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Internal Assessment Test -3 – Jan. 2022

Sub:	Principles of User Interface Design							Sub Code:	18MCA552	
Date:	25/1/2022	Duration:	90 min's	Max Marks:	50	Sem:	V	Branch:	MCA	

Note : Answer FIVE FULL Questions, choosing ONE full question from each Module.

		MARKS	OBE	
			CO	RBT
	PART I	[10]	CO4	L1
1	Explain seven data types by task taxonomy			
	OR			
2	Justify importance of online documentation formation and content. Provide an example.	[10]	CO5	L3
	PART II	[10]	CO4	L2
3	Write the advantages and disadvantages in reading from display			
	OR			
4	Describe Information visualization challenges	[10]	CO5	L1

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1. Explain about shaping the content of the documentation

- Traditionally, training and reference material often written by junior member of development team
  - manuals were often poorly written
  - were not suited to the background of the users
  - were delayed or incomplete
  - were not tested adequately
- The benefits of well-designed manuals include shorter learning times, better user performance, increased user satisfaction, and few calls for support

Choose an action-oriented approach
- Provide an immediate opportunity to act.
- Encourage and support exploration and innovation.
- Respect the integrity of the user's activity.
- Show numerous examples.

Let users' tasks guide organization
- Select or design instructional activities that are real tasks.
- Present task concepts before interface objects and actions.
- Create components of instructions that reflect the task structure.

Support error recognition and recovery
- Prevent mistakes whenever possible.
- Provide error information when actions are error-prone or correction is difficult.
- Provide error information that supports detection, diagnosis, and correction.
- Provide on-the-spot error information.

Support reading to do, study, and locate
- Be brief; don't spell out everything.
- Provide a table of contents, index, and glossary.
- Keep the writing style clean and simple.
- Provide closure for chapters.

1 Towards minimal manuals

Minimal manuals encourage active involvement with hands-on experiences

Carroll's *guided exploration*
- choose an action-oriented approach
- anchor the tool in the task domain
- support error recognition and recovery
- support reading to do, study, and locate

- Show numerous well-chosen screen prints that demonstrate typical uses (*predictive model*)
- Table of contents and index required
- Glossaries for clarifying technical terms
- Appendices for error messages

2 Organization and writing style

Precise statement of educational objectives
Present concepts in a logical sequence with increasing order of difficulty
Ensure that each concept is used in subsequent sections
Avoid forward references
Construct sections with approximately equal amounts of new material
Need sufficient examples and complete sample sessions
Choice of words and phrases important
Style guides for organizations attempt to ensure consistency and high quality
Writing style should match users' reading ability

2. Write the disadvantages in reading from display.

Potential Disadvantages in Reading from Displays:

- *Fonts* may be poor, especially on low-resolution displays. The dots composing the letters may be so large that each is visible, making users expend effort to recognize characters.
- *Low contrast* between the characters and the background and *fUZZY character boundaries* also can cause trouble.
- *Emitted light* from displays may be more difficult to read by than reflected light from paper
- *Small displays* require frequent *page turning;* issuing the page-turning commands is disruptive, and the page turns are unsettling, especially if they are slow and visually distracting.
- *Reading distance* is easily adjustable for paper, while most displays are *fixed* in place, and display *placement* may be too high for comfortable reading

- *Layout and formatting* can be problems-for example, improper margins, inappropriate line widths (35 to 55 characters is recommended)
- *Reduced hand and body motion* with fixed-position displays, as compared to paper, may be more fatiguing.
- *Unfamiliarity of displays* and the *anxiety* of navigating the text can increase stress.

3.Justify importance of online documentation formation and content. Provide an example.

- Online Manuals
  - Reproduction of printed manuals online
    - paper page layouts may not convert well
    - dealing with figures problematic
    - attractive if users have large enough display (full page)
    - close match between printed and online versions useful
- Enhanced by special online features
    - string search
    - multiple indices
    - multiple tables of contents
    - tables of figures
    - electronic bookmarks
    - electronic annotations
    - hypertext traversal
    - automatic history keeping
- Most effective if manuals redesigned to fit electronic medium to take advantage of
  - multiple windows
  - text highlighting
  - color

4. Explain seven data types by task taxonomy

Data Types	
1D Linear	Document Lens, SeeSoft, Information Mural, TextArc
2DMap	Geographic information systems, ESRI ArcInfo, ThemeView, newspaper layout, self-organizing maps
3D World	Desktops, WebBook, VRML, Web3D, architecture, computer-assisted design, medicine, molecules
Multidimensional	Parallel coordinates, scattergram matrices, hierarchical clustering, prosection matrices, Visage, Table Lens, InfoZoom
Temporal	Perspective Wall, exploratory sequential data analysis (ESDA), Project Managers, Lifelines, TimeSearcher
Tree	Outliners, Superbook, Degree-of-InterestTrees Cone/CamTrees, Hyperbolic, SpaceTree, treemaps
Network	NetMap, netViz, SemNet, SeeNet, Butterfly
Tasks	
Overview	Gain an overview of the entire collection.
Zoom	Zoom in on items of interest.
Filter	Filter out uninteresting items.
Details-on-demand	Select an item or group and get details when needed.
Relate	View relationships among items.
History	Keep a history of actions to support undo, replay, and progressive refinement.
Extract	Allow extraction of subcollections and of the query parameters.

5. Describe Information visualization challenges

The data type by task taxonomy helps organize our understanding of the range of problems, but there are still many challenges that information-visualization researchers need to face to create successful tools:

- *Import data.* Deciding on how to organize input data to achieve a desired result often takes more thought and work than expected. Then, getting data into the correct format, filtering out incorrect items, normalizing attribute values, and coping with missing data can be burdensome tasks.
- *Combine visual representations with textual labels.* Visual representations are potent, but meaningful textual labels have an important role. Labels should be visible without overwhelming the display or confusing users. Mapmakers have long wrestled with this problem, and their work offers valuable lessons. Often, user-controlled approaches such as ScreenTips and excentric labels can help (Fig. 14.25). (Fekete and Plaisant, 1999)
- *See related information.* Additional information is often needed to make meaningful judgments. Patent lawyers want to see related patents, other filings by the same people, or recent filings by competing companies. Genomics researchers want to see how clusters of genes work in harmony during the phases of cellular processes, and then view similar genes in the Gene Ontology or read research papers on relevant biological pathways. The pursuit of meaning during discovery requires rapid access to rich sources of related information.
- *View large volumes of data.* A general challenge to information visualization is the handling of large volumes of data. Many innovative prototypes can only deal with a few thousand items, or have difficulties maintaining real-time interactivity when dealing with larger numbers of items. Dynamic visualizations showing millions of items (Fig. 14.26) demonstrate that information visualization is not yet close to reaching the limits of human visual abilities, and user-controlled aggregation mechanisms will push the envelope even further (Keim, 2001). Larger displays (Section 9.5.2) can help because additional pixels enable users to see more details, while maintaining a reasonable overview.
- *Integrate data mining.* Information visualization and data mining originated from two separate lines of research. Information-visualization researchers believe in the importance of letting users' visual systems lead them to hypothesis making, while data-mining researchers believe that statistical algorithms and machine learning can be relied on to find interesting patterns. Sometimes consumer purchasing patterns stand Ollt when properly visualized, such as spikes in demand before snowstorms or correlations between beer and pretzel purchases. However, statistical tests can be helpful in finding more subtle trends in consumer desires or demographic linkages for product purchases.

6. Explain five phase frame work to clarify user interface for textual search

Five-phase framework to clarify user interfaces for textual search.

1. *Formulation*
   - Provide access to the appropriate sources in libraries and collections.
   - Use *fields* for limiting the source: structured fields such as year, media, or language, and text fields such as titles or abstracts of documents.
   - Recognize *phrases* to allow entry of names, such as George Washington or Environmental Protection Agency, and concepts, such as abortion rights reform or gallium arsenide.
   - Permit *variants* to allow relaxation of search constraints, such as case sensitivity, stemming, partial matches, phonetic variations, abbreviations, or synonyms from a thesaurus.
   - Control the size of the result set.
2. *Initiation* of *action*
   - Include *explicit actions* initiated by buttons with consistent labels (such as "Search"), locations, sizes, and colors.
   - Include *implicit actions* initiated by changes to a parameter ofthe formulation phase that immediately produce a new set of search results.
3. *Review* of *results*
   - Present explanatory messages.
   - View an overview of the results and previews of items.
   - Manipulate visualizations.
   - Adjustthe size of the result set and which fields are displayed.
   - Change the sequencing (alphabetical, chronological, relevance ranked, and so on).
   - Explore clustering (by attribute value, topics, and so on).
   - Examine selected items.
4. *Refinement*
   - Use meaningful messages to guide users in progressive refinement; for example, if the two words in a phrase are not found near each other, then offer easy selection of individual words or variants.
   - Make changing of search parameters convenient.
   - Explore relevance feedback.
5. *Use*
   - Allow queries, the setting of each parameter, and results to be saved and annotated, sent bye-mail, or used as input to other programs, such as visualization or statistical tools.

7. Compare and contrast Paper versus Online manuals

There are many reasons to have online manuals

a. Physical advantages
b. Navigation features
c. Interactive services
d. Economic advantages

However, these advantages can be compromised by potentially serious negative side effects

e. Displays may not be as readable as paper manuals
f. Each display may contain substantially less information than a sheet of paper
g. The user interface of online help systems may be novel and confusing to novices
h. The extra mental effort required for navigating through many screen may interfere with concentration and learning, and annotation can be difficult
i. Splitting the display between work and help or tutorial windows reduces the space for work displays
j. Small devices such as cell phones do not have enough display space to provide online help

Numerous studies have found 15% to 30% slower task times for comprehension or proofreading of text on computer displays, compared to on paper

Potential Disadvantages in Reading from Displays:

k. Poor fonts, especially on low resolution displays
l. Low contrast between characters and the background
m. Fuzzy character boundaries
n. Emitted light from displays may be more difficult to read by than reflected light from paper
o. Glare may be greater on displays
p. Screen flicker can be a problem
q. Curved display surface may be problem
r. Small displays require more frequent page turning
s. Reading distance can be greater than for paper
t. Displays are fixed in place
u. Display placement may be too high for comfortable reading
v. Layout and formatting problems
w. Reduced hand and body motions with displays as compared to paper may be fatiguing
x. Rigid posture for displays may also be fatiguing
y. Unfamiliarity of displays and the anxiety that the image may disappear can increase stress

8. Discuss Advantages and disadvantages of Direct Manipulation and Indirect Manipulation

What is Direct Manipulation?

Direct manipulation is a human–computer interaction style which involves continuous representation of objects of interest and rapid, reversible, and incremental actions and feedback**.**

Advantages and disadvantages of direct manipulation

Direct manipulation is computer science is a style of human-computer interaction that includes continuous representation of the object of interest and fast, reversible, and incremental actions and feedback. So here this article gives the advantages and disadvantages of Direct manipulation to better understand this topic.

Pros or Advantages of Direct manipulation

1. It is easy to learn and remember.
2. It is easy to retain.
3. Present task concept visually.
4. Permits error avoidance.
5. It is a flexible and reversible action.
6. Low typing requirement.
7. Encourages exploration.
8. High subjective satisfaction.
9. Predictable and controllable.
10. Permits high subjective satisfaction.
11. Instant visual feedback.
12. User learning time is relatively small.
13. User feel in control of the computer and less likely to be intimidated by it

Cons or Disadvantages of Direct manipulation

1. May be hard to code.
2. High resource usage.
3. The requirement for a lot of screen space may be cumbersome.
4. Poing may be slower than typing.
5. May increase difficulty for the visually impaired.
6. May require graphics display and pointing devices.

Indirect Manipulation

- In practice, direct manipulation of all screen objects and actions may not be feasible because of the following:
- The operation may be difficult to conceptualize in the graphical system.
- The graphics capability of the system may be limited.
- The amount of space available for placing manipulation controls in the window border may be limited.
- It may be difficult for people to learn and remember all the necessary operations and actions.
- When this occurs, indirect manipulation is provided. Indirect manipulation substitutes words and text, such as pull-down or pop-up menus, for symbols, and substitutes typing for pointing.

9. Define Interaction Style. List various types of interaction styles in graphical system. Ans Explain each style with appropriate advantages and disadvantages.

Define Interaction Style

Interaction styles are the "bread and butter" of the interface. The concept of Interaction Styles refers to all the ways the user can communicate or otherwise interact with the computer system.

The types of interaction styles mentioned are usually

COMMAND LANGUAGE

Command language is the earliest form of interaction style and is still being used, though mainly on Linux/Unix operating systems. These "Command prompts" are used by (usually) expert users who type in commands and possibly some parameters that will affect the way the command is executed. The following screen dump shows a command prompt - in this case, the user has logged on to a (mail) server and can use the server's functions by typing in commands.

Advantages

- Flexible.
- Appeals to expert users.
- Supports creation of user-defined "scripts" or macros.
- Is suitable for interacting with networked computers even with low bandwidth.

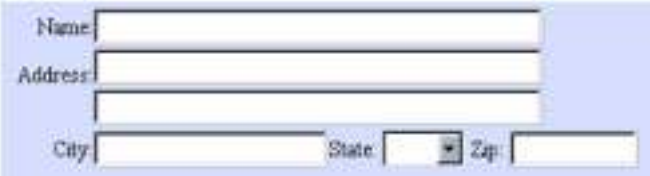
Disadvantages

- Retention of commands is generally very poor.
- Learnability of commands is very poor.
- Error rates are high.
- Error messages and assistance are hard to provide because of the diversity of possibilities plus the complexity of mapping from tasks to interface concepts and syntax.
- Not suitable for non-expert users.

FORM FILLIN

The form fillin interaction style (also called "fill in the blanks") was aimed at a different set of users than command language, namely non-experts users. When form fillin interfaces first appeared, the whole interface was form-based, unlike much of today's software that mix forms

with other interaction styles. Back then, the screen was designed as a form in which data could be entered in the pre-defined form fields. The TAB-key was (and still is) used to switch between the fields and ENTER to submit the form. Thus, there was originally no need for a pointing device such as a mouse and the separation of data in fields allowed for validation of the input. Form fillin interfaces were (and still is) especially useful for routine, clerical work or for tasks that require a great deal of data entry.



Advantages

- Simplifies data entry.
- Shortens learning in that the fields are predefined and need only be 'recognised'.
- *Guides* the user via the predefined rules.

Disadvantages

- Consumes screen space.
- Usually sets the scene for rigid formalisation of the business processes.

MENU SELECTION

A menu is a set of options displayed on the screen where the selection and execution of one (or more) of the options results in a state change of the interface (Paap and Roske-Hofstrand, 1989, as cited in Preece et al. 1994). Using a system based on menu-selection, the user selects a command from a predefined selection of commands arranged in menus and observes the effect. If the labels on the menus/commands are understandable (and grouped well) users can accomplish their tasks with negligible learning or memorisation as finding a command/menu item is a recognition as opposed to recall memory task (see recall versus recognition). To save screen space menu items are often clustered in pull-down or pop-up menus. Some examples of menu selection is shown below.

Advantages

- Ideal for novice or intermittent users.
- Can appeal to expert users if display and selection mechanisms are rapid and if appropriate "shortcuts" are implemented.
- Affords exploration (users can "look around" in the menus for the appropriate command, unlike having to remember the name of a command *and* its spelling when using command language.)
- Structures decision making.
- Allows easy support of error handling as the user's input does not have to be parsed (as with command language).

Disadvantages

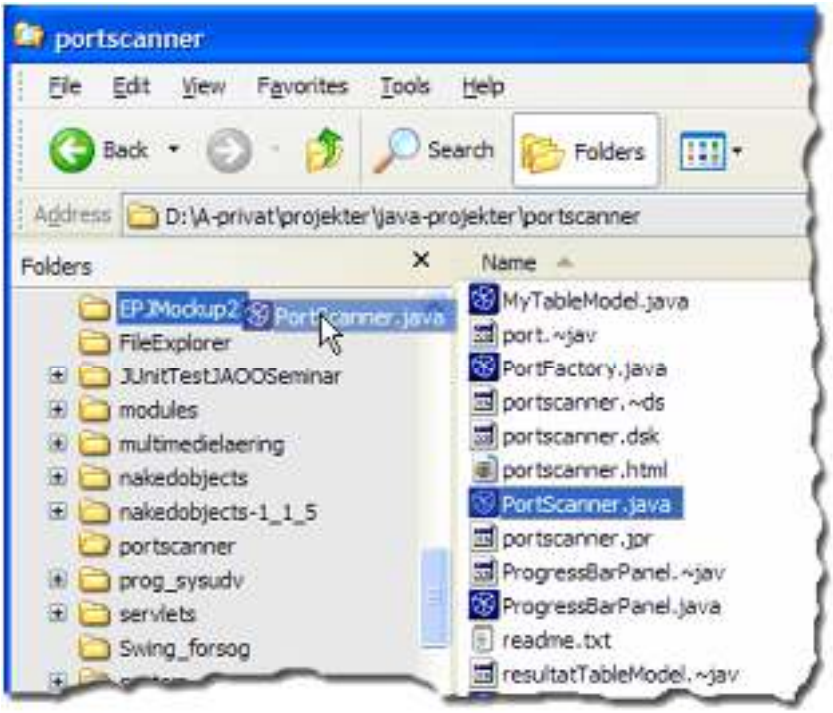
- Too many menus may lead to information overload or complexity of discouraging proportions.
- May be slow for frequent users.
- May not be suited for small graphic displays.

DIRECT MANIPULATION.

Direct manipulation captures the idea of "direct manipulation of the object of interest" which means that objects of interest are represented as distinguishable objects in the UI and are manipulated in a direct fashion.

Direct manipulation systems have the following characteristics:

- Visibility of the object of interest.
- Rapid, reversible, incremental actions.
- Replacement of complex command language syntax by direct manipulation of the object of interest.



Advantages

- Visually presents task concepts.
- Easy to learn.
- Errors can be avoided more easily.
- Encourages exploration.
- High subjective satisfaction.
- Recognition memory (as opposed to cued or free recall memory)

Disadvantages

- May be more difficult to programme.
- Not suitable for small graphic displays.
- Spatial and visual representation is not always preferable.
- Metaphors can be misleading since the "the essence of metaphor is understanding and experiencing one kind of thing in terms of another" (Lakoff and Johnson 1983: p. 5), which, by definition, makes a metaphor different from what it represents or points to.
- Compact notations may better suit expert users.

10.Explain types of Graphical Menus in detail with example and Explain the guideline for form fill in.

There are many different kinds of graphical menus available. The various kinds of graphical menus are

1.Menu Bar
2.Pull-Down Menus
3.Cascading Menus
4.PopUp Menus
5.Tear Off Menus
6.Iconic Menus
7.Pie Menus

1.Menu Bar:

The highest level graphical system menu is commonly called the menu bar.The Menu bar consists of a series of textual words or buttons.These are used to represent the application alternatives or choices to the user.All primary window must have a menu bar.All menu bars must have an associated pull down menu which containing atleast 2 choices.It does not allows the user to turn off the display of the menu bar.The window title will be the menu bar title.It do not display choices that are never available to the user.It separate the bar from the remainder of the screen by a different background.They require the moving pointer from the main working area to select the choices.It consumes a full row of screen space.It usually do not hidden the screen working area.This is called Menu Bar.

2.Pull-Down Menus:

These are the first level menus which is used to provide access to the common and most frequently used application actions that take place on a wide variety of different windows.These are a smaller number of items.No window space is consumed when they are not used.These menus are easy to browse.The items are smaller than full sized buttons.It displays all possible alternatives.Each consists of atleast 2 choices.Title is not necessary for a pull down menu.If a pull down choice leads to another pull down,then it provide a cascade indicator to denote it.This is called Pull-Down Menus.

3.Cascading Menus:

A cascading menu is a sub menu which is derived from a higher level menu,most typically a pull down menu.It don not exceed 3 menu levels that is 2 cascades.This is called Cascading menus.

4.Popup Menus:

The choices may be presented to the user on the screen through popup menus.These menus appear in the working area.They do not use window space when not displayed.No pointer movement is needed if selected by button.They require a special action to see the menu.Their display location may not be consistent.This is called Popup Menus.

5.Tear Off Menus:

A tear off menu is a pull down menu that can be positioned any where on the screen.It possess all the characteristics of a pull down.It require extra steps to retrieve.It hides the screen working area.This is called Tear off menus.

6.Iconic Menus:

It is the picture of menu items or objects in a graphic form.The purpose of an iconic menu is to remind users of the functions,commands,attributes or application choices available.Icons must be meaningful and clear.This is called Iconic Menus.

7.Pie Menus:

A pie menu is a circular representation of menu items.It can be used as a alternative for pull down menu or popup menus.This is called pie menus.

This article is very useful for computer science engineering students.

Form Fillin

- Appropriate when many fields of data must be entered:
  - Full complement of information is visible to user.
  - Display resembles familiar paper forms.
  - Few instructions are required for many types of entries.
- Users must be familiar with:
  - Keyboards
  - Use of TAB key or mouse to move the cursor
  - Error correction methods
  - Field-label meanings
  - Permissible field contents
  - Use of the ENTER and/or RETURN key.

- **Form-Fillin Design Guidelines**
  - Meaningful title
  - Comprehensible instructions
  - Logical grouping and sequencing of fields
  - Visually appealing layout of the form
  - Familiar field labels
  - Consistent terminology and abbreviations
  - Visible space and boundaries for data-entry fields
  - Convenient cursor movement
  - Error correction for individual characters and entire fields
  - Error prevention
  - Error messages for unacceptable values
  - Optional fields clearly marked
  - Explanatory messages for fields
  - Completion signal
  - Order the Form Logically and Only Ask What's Required
  - Present Fields in a Single Column Layout
  - Minimize the Number of Input Fields and User Typing Effort

- Match Fields to the Size of the Input
- Place Labels Above the Corresponding Input Felds
- Use Forgiving Formatting
- Don’t Use Placeholder Text as Input Field Label
- Distinguish Optional And Required Fields
- Avoid ‘Reset’ Button
- Provide Highly Visible and Specific Error Messages

- **Format-specific field**
  - **Coded fields**
    - Telephone numbers
    - Social-security numbers
    - Times
    - Dates
    - Dollar amounts (or other currency)
- **Dialog Boxes**
  - Combination of menu and form-fillin techniques.
  - Internal layout guidelines:
    - Meaningful title, consistent style
    - Top-left to bottom-right sequencing
    - Clustering and emphasis
    - Consistent layouts (margins, grid, white space, lines, boxes)
    - Consistent terminology, fonts, capitalization, justification
    - Standard buttons (OK, Cancel)
    - Error prevention by direct manipulation

	PART III			
5.	Explain types of Graphical Menus in detail with example and Explain the guideline for form fill in.	[10]	CO5	L2
	OR			
6.	Explain five phase frame work to clarify user interface for textual search	[10]	CO4	L1
	PART IV			
7.	Compare and contrast Paper versus Online manuals	[10]	CO4	L1
	OR			
8.	Discuss Advantages and disadvantages of Direct Manipulation and Indirect Manipulation	[10]	CO3	L2
	PART V			
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	OR			
10	Explain Visualization components and work flow in details	[10]	CO4	L2

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