

# **Systems Analysis and Design**

**5th Edition**

## **Chapter 9. User Interface Design**

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# Chapter 9 Outline

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- Principles of user interface design.
- User interface design process.
- Navigation design.
- Input design.

# INTRODUCTION

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- **Interface design** is the process of defining how the system will interact with external entities.
- In this chapter, we focus on the design of ***user interfaces*** – how the system will interact with the **users**.
- The design of **system interfaces** defines how the systems exchange information

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- The user interface includes three fundamental parts:
  - The **Navigation mechanism** - the way in which the user tells the system what to do.
  - The **input mechanism** – the way in which the system captures information.
  - The **output mechanism** - the way in which the system provides information to the user or to other systems.
- **Graphical user interfaces (GUI)** use windows, menus, icons, etc., and are the most common type of user interfaces.

# PRINCIPLES FOR USER INTERFACE DESIGN

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- User interface design is an art.
- The goal is to make the interface pleasing to the eye and simple to use, while minimizing the user's effort.



## 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 trade-off between including enough white space to make the interface look pleasing and 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 trade-off 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.
Minimize 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.

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**System Navigation**

**Site Navigation**

**Page Navigation**

**Status bar**

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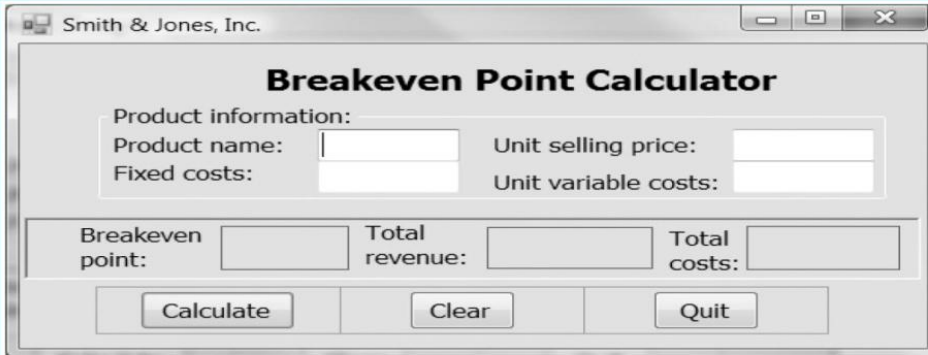
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# Consistency

The flow between sections should also be consistent.



Smith & Jones, Inc.

### Breakeven Point Calculator


Product information:

Product name:	<input type="text"/>	Unit selling price:	<input type="text"/>
Fixed costs:	<input type="text"/>	Unit variable costs:	<input type="text"/>

Breakeven point:	<input type="text"/>	Total revenue:	<input type="text"/>	Total costs:	<input type="text"/>
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Calculate Clear Quit

(a) Horizontal Flow



Smith & Jones, Inc.

### Breakeven Point Calculator

Product information:

Product name:

Unit selling price:

Fixed costs:

Unit variable costs:

Breakeven point:

Total revenue:

Total costs:

Calculate

Clear

Quit

(b) Vertical Flow

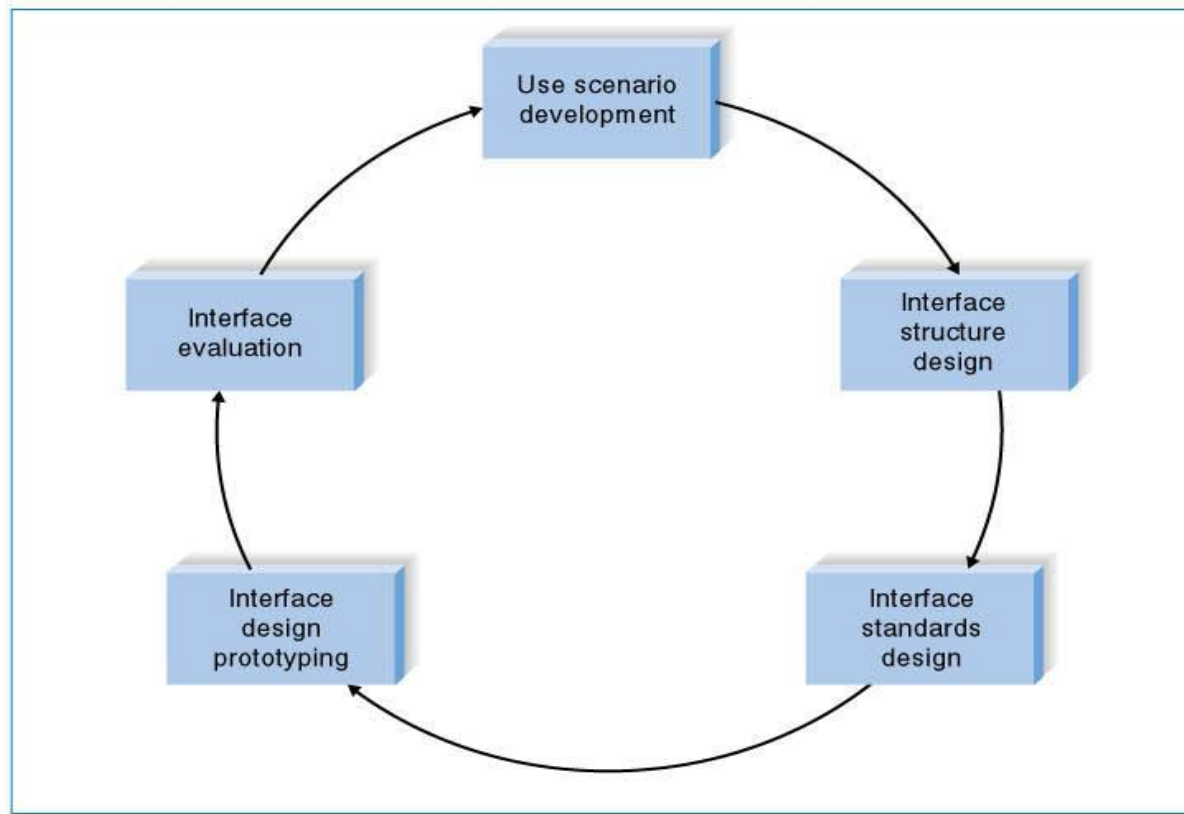


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# USER INTERFACE DESIGN PROCESS

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- **User interface design** is a five-step process that is iterative.



# Use Scenario Development

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- A *use scenario* is an outline of steps that users perform to accomplish some part of their work.
- Use scenarios are presented in a simple narrative description that is tied to the DFD.

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## Use Scenario: The Browsing Shopper

User is not sure what they want to buy and will browse through several tunes.

1. User may search for a specific artist or browse through a music category (1.2).
2. User will likely read the basic information for several tunes, as well as the marketing material for some. He or she will likely listen to music samples and browse related tunes (1.3).
3. User will put the tune in the shopping cart (1.3) and will continue browsing (1.2).
4. Eventually, the user will want to purchase the download, but will probably want to look through the shopping cart, possibly discarding some tunes first (1.3).

## Use Scenario: The Hurry-up Shopper

User knows exactly what he or she wants and wants it quickly.

1. User will search for a specific artist or tune (1.2).
2. User will look at the price and enough other information to confirm that the tune is the desired tune (1.3).
3. User will want to buy the download (process 2) or move on to other Web sites.

The numbers in parentheses refer to process numbers in the DFD.

# Interface Standards Design

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- The interface standards are the basic design elements that are common across the individual screens, forms, and reports within the system.
- The *interface template* defines the general appearance of all screens and the paper-based forms and reports.

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- The template specifies the names that the interface will use for the major *interface objects*, the fundamental building blocks of the system.
- The template gives names to the most commonly used *interface actions*.
- The interface objects and actions, and also their status, may be represented by *interface icons*.

# Interface Design Prototyping

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- An **interface design prototype** is a mock-up or a simulation of a computer screen, form, or report.
- Common approaches to interface design prototyping:
  - **Storyboards**
  - HTML prototypes
  - Language prototypes.



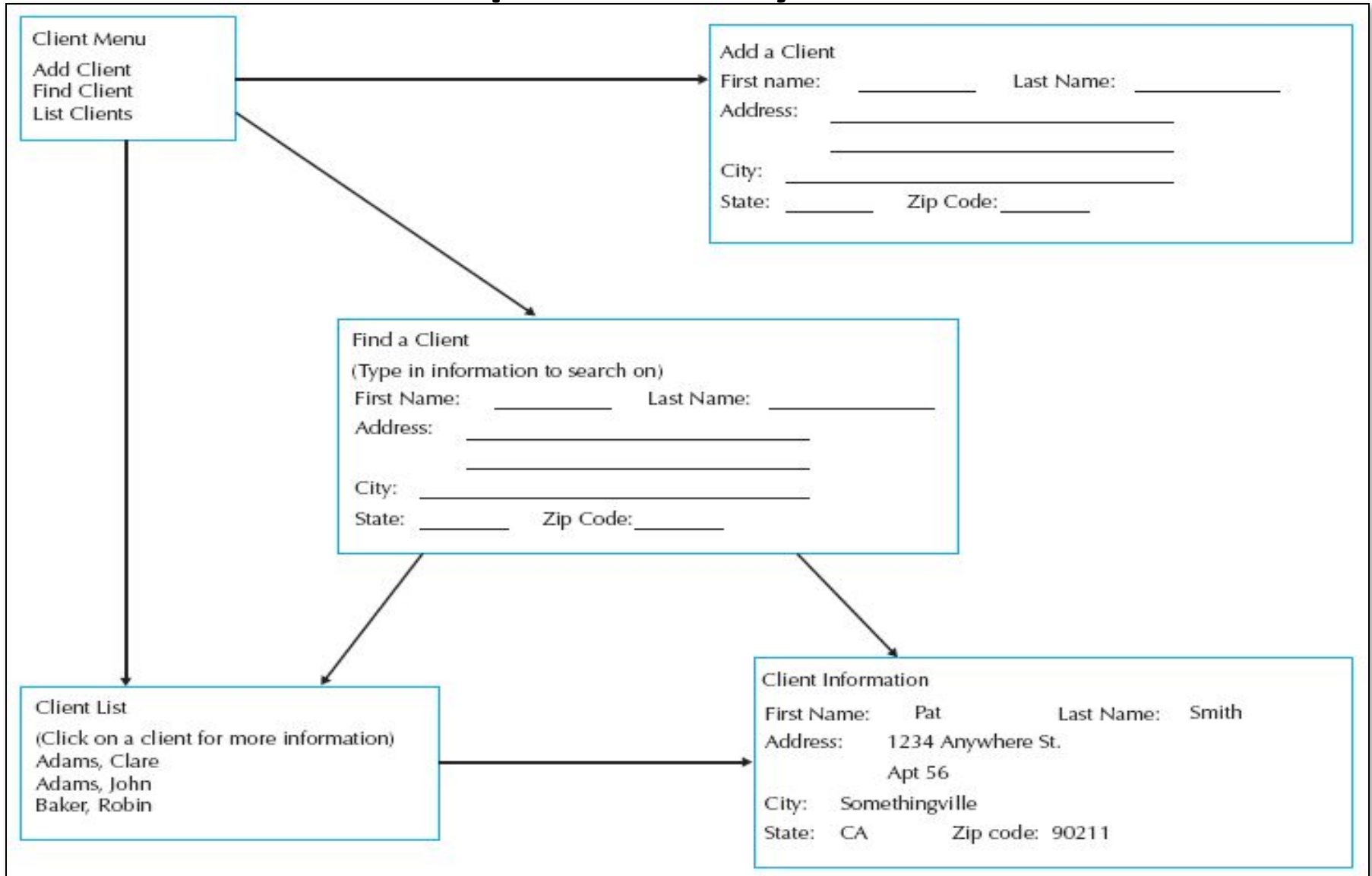
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- The *storyboard* shows hand-drawn pictures of screens.
- An *HTML prototype* is built with the use of Web pages created in HTML
- A *language prototype* is an interface design prototype built in the actual language or by the actual that will be used to build the system.



# Sample Storyboard



# Interface Evaluation

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- The objective of interface evaluation is to understand how to improve the interface design.
- There are four common approaches to interface evaluation.
  1. **Heuristic evaluation** - Compare the interface to a checklist of design principles.
  2. **Walk-through evaluation** - It is a meeting conducted with the users to walk through the interface.
  3. **Interactive evaluation** - Users try out the interface.
  4. **Formal usability testing** - It is a formal testing process to understand how usable the interface is.

# NAVIGATION DESIGN

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## ■ Basic Principles

- Analysts usually must assume that users have not read the manual, have not attended training, and do not have external help readily at hand.
- All controls should be clear and understandable and placed in an intuitive location on the screen.

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- **Prevent Mistakes** - The first of principle of designing navigation control is to prevent users from making mistakes.
  - Labeling commands appropriately and limiting choices.
  - Confirming with the user that the actions are difficult or impossible to undo.
- **Simplify Recovery from Mistakes** – making “undo” buttons whenever possible.
- **Use Consistent Grammar Order** – Windows application uses an *object-action* grammar order

# Window Navigation Diagram

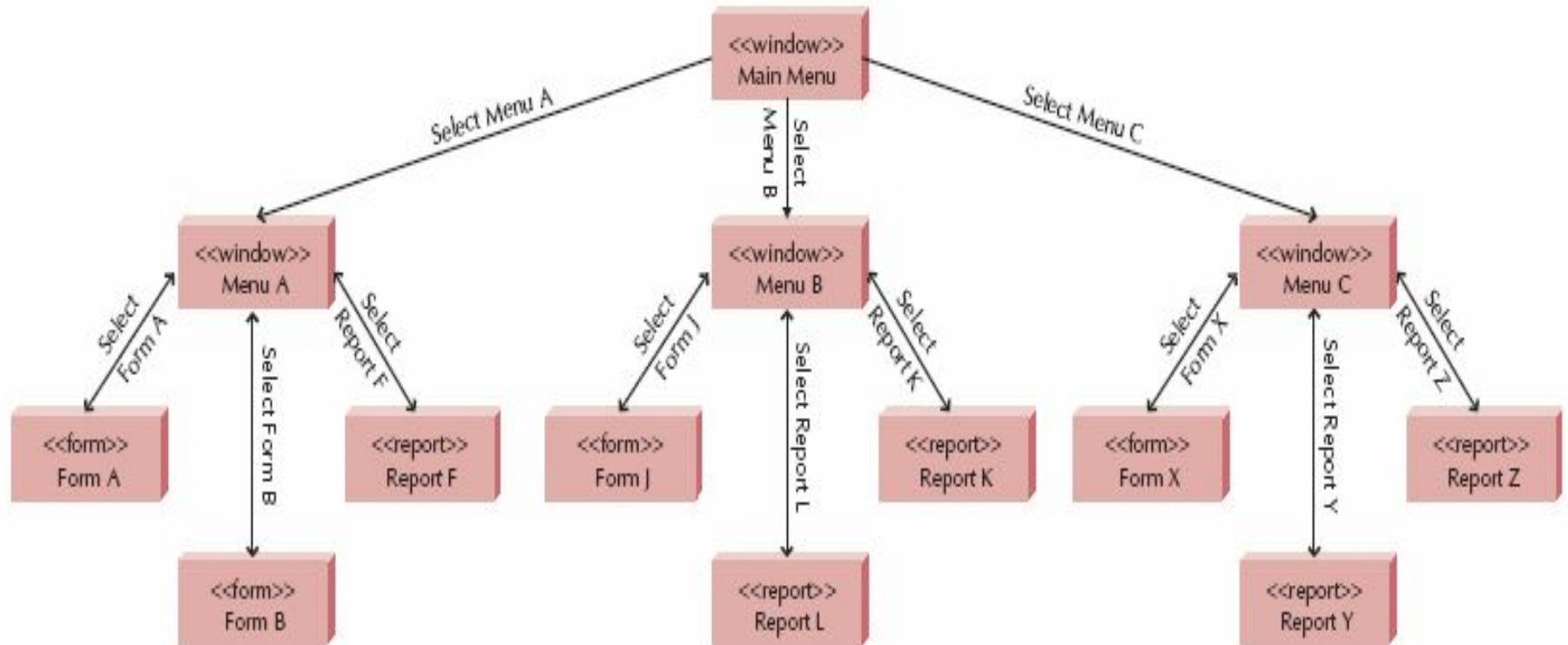
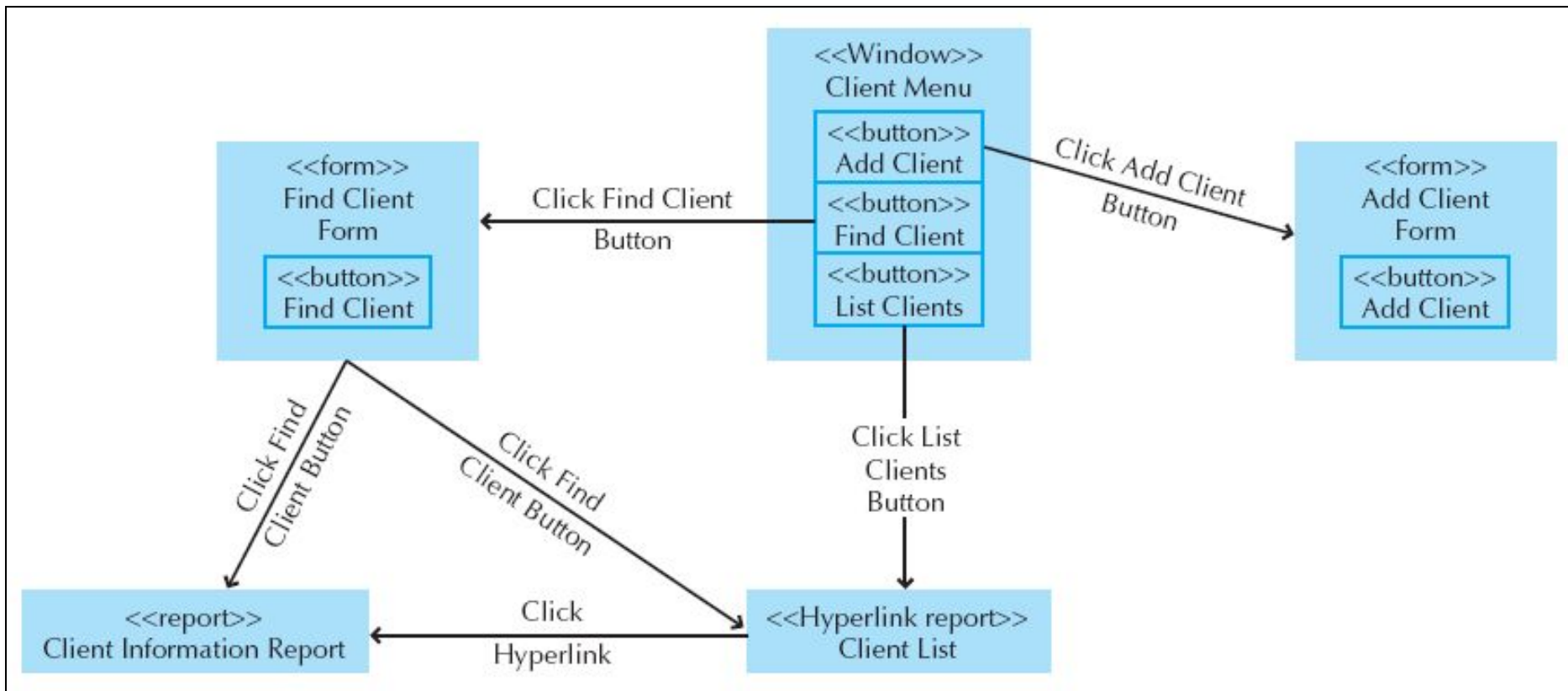


FIGURE 12-7 An Example Window Navigation Diagram

# Sample WND



# INPUT DESIGN

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- Input mechanisms facilitate the entry of data into the computer system.
- Input design means designing the screen used to enter information and forms on which the users write and type information.
- The goal of input design is to capture accurate information for the system simply and easily.

# Types of Inputs

**Input Choices**

Name:

Select your major:

- ☐ Accounting
- ☒ MIS
- ☐ Finance
- ☐ Marketing

Select all software in which you are proficient:

- ☒ Word
- ☒ Excel
- ☒ Access
- ☒ Powerpoint
- ☐ Visio
- ☒ Visual Basic

Select your eye color:

- Brown
- ☒ Blue
- Green
- Hazel

Select the region in which you were born:

- Central U.S.
- Eastern Canada
- Central Canada
- Western Canada
- Northern Canada
- Eastern U.S.
- Central U.S.**
- Western U.S.
- Northern U.S.
- Hawaii, Alaska
- Other U.S. Territories
- Mexico
- Non-North America

Average proficiency score:



# Minimize Keystrokes

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- Keystrokes cost time and money.
- The system should never ask for information that can be obtained in another way (e.g., by retrieving it from a database).
- The system should not require a user to type information that can be selected from a list.
- The frequent values should be used as the

# OUTPUT DESIGN

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- Outputs are the reports that the system produces, whether on the screen, on paper, or in other media, such as the Web.
- Outputs are the most visible part of any system.

# Basic Principles

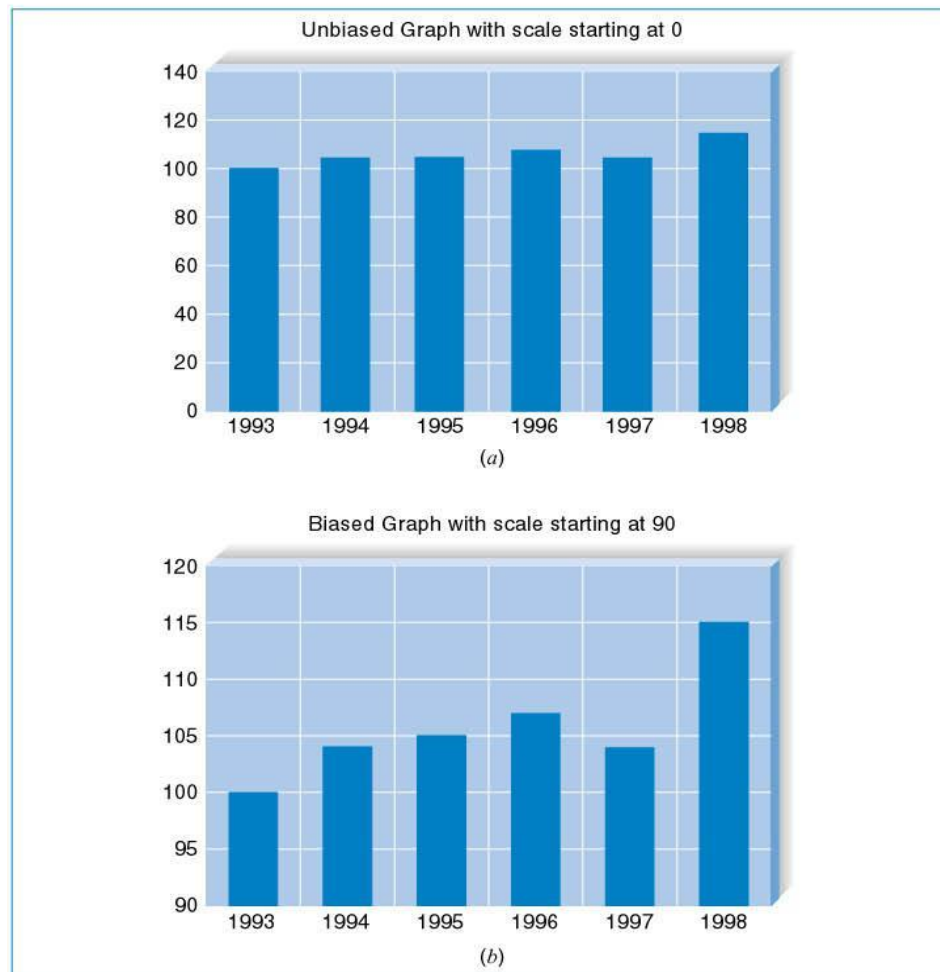
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- The goal of the output mechanism is to present information to users so that they can accurately understand it with the least effort.
- **Understand report usage** – the first principle in designing reports is to understand how they are used.
- **Manage information load** – the goal of a well-designed report is to provide all needed information without information overload.

- **Minimize bias** – no analyst sets out to design a

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- Example of bias: Bias in graphs.



# SUMMARY

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- **User interface design** principles
  - Layout, content awareness, aesthetics, user experience, consistency, minimize user effort.
- The user interface design process
  - Use scenario development, interface structure design, interface standards design, interface design prototyping, and interface evaluation.

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## ■ Navigation design

- The fundamental goal of navigation design is to make the system as simple to use as possible.

## ■ Input design

- The goal of input design is to simply and easily capture accurate information for the system.

## ■ Output design

- The goal of the output design is to present information to users so that they can accurately understand it with the least effort.