Systems Analysis and Design

Alan Dennis, Barbara Wixom, and David Tegarden

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Slides by Fred Niederman

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Objectives

- Understand several fundamental user interface design principles.
- Understand the process of user interface design.
- Understand how to design the user interface structure.
- Understand how to design the user interface standards.
- Understand commonly used principles and techniques for navigation design.
- Understand commonly used principles and techniques for input design.
- Understand commonly used principles and techniques for output design.
- Be able to design a user interface.

Principles for User Interface Design

Principles

Principle	Description
Layout	The interface should be a series of areas on the screen that are used consistently for different purposes—for example, a top area for commands and navigation, a middle area for information to be input or output, and a bottom area for status information.
Content awareness	Users should always be aware of where they are in the system and what information is being displayed.
Aesthetics	Interfaces should be functional and inviting to users through careful use of white space, colors, and fonts. There is often a tradeoff between including enough white space to make the interface look pleasing without losing so much space that important information does not fit on the screen.
User experience	Although ease of use and ease of learning often lead to similar design decisions, there is sometimes a tradeoff between the two. Novice users or infrequent users of software will prefer ease of learning, whereas frequent users will prefer ease of use.
Consistency	Consistency in interface design enables users to predict what will happen before they perform a function. It is one of the most important elements in ease of learning, ease of use, and aesthetics.
Minimal user effort	The interface should be simple to use. Most designers plan on having no more than three mouse clicks from the starting menu until users perform work.

User Interface Design Process

Chapter 12

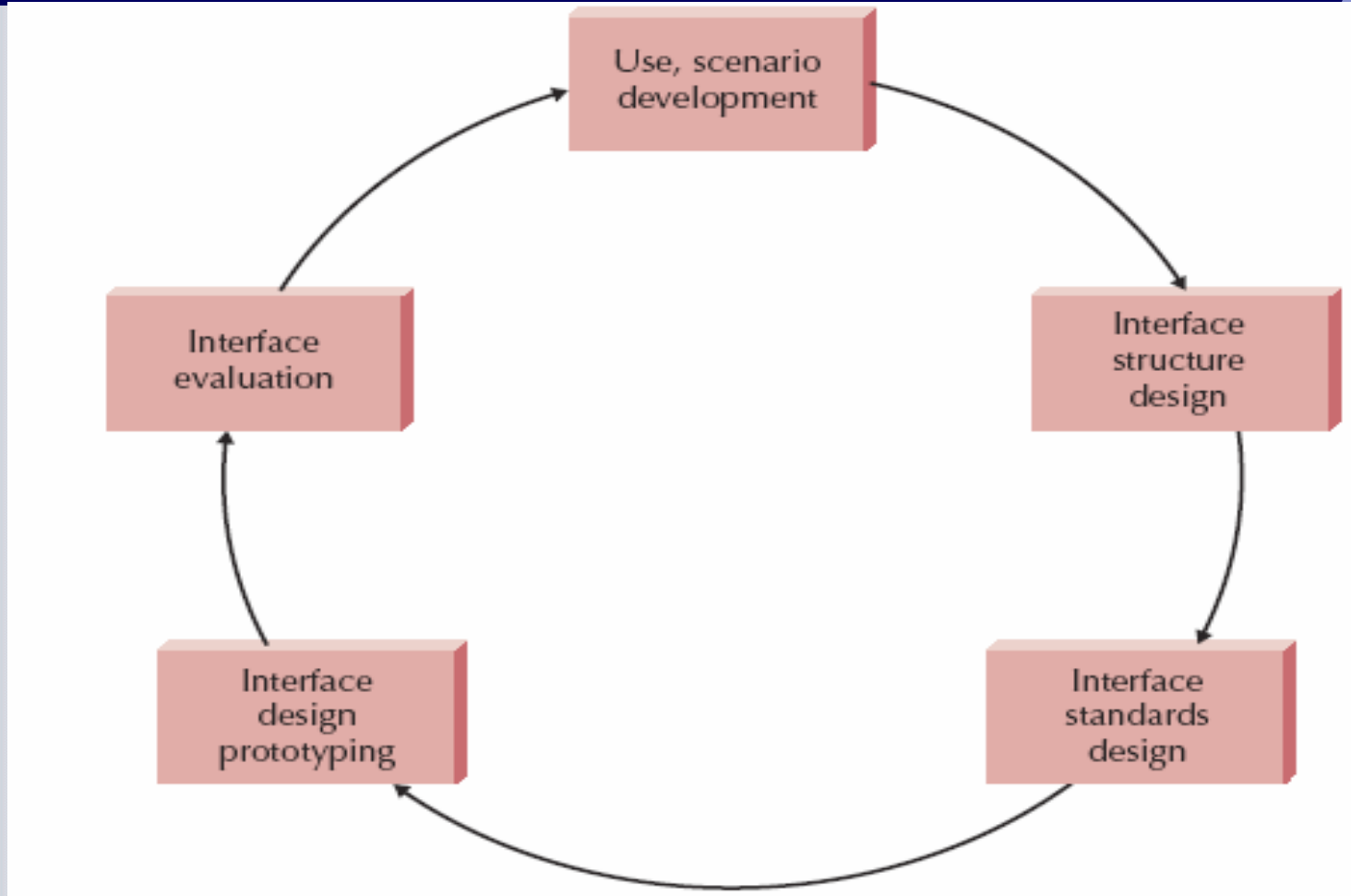
Key Definitions

- The navigation mechanism provides the way for users to tell the system what to do
- The input mechanism defines the way the system captures information
- The output mechanism defines the way the system provides information to users or other systems

Key Definitions

- The graphical user interface (GUI) is the most common type of interfaces most students are likely to use personally and for developing systems.

Use Scenario Development



Window Navigation Diagram

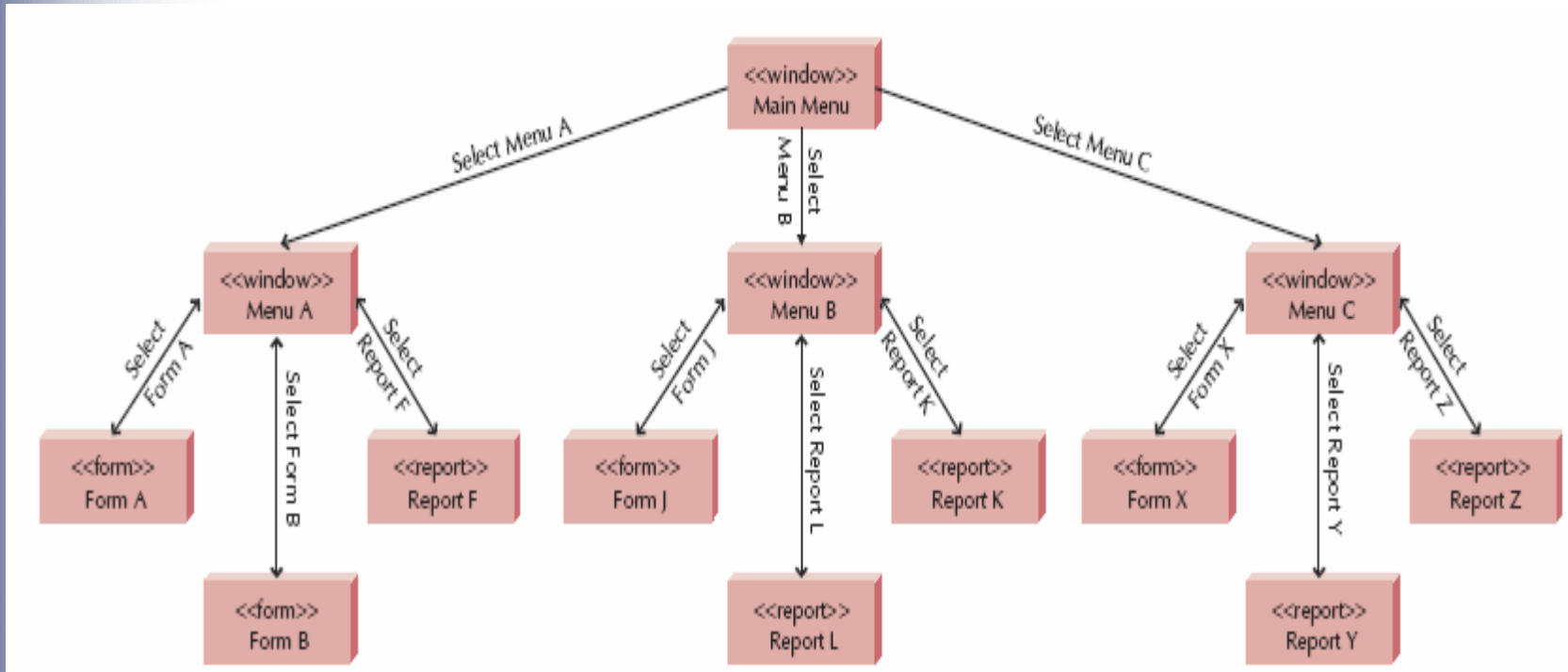


FIGURE 12-7 An Example Window Navigation Diagram

Interface Standards Design

- The *interface standards* are the basic design elements that are common across the individual screens, forms, and reports within the system.

Interface Design Prototyping

- Storyboard
- HTML Prototype
- Language Prototype
- Interface Evaluation
  - Heuristic
  - Walkthrough
  - Interactive
- Formal Usability Testing

NAVIGATION DESIGN

Basic Principles

- Assume users
  - Have not read the manual
  - Have not attended training
  - Do not have external help readily at hand
- All controls should be clear and understandable and placed in an intuitive location on the screen.

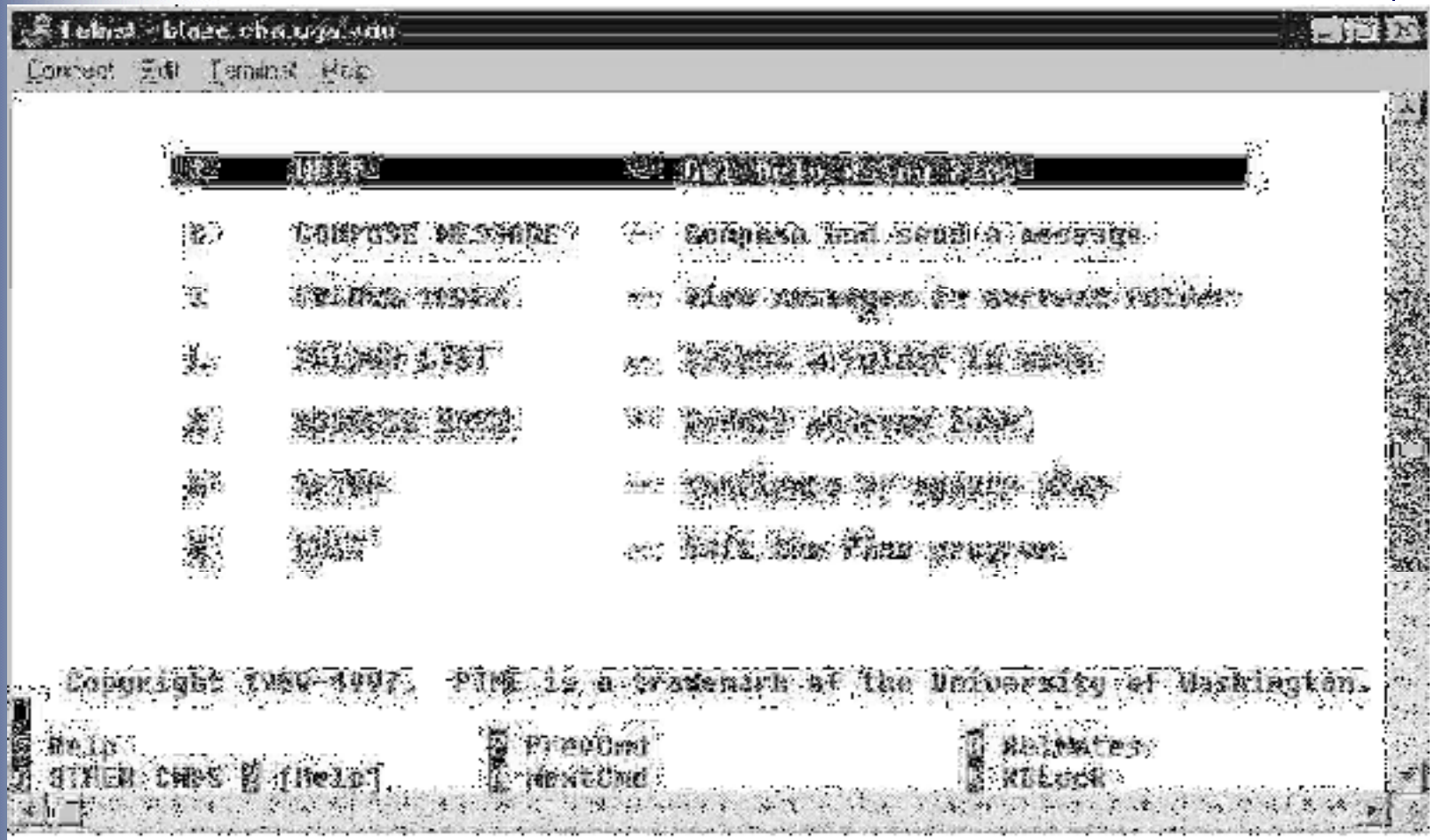
Basic Principles

- Prevent mistakes
  - Limit choices
  - Never display commands that can't be used (or "gray them out")
  - Confirm actions that are difficult or impossible to undo
- Simplify recover from mistakes
- Use consistent grammar order

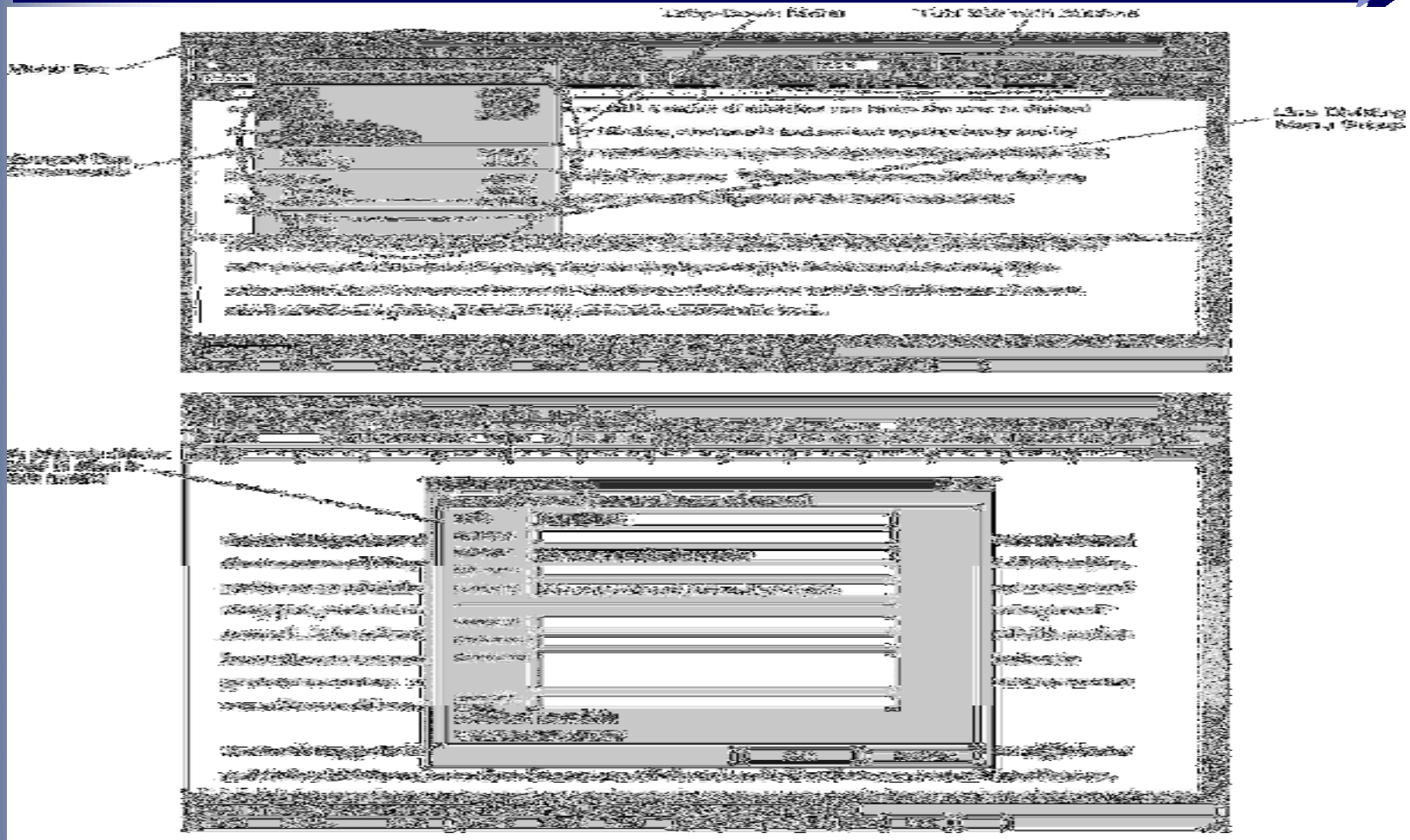
Types of Navigation Control

- Languages
  - Command language
  - Natural language
- Menus
  - Generally aim at broad shallow menu
  - Consider using "hot keys"
- Direct Manipulation
  - Used with icons to start programs
  - Used to shape and size objects
  - May not be intuitive for all commands

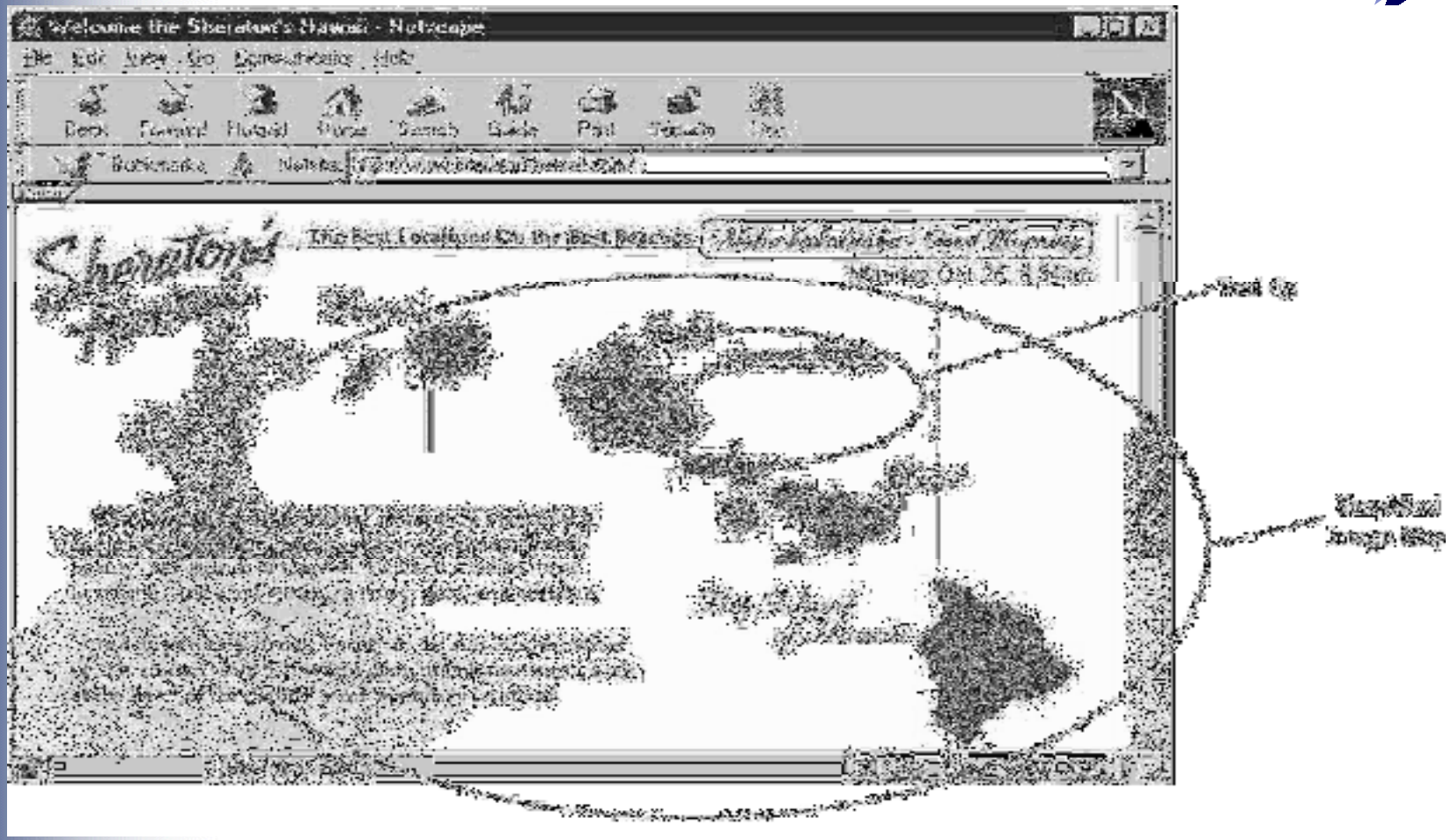
A Traditional Menu in a UNIX System



Common Types of Menus



Example of an Image Map



Types of Menus

Types of Menus	
Menu bar Drop-down menu Pop-up menu Tab menu Toolbar Image map	***When Would You Use Each of These Menu Types?***

Message Tips

- Should be clear, concise, and complete
- Should be grammatically correct and free of jargon and abbreviations (unless they are the users)
- Avoid negatives and humor

Types of Messages

Types of Messages	
Error message Confirmation message Acknowledgment message Delay message Help message	***When Would You Use Each of These Message Types?***

An Example of Crafting an Error Message

Your Turn

- Pretend that you are designing the new interface to a career services system at your university.
- How would you incorporate the basic principles of input design into your interface design?

INPUT DESIGN

Basic Principles

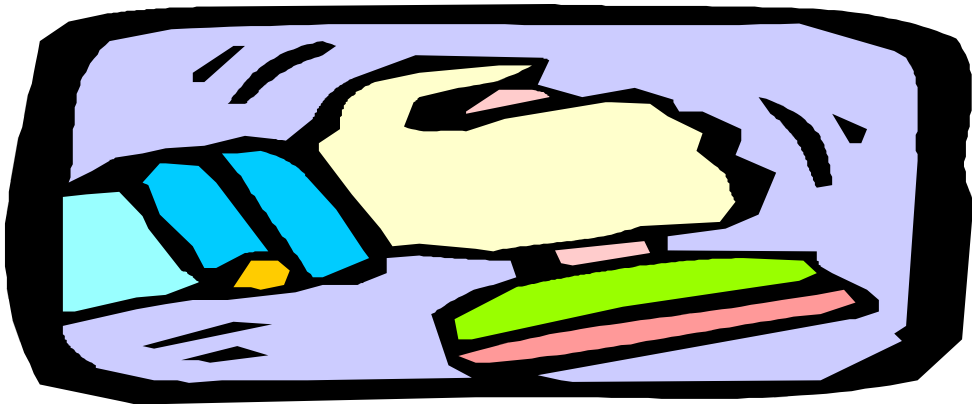
- The goal is to simply and easily capture accurate information for the system
- Reflect the nature of the inputs
- Find ways to simplify their collection

Online versus Batch Processing

- Online processing immediately records the transaction in the appropriate database
- Batch processing collects inputs over time and enters them into the system at one time in a batch
- Batch processing simplifies data communications and other processes, but means that inventory and other reports are not accurate in real time

Capture Data at the Source

- Reduces duplicate work
- Reduces processing time
- Decreases cost
- Decreases probability of error



Source Data Automation

- Can be obtained by using the following technologies:
  - bar code readers
  - optical character recognition
  - magnetic stripe readers
  - smart cards
- ***How can internet be used for source data automation?***

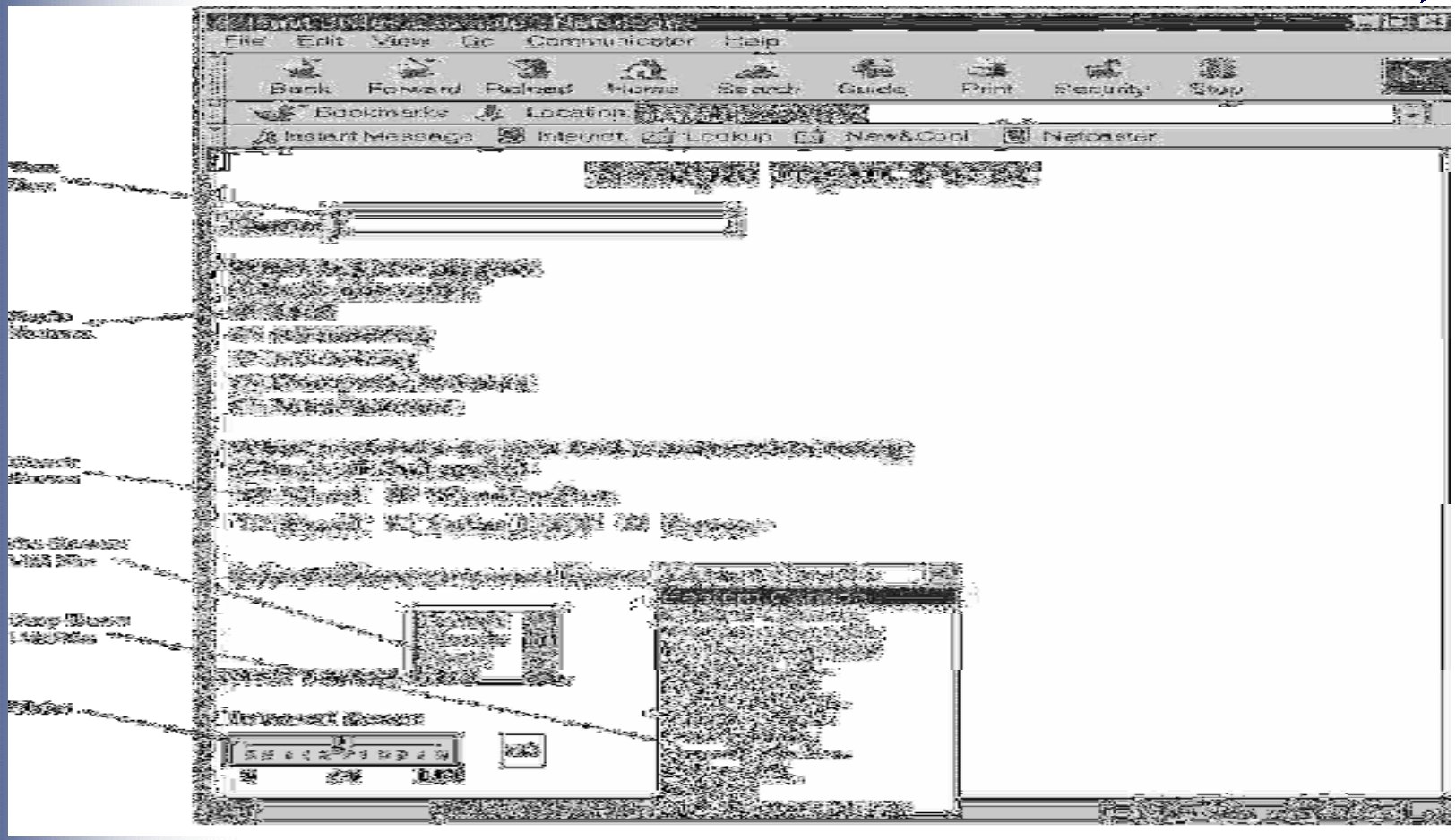
Minimize Keystrokes

- Never ask for information that can be obtained in another way
- List selection is more efficient than entering information
- Use default values where possible

Types of Inputs

- Data items linked to fields
- Text
- Numbers
- Selection boxes

Types of Input Boxes



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Types of Selection Boxes

Types of Boxes	
Check box Radio button On-screen list box Drop-down list box Combo box Slider	***When Would You Use Each of These Box Types?***

Types of Input Validation

Types of Validation	
Completeness check Format check Range check Check digit check Consistency check Database checks	***When Would You Use Each of These Validation Methods?***

Your Turn

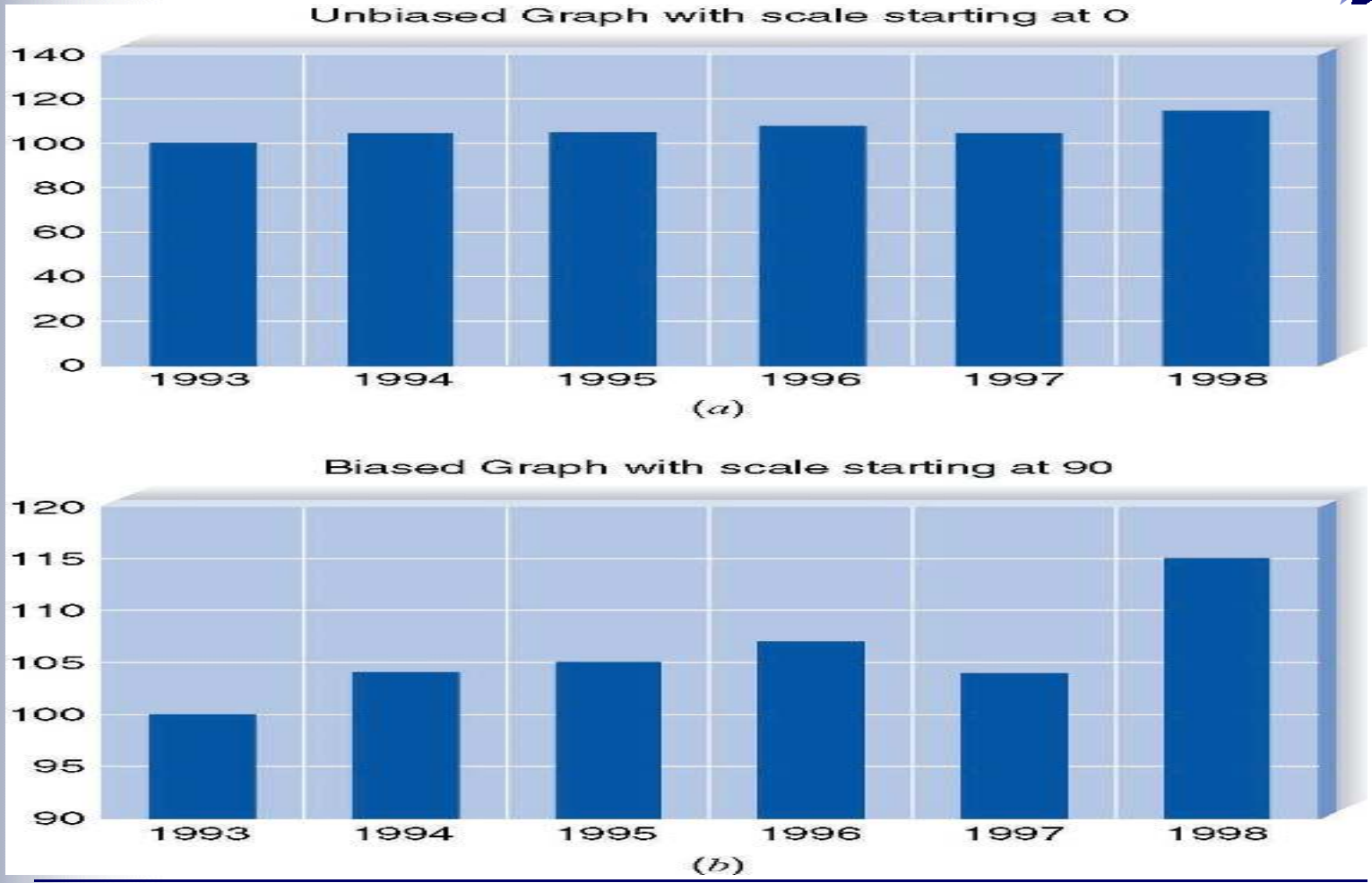
- Consider a Web form that a student would use to input student and resume information into a career services application.
  - Sketch out how this form would look and what data fields would be used
  - What validity checks would you need?

OUTPUT DESIGN

Basic Principles

- Understand report usage
  - Reference or cover-to-cover?
  - Frequency?
  - Real-time or batch reports?
- Manage information load
  - All needed information, no more
- Minimize bias

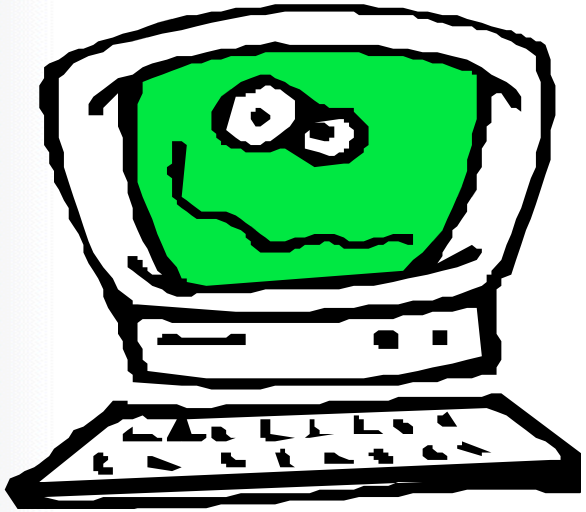
Bias in Graphs



Types of Reports

Types of Reports	
Detail reports Summary report Turnaround document Graphs	***When Would You Use Each of These Report Types?***

Report Media



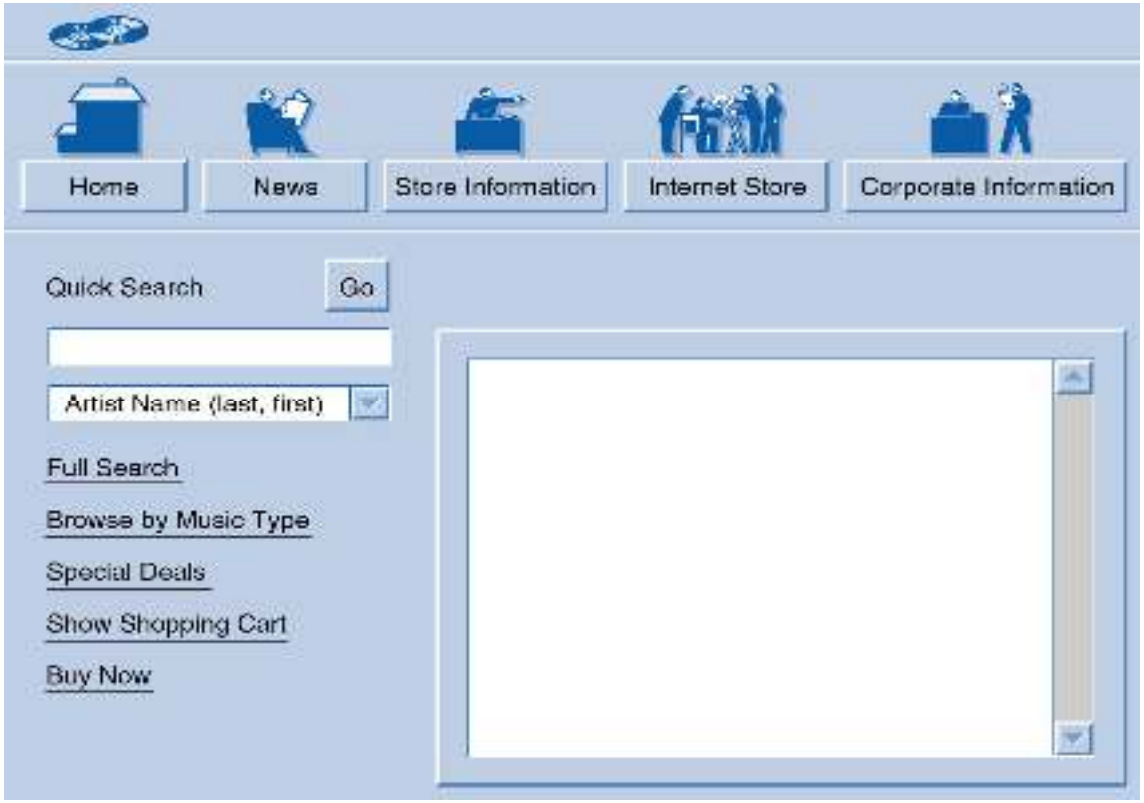
Electronic

Versus Paper

Your Turn

- Under what conditions would you be most likely to replace reports on paper with ones delivered electronically? When might you NOT want to make the change?

CD Selections



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CD Selections

(a)

(b)

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Summary

- The fundamental goal of navigation design is to make the system as simple to use as possible
- The goal of input mechanism is to simply and easily capture accurate information
- The goal of the output mechanism is to provide accurate information to users that minimize information overload and bias

Expanding the Domain

- For many years, the University of Maryland has been a leader in research for ideas in human-computer interfaces. For more information investigate:
- *http://www.cs.umd.edu/hcil/*