter in  
the choice description  Underline

### Selection Method & Indication

- Pointing: - The selection target area should be as large as possible
- Include the check box and the choice description text
- Highlight the selection choice in some visually distinctive way when the cursor rests on it and the choice is available for <sup>selection</sup>
- This cursor should be as long as the longest choice description, plus one space at each end. Do not place the cursor over check <sub>box</sub>.

Bold

Italic

Underline

Activation: - When a choice is selected, distinguish it visually from the non-selected choices.

• A check box should be filled in or made to look depressed or higher through use of a shadow

Defaults: If a check box is displayed that contains a choice previously selected or default choice, display the selected choice as set in the control.

• Select / Deselect all: Do not use Select All & Deselect All <sup>check boxes</sup>

• Mixed-value state: - When a check box represents a value, and a multiple selection encompasses multiple value occurrences, set in both the on and off state, display the check box in a mixed value state

• Fill the check box with another easily differentiable symbol or <sup>pattern</sup>

Bold

Italic

Underline

- Toggle the check box as follows:

• Selection 1: Set the associated value for all elements. Fill the check box with an "X" or "check".

• Selection 2: Unset the value for all associated elements. Blank out the check box

• Selection 3: Return all elements to their original state. Fill the check box with the mixed valued symbol or pattern.



③ List Boxes: Description: - A permanent box-shaped control containing a list of attributes or objects from which:

- A ~~selection~~ single selection is made (mutually exclusive), or
- Multiple selections are made (non-mutually-exclusive)
- The choice may be text, pictorial representations, or graphics
- Selections are made by using a mouse to point and click
- Capable of being scrolled to view large lists of choices
- No text entry field exists in which to type text
- A list box may be associated with a summary list box control, which allows the selected choice to be displayed or an item added to the list.
- Purpose: - To display a collection of items containing:
  - Mutually exclusive options
  - Non-mutually-exclusive options
- Advantages: - Unlimited number of choices
  - Reminds users of available options
  - Box always visible
- Disadvantages: - Consumes screen space
  - Often requires an action (scrolling) to see all list choices
  - The list content may change, making it hard to find items
  - The list may be ordered in an unpredictable way, making it hard to find items
- Proper usage: - For selecting values or setting attributes
  - For choices that are:
    - Mutually exclusive (only one can be selected)
    - Non-mutually-exclusive (one or more)
    - where screen space is available
  - For data and choices that are:
    - Best represented textually
    - Not frequently selected
    - Not well known, easily learned, or remembered
    - Ordered in an unpredictable fashion
    - Frequently changed
    - Large in number
    - Fixed or variable in list length

Events:

Asterisk	↑
Chat Incoming Ring	
" outgoing Ring	
Critical Stop	
Default Beep	↓

Fig: List Box

List Box General Guidelines: ~~first, general list box guidelines will be presented~~

Selection Descriptions: - Clearly & meaningfully describe the choices available. Spell them out as fully as possible

- Graphical representations must clearly represent the options
- Present in mixed case, using the sentence style structure
- Left-align into columns

List Size: - Not actual limit in size

- Present all available alternatives

- Require no more than 40 page-downs to search a list

- If more are required, provide a method for using search criteria or dropping the options

Box Size: - Must be long enough to display 6 to 8 choices without requiring scrolling. - Exceptions:

- If screen space constraints exist, the box may be reduced in size to display at least 3 items.

- If ~~the~~ it is the major control within a window, the box may be <sup>larger</sup>

- If more items are available than are visible in the box, provide vertical scrolling to display all items

- Must be wide enough to display the longest possible choice

Australia	↑
Canada	
England	
France	
Germany	
New Zealand	↓

Organization: - order in a logical & meaningful way to permit easy browsing

- Consider using separate controls to enable the user to change the sort order or filter items displayed in the list

- If a particular choice is not available in the current

content, omit it from the list

- Exception: If it's important ~~for~~ <sup>that</sup> the existence & unavailability of a particular list item to be communicated, display the choice dimmed or grayed out instead of deleting it

Layout and Separation: - Enclose the choices in a box with a solid <sup>border</sup>

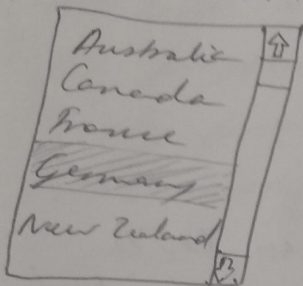
- The border should be the same color as the choice descriptions
- Leave one blank character position between the choice description and the left border

Leave one blank character position between the longest choice description in the list and the right border, if possible

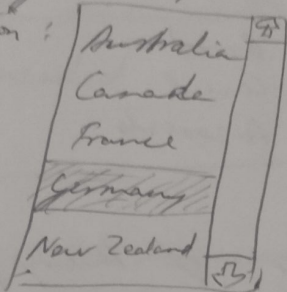
Captions: • Use mixed-case letters

• The preferred position of the control caption is above the upper-left corner of the list box. Alternatively, the caption may be located to the left of the topmost choice description.

Destination:



Destination:



Disabling: When a list box is disabled, display its caption and show its entries as grayed out or dimmed

Selecting Method and Indication: • Pointing: - Highlight the selection choice in some visually distinctive way when the pointer or cursor is resting on it & choice is available for selection

• Selection: - Use a reverse video or reverse color bar to surround the choice description when it is selected

- The cursor should be as wide as the box itself

- Mark the selected choice in a distinguishing way

- Activation: - Require the pressing of a command button when an item, or items, is selected

### Single-Selection List Boxes

• Purpose: - To permit selection of only one item from a large listing

• Design guidelines: - Related text box

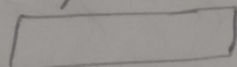
• If presented with an associated text box control:

- Position the list box below & as close as possible to the text box

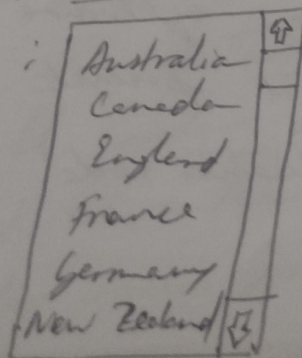
- The list box caption should be worded similarly to the text box caption

- If the related text box and list box are very close in proximity, the caption may be omitted from the list box

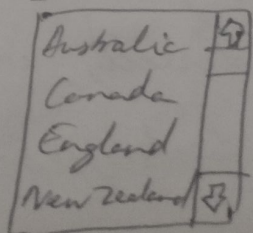
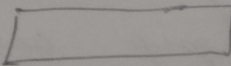
Destination:



Destination:



Destination:



## Extended and Multiple-selection List Boxes

- Purpose: - To permit selection of more than one item in a long listing
- Extended list box: Optimized for individual item or range selection
- Design guidelines: - Selection indication
  - Mark the selected choice w/ an X or check mark to the left of the entry

Groceries:

A diagram of an extended list box. It is a rectangular box with a vertical scrollbar on the right side. The scrollbar has a track with a vertical line and a handle. The list items are:  Bread,  Cereal,  Dairy Foods, and  Desserts.

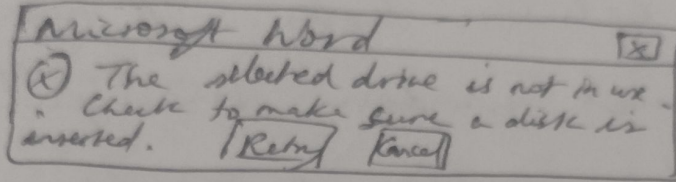
Groceries Selected:

A diagram of a list box showing the selected items. The list contains: Bread, Cereal, and Desserts.

Q) Explain any two ~~the~~ types of testing prototypes used in UID  
(July 2019) Explain the purpose of prototypes. Discuss any two kinds of prototypes with their importance to system developers (Jan 2020)

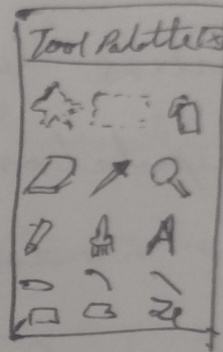
Sol) Prototype: - Primarily a vehicle for exploration, communication and evaluation. Its purpose is to obtain user input in design, and to provide feedback to designers. Its major function is the communication thoroughness. A prototype enables

- Buttons to correct the action that caused the message box to be displayed.
- Enable the title bar close box only if the message includes a cancel button.
- Designate the most frequent or least destructive option as the default command button.



## Palette Windows

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



## Pop-up Windows

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

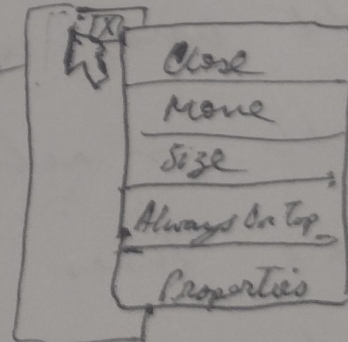


Fig: Microsoft Windows pop-up window

Q) Describe ~~briefly~~ overlapping windows and tiled windows presentation states with examples. (July 2019)

- Q) Explain Slider and Tree View operable controls (July 2019). What are operable controls? Explain usage of buttons along with their advantages and disadvantages (Jan 2020)

Sol) Operable Controls: Those that permit the entry, selection, changing, or editing of a particular value, or cause a command to be performed. Classes include buttons, text-entry/read-only, selection, combination entry/selection, and other specialized controls.

Buttons: Description: - A square or rectangle-shaped control with a label inside that indicates action to be accomplished. The label may consist of text, graphics or both.

- Purpose: - To start actions
- To change properties
- To display a pop-up menu

Advantages: - Always visible, reminding one of the choices available

- Convenient

- Can be logically organized in the work area
- Can provide meaningful descriptions of the actions that will be performed
- Larger size generally provides faster selection target
- Can possess 3D appearance:
  - Adds an aesthetically pleasing style to the screen
- Provides visual feedback through button movement when activated
- May permit use of keyboard equivalents and accelerators
- Faster than using a 2-step menu bar (full-down sequence)

Disadvantages: - Consumes screen space

- Size limits the number that may be displayed
- Requires looking away from main working area to activate
- Require moving the pointer to select

Popup Usage: - Use for frequently used actions that are specific to a window

- To cause something to happen immediately

- To display another window
- To display a menu of options
- To set a mode or property value

OK - Any changed info in the window is accepted & the window is closed  
 Cancel - Closes window without implementing unsaved changes  
 Close - Closes the window  
 Help - Opens online Help

A button comes in three styles -

1. Command buttons: Resembles the control commonly found on electrical or mechanical devices and is sometimes referred to as a pushbutton.
 

OK

Cancel

Help
2. Toolbar buttons: A square or rectangular in shape with an icon or graphic inside. It may also have an associated label.
 

▶

||

■

3. A symbol button: Square or rectangular symbol with a symbol inscribed inside.
 

□

Other Operable Controls: Other more specialized operable controls also exist: Among them are: 1. Sliders 2. Tabs 3. Data Pickers

4. Tree View 5. Scroll Bars

① Slider: Description: - A scale exhibiting degrees of a quality on a continuous

- Includes the following:

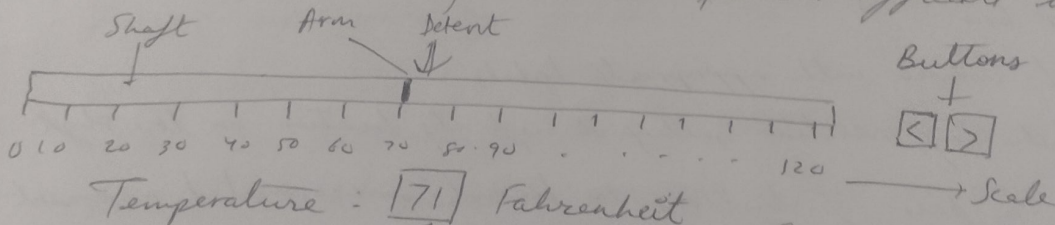
- A shaft or bar
- A range of values with appropriate labels
- An arm indicating relative setting through its location on the shaft
- Optionally, a pair of buttons to permit incremental movement of the slider arm.
- Optionally, a text box for typing or displaying an exact value
- Optionally, a detent position for special values
  - May be oriented vertically or horizontally
  - Selected by using the mouse to:
    - Drag a slider across the scale until the described value is reached.
    - Point at the buttons at one end of the scale and clicking to change the value
    - Keying a value in the associated text box

• Purpose: - To make a setting when a continuous qualitative adjustment is acceptable, it is useful to see the current value relative to the range of possible values.

Advantages: - Spatial representation of relative setting  
- Visually distinctive

Disadvantages: - Not as precise as an alphanumeric indication  
- Consumes screen space  
- Usually more complex than other controls

Proper Usage: - To set an attribute  
- For mutually exclusive choices  
- When an object has a limited range of possible settings  
- When the range of values is continuous  
- When the choices can increase or decrease in some well-known, predictable and easily understood way  
- When a spatial representation enhances comprehension & interpretation  
- When using a slider provides sufficient accuracy



② Tree View: Description: - A special list box control that displays a set of objects as an indented outline based on the objects logical hierarchical relationship

- Includes, optionally, buttons that expand and collapse the outline

- A button inscribed with a plus (+) expands the outline
- A button inscribed with a minus (-) collapses the outline

~~Elements that~~

• Purpose and proper usage: - To display a set of objects as an indented outline to illustrate their logical hierarchical relationship



## Desktop

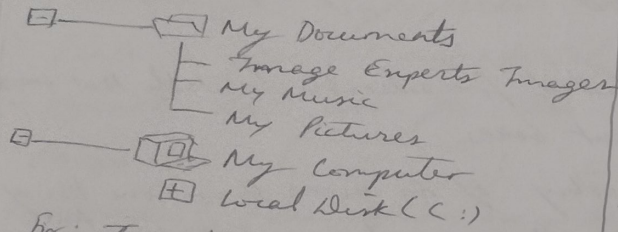


Fig: Tree View

③ Date-Picker: Description: A drop-down list box that displays a 1-month calendar in the drop-down list box.

- Clicking the right arrow moves forward the monthly calendar and left arrow moves backward.
- A date can be selected from the drop-down list box.

Advantages - Provides a representation of a physical calendar.

- The calendar listing is ordered in a predictable way, very distinctive.

Disadvantages - Requires an extra step to display the calendar.

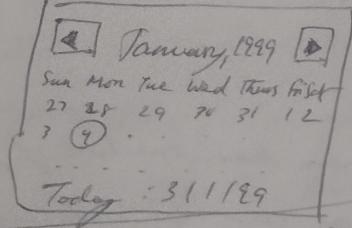
- When displayed, all months are not visible, so scrolling might be required to access the desired choice.

Proper usage: The select and display a single date in close monthly proximity to the default month presented on the drop-down list box.

1/30/99

Fig: Date

Picker Control



④ Scroll Bars: Description: - An elongated rectangular container consisting of:

- Available, if needed, in primary and secondary windows, some controls and web pages.

- May be oriented vertically or horizontally at window or page edge.

• Purpose - To find and view information that takes more space than the allocated display space.

• Advantages: Permits viewing data of unlimited size.

• Disadvantages: - Consumes screen space.

- Can be cumbersome to operate.

• Proper use: - When more info. is available than the window space for displaying it.

- Does not use to set values.

