



西安电子科技大学
XIDIAN UNIVERSITY

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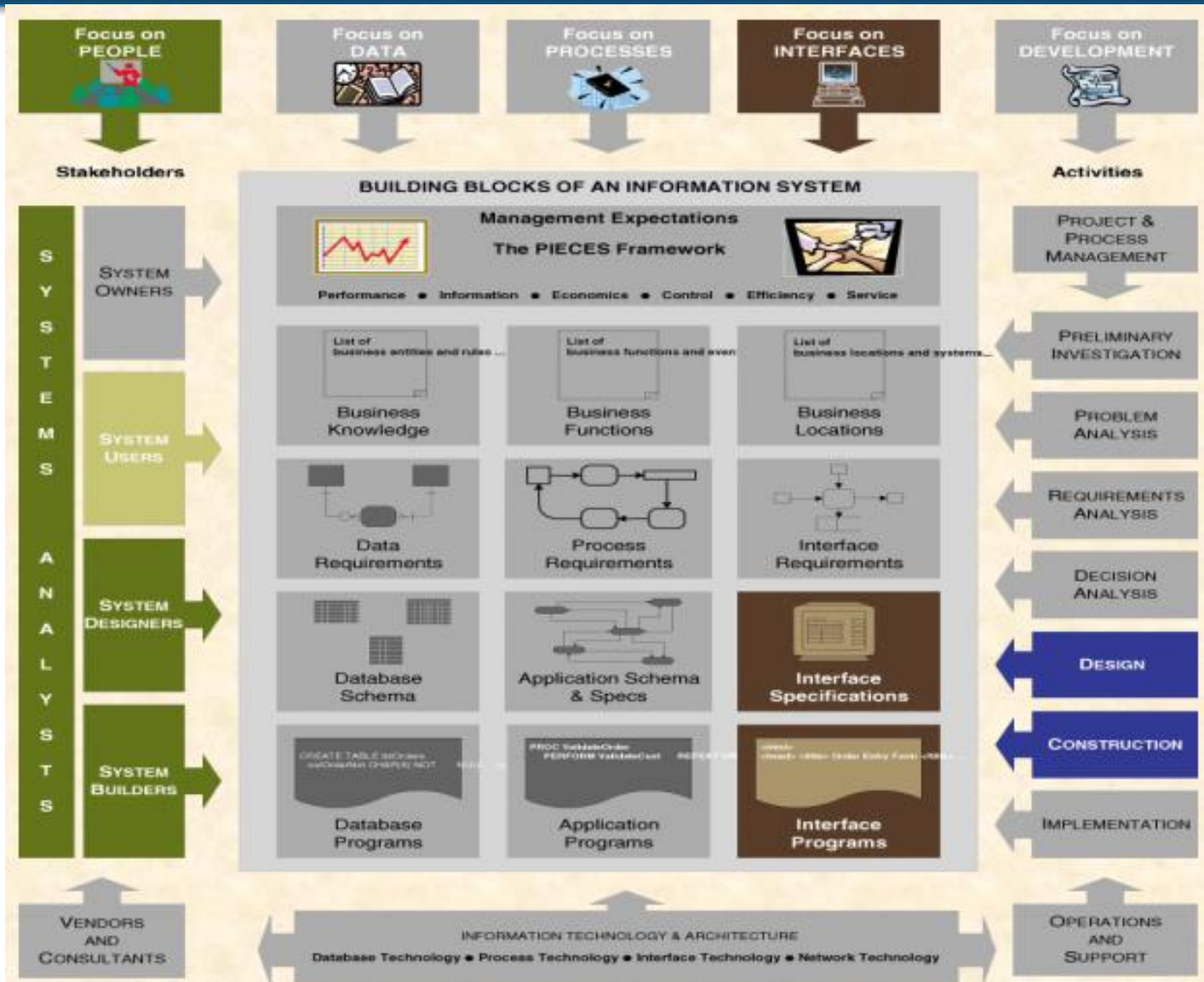
系统分析与设计 (SYSTEM ANALYSIS AND DESIGN)

User Interface Design

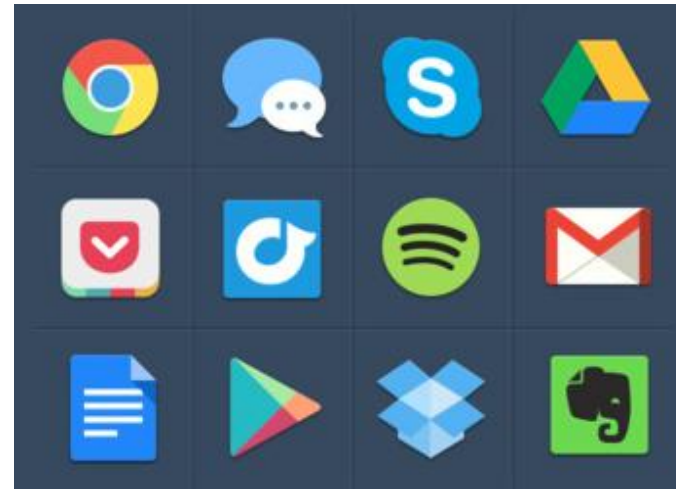
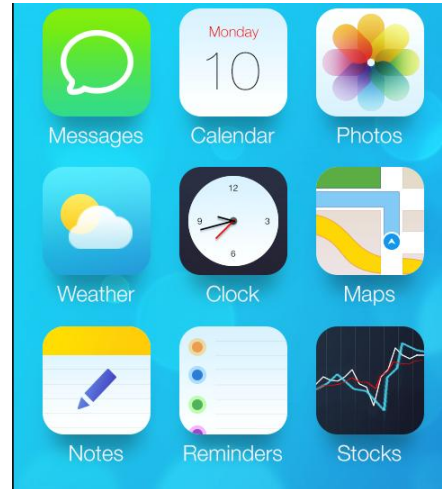
Content Structure

- ✿ User Interface Design Concepts and Guidelines
 - 用户的类别；人的因素；人机工程的原理。
- ✿ User Interface Technology
 - 系统对人机界面的支持。
- ✿ Graphical User Interface Styles and Considerations
 - 不同类别的典型 GUI 风格；人机界面设计所需要考虑的问题。
- ✿ How to Design and Prototype a User Interface?
 - 工具；设计过程。

Chapter Map

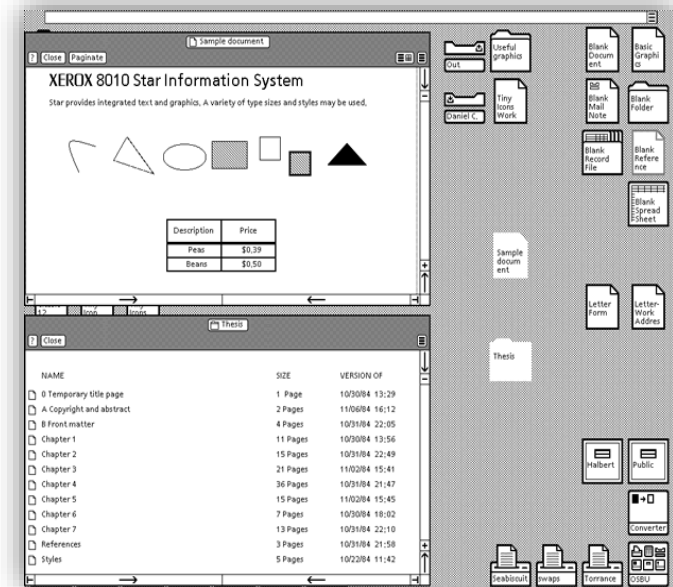
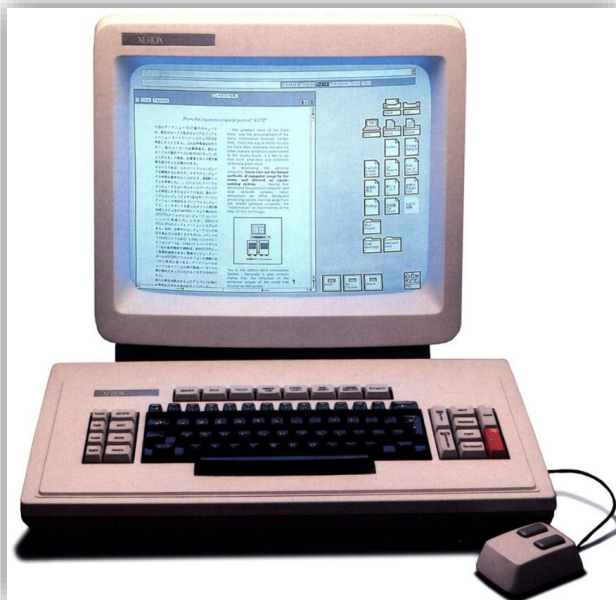


User Interface

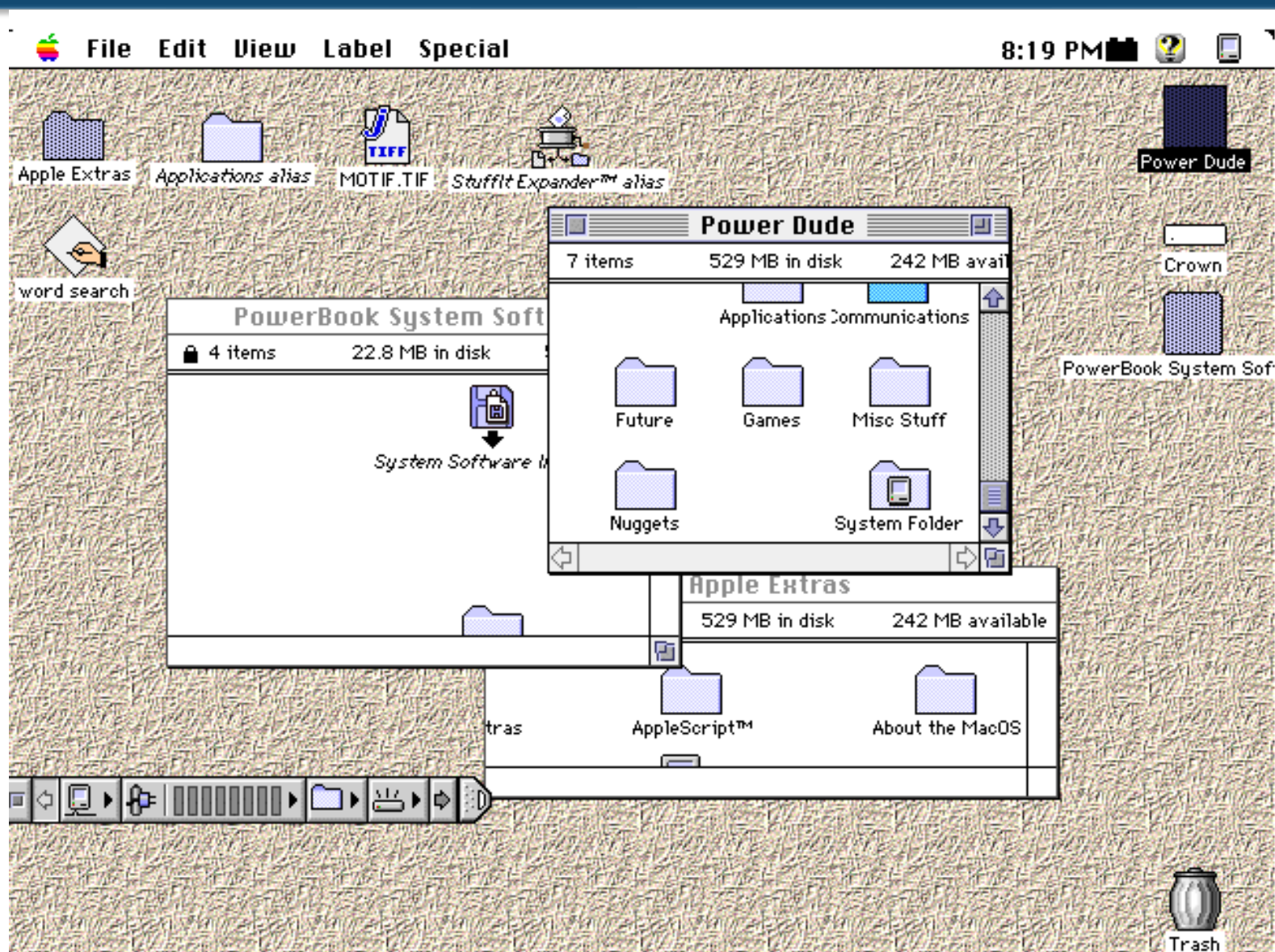


Examples of GUIs

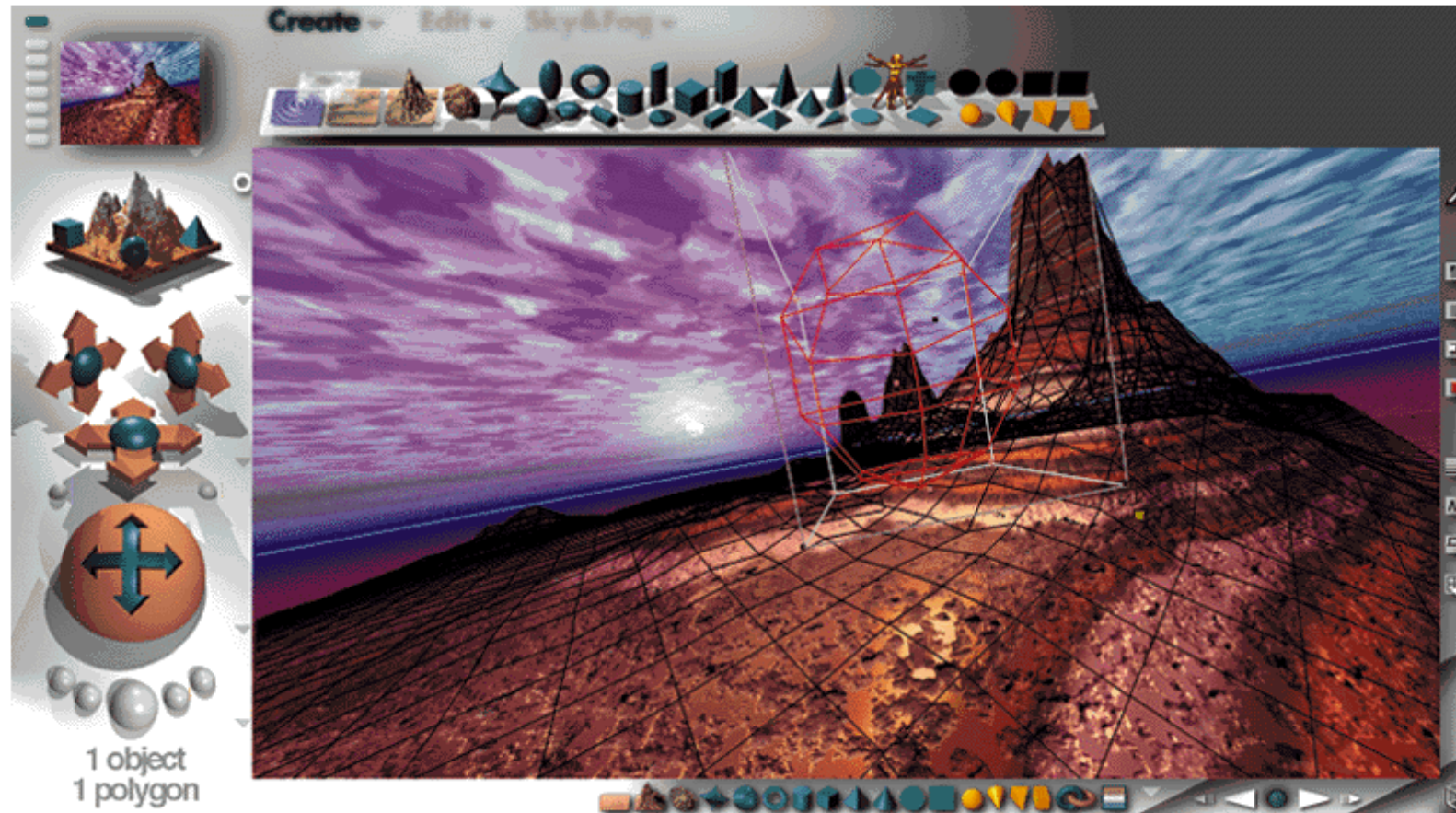
- ❁ Xerox's Star workstation was the first commercial implementation of the graphical user interface. The Star was introduced in 1981 and was the inspiration for the Mac and all the other GUIs that followed



Examples of GUIs



Examples of GUIs



The GUI Created a Revolution

GUIs allow the most imaginative interfaces to be created; witness this Bryce 3-D modeling program. All the symbols are working tools. For example, the ones on the left side with crosses are camera controls. The large symbol at the bottom is the camera trackball, while the other three control the x, y and z axes. On top are primitive graphic elements, including an "organic rock generator," fourth from left. (Screen shot courtesy of MetaCreations Corporation.)



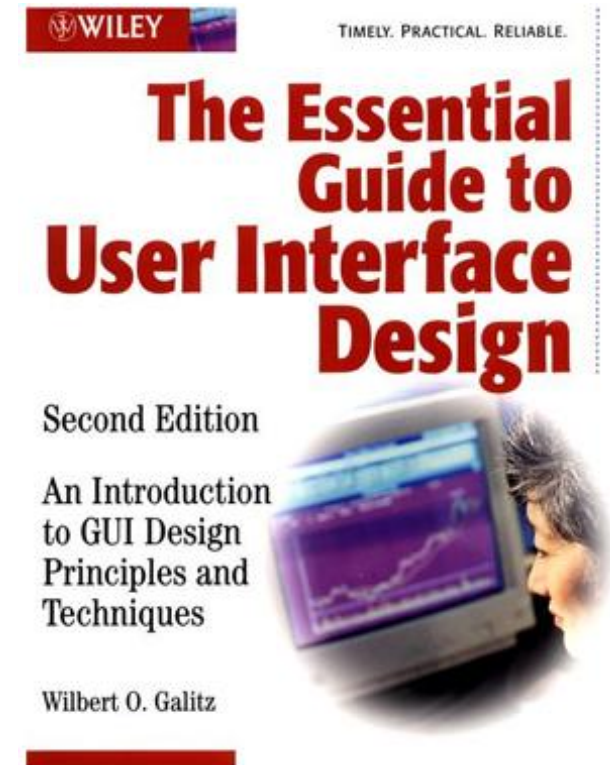
User Interface Design Concepts and Guidelines

System User Classifications

- ✿ An **expert user** is an experienced computer user who has spent considerable time using specific application programs. The use of a computer is usually considered nondiscretionary (不可任意支配的) . In the mainframe computing era, this was called a dedicated user (专用用户) .
- ✿ The **novice user** (初学者用户) (sometimes called a casual user (临时用户)) is a less experienced computer user who will generally use a computer on a less frequent, or even occasional, basis. The use of a computer may be viewed as discretionary (可任意支配的) (although this is becoming less and less true).

Interface Problems

- ✿ According to Wilbert O. Galitz (a GUI expert), these problems result in confusion, panic (恐慌), frustration (受挫), boredom (厌倦), misuse (误用), abandonment (放弃), and other undesirable consequences.
- Excessive (过分的) use of computer jargon and acronyms
 - Nonobvious or less-than-intuitive design
 - Inability to distinguish between alternative actions (“what do I do next?”)
 - Inconsistent problem-solving approaches
 - Design inconsistency



Commandments of User Interface Design

- ❁ Understand your users and their tasks.
- ❁ Involve the user in interface design.
- ❁ Test the system on actual users.
 - Observation and listening are the key skills here.
- ❁ Practice iterative design.
 - When is the interface finished? Probably never.



Human Engineering Guidelines

- ✿ The system user should always be aware of what to do next.
 - Tell the user what the system expects right now.
 - Tell the user that data has been entered correctly.
 - Tell the user that data has not been entered correctly.
 - Explain to the user the reason for a delay in processing.
 - Tell the user that a task was completed or was not completed.
- ✿ The screen should be formatted so that the various types of information, instructions, and messages always appear in the same general display area.

Human Engineering Guidelines (continued)

- ✿ Messages, instructions, or information should be displayed long enough to allow the system user to read them.
- ✿ Use display attributes sparingly (不要滥用加亮、闪烁、逆显等, 反而不能让用户集中视点) .
- ✿ Default values for fields and answers to be entered by the user should be specified.
- ✿ Anticipate (预见到) the errors users might make.
- ✿ With respect to errors, a user should not be allowed to proceed without correcting an error.
- ✿ If the user does something that could be catastrophic (灾难性的) , the keyboard should be locked to prevent any further input, and an instruction to call the analyst or technical support should be displayed.

Guidelines for Dialogue Tone and Terminology

☼ Tone (语气)

- Use simple, grammatically correct sentences.
- Don't be funny or cute (装腔作势) !
- Don't be condescending (故作谦卑状) .

☼ Terminology (术语)

- Don't use computer jargon.
- Avoid most abbreviations (缩写词).
- Use simple terms.
- Be consistent in your use of terminology.
- Carefully phrase instructions—use appropriate action verbs.



User Interface Technology



Today's User Interfaces

- ❁ Most of today's user interfaces are graphical. The basic structure of the **graphical user interface** (GUI) is provided within either the computer operating system or the Internet browser of choice.
- ❁ In client/server information systems, the user interface client is implemented to execute within the PC operating system.
- ❁ In Internet and intranet information systems, the user interface is implemented to execute within the PC's Web browser.

Common Approaches to Showing the Display Area

- ❁ **Paging** displays a complete screen of characters at a time. The complete display area is known as a page (or screen). The page is replaced on demand by the next or previous page, much like turning the pages of a book.
- ❁ **Scrolling** moves the displayed information up or down on the screen, one line at a time. This is similar to the way movie and television credits scroll up the screen at the end of a movie.

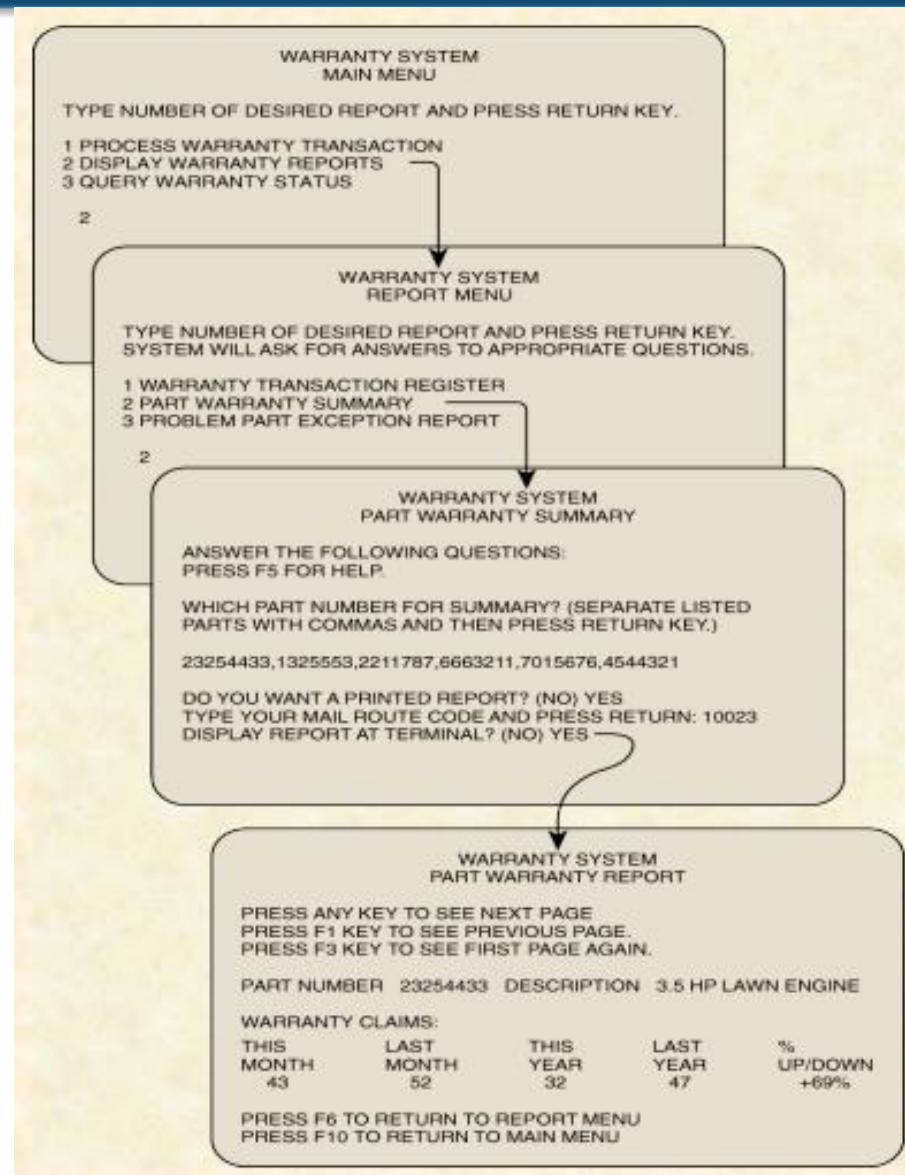


Graphical User Interface Styles and Considerations

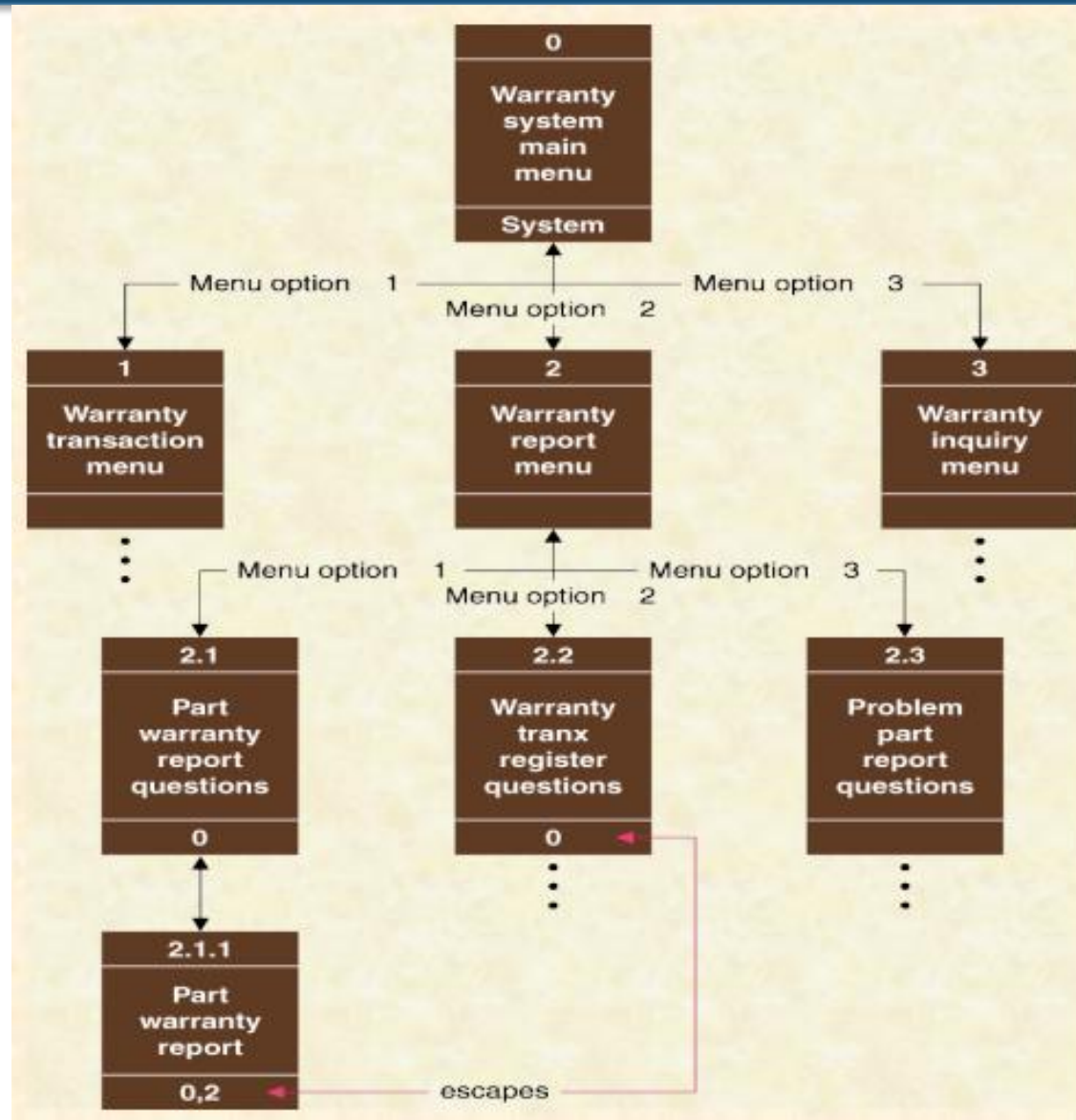
Styles or Strategies Used For Designing GUI

- ❁ Windows and frames
 - A window may be divided into zones called **frames**.
- ❁ Menu-driven interfaces
 - Menu-driven strategies require the user to select an action from a menu of alternatives.
- ❁ Instruction-driven interfaces
- ❁ Question-answer dialogue

A Classical Hierarchical Menu Dialogue



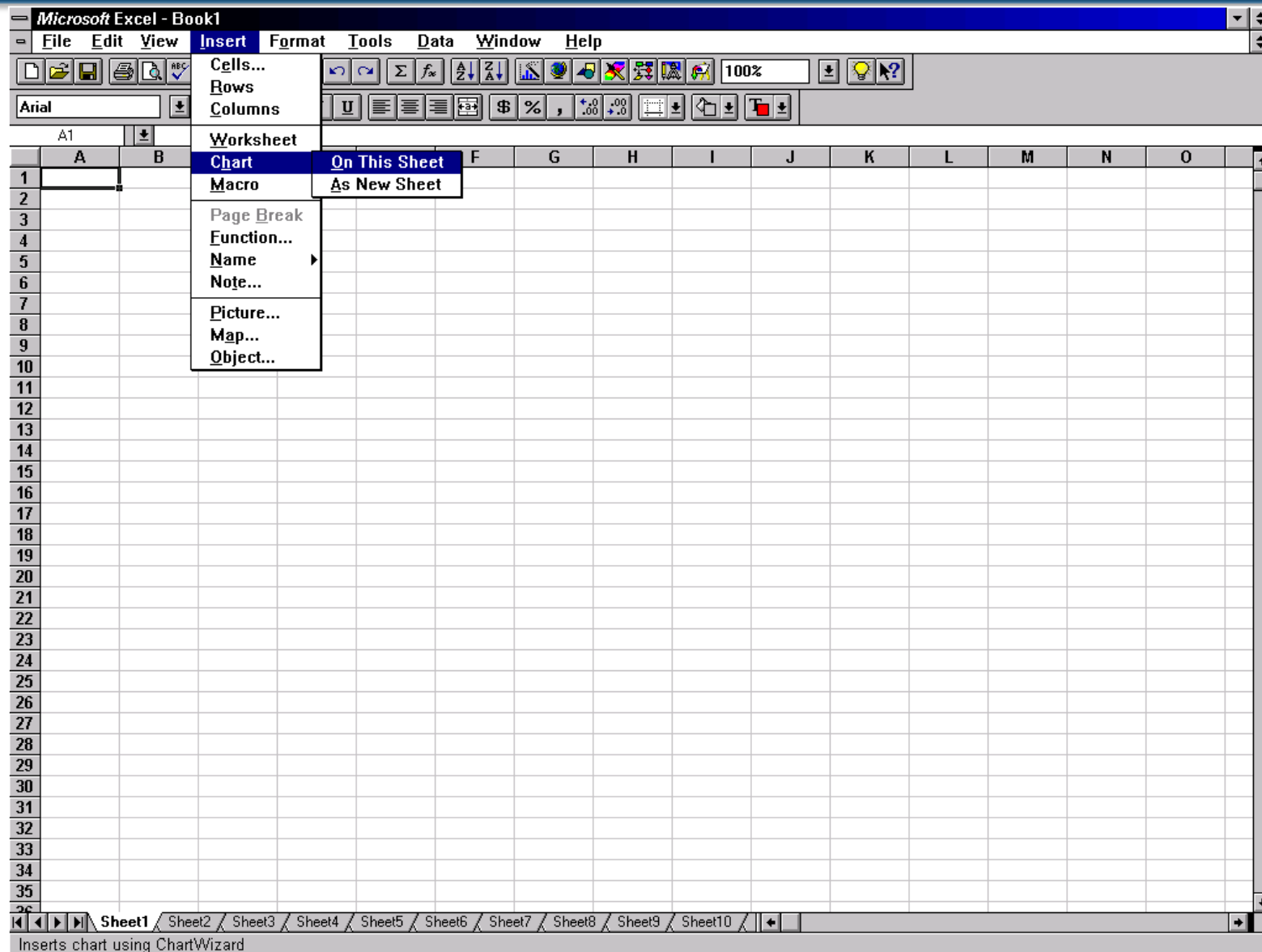
Sample Dialogue Chart



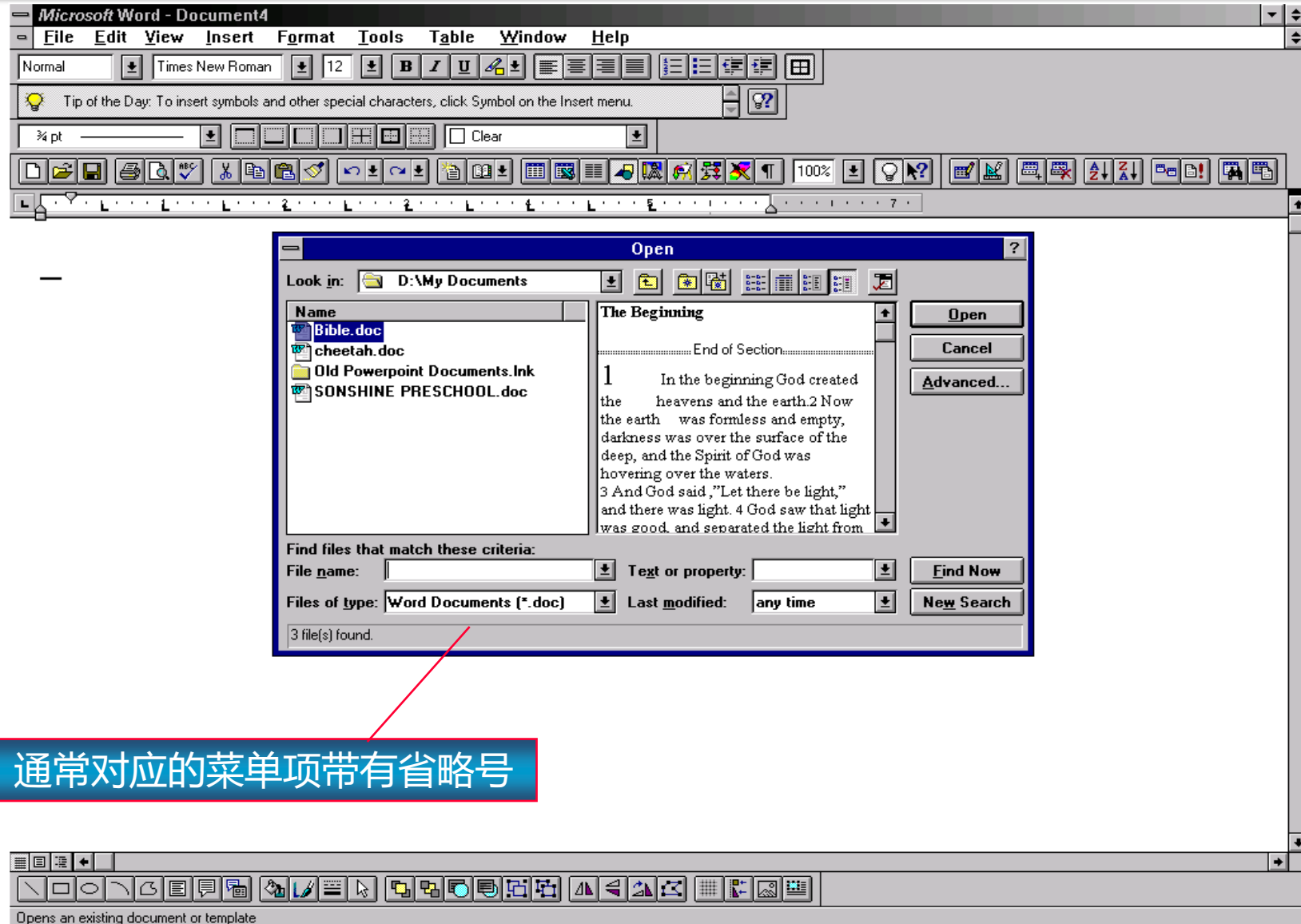
GUI Menus

- ❁ Pull down (下拉式的) and cascading (层迭式的) menus
- ❁ Tear-off (可拖动的) and pop-up (弹出式的) menus
- ❁ Toolbar and iconic (图标式的) menus
- ❁ Hypertext and hyperlink menus

Pull-Down and Cascading Menus



Dialogue Box



Pop-Up Menus

Microsoft Excel - Fall 99

File Edit View Insert Format Tools Data Window Help

Arial 10 B I U

F14 MF 1.30-2.20

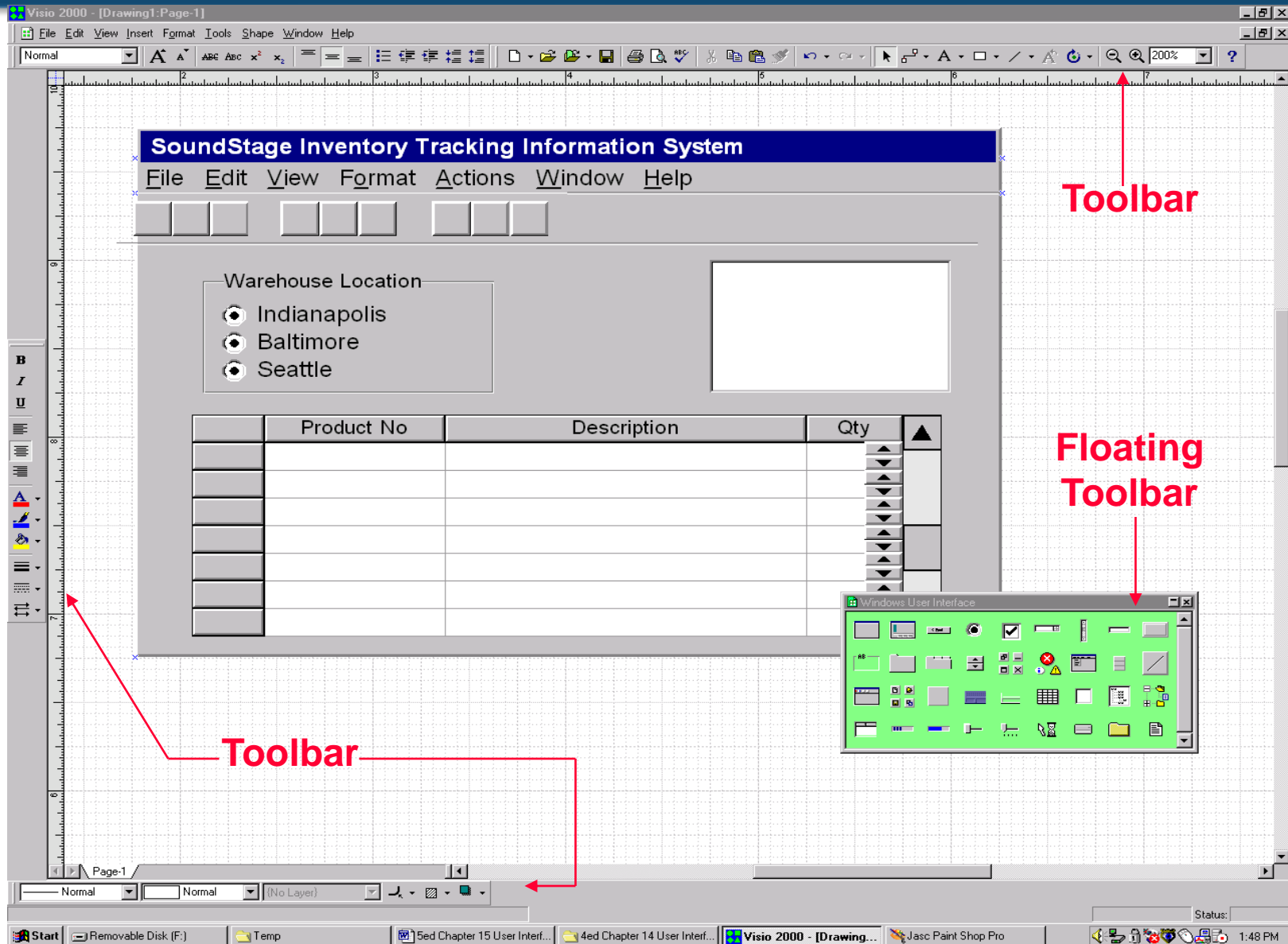
	A	B	C	D	E	F	G	H	I	J	K	L	N	O	P
1	Fall 99 Schedule of Classes														
2	Subject	Course	Inst Type	Div	Sec	Days & Times	Evening Exam?	Final Exam?	Limit	Building	Room	Seats			
3	CPT	091	Exp	1	1	arrange hours	no	no	999	NA	NA	NA			
4	CPT	092	Exp	1	1	arrange hours	no	no	999	NA	NA	NA			
5	CPT	093	Exp	1	1	arrange hours	no	no	999	NA	NA	NA			
6	CPT	094	Exp	1	1	arrange hours	no	no	999	NA	NA	NA			
7	CPT	095	Exp	1	1	arrange hours	no	no	999	NA	NA	NA			
8	CPT	101	Prim	1	1	TTh 9.30-10.20 wks 1-8	no	no	88	CIVL	1144	100			
9	CPT	107A	Lab	1	1	Th 2.30-3.20	no	no	10	SCHL	230	10			
10	CPT	125	Sec	1	1	T 1.30-2.20	no	no	60	MSEE	B012	96			
11	CPT	125L	Lab	1	1	Th 11.30-1.20	no	no	20	PHYS	116	24			
12	CPT	125L	Lab	2	1	Th 1.30-3.20	no	no	20	PHYS	116	24			
13	CPT	125L	Lab	3	1	Th 3.30-5.20	no	no	20	PHYS	116	24			
14	CPT	135	Prim	1	1	MF 1.30-2.20	yes	yes	167	RHPH	172	196			
15	CPT	135	Prim	2	1	MF 4.30-5.20	yes	yes	167	EE	170	172			
16	CPT	135	Prim	3	1	MF 7.30-8.20	yes	yes	166	PHYS	114	273			
113	CPT	255L	Lab	2	1	W 9.30-11.20	no	no	22	KNOY	228	24			
114	CPT	255L	Lab	3	1	W 1.30-3.20	no	no	22	KNOY	228	24			
115	CPT	255L	Lab	4	1	W 3.30-5.20	no	no	22	KNOY	228	24			
116	CPT	255L	Lab	5	1	Th 7.30-9.20	no	no	22	KNOY	228	24			
117	CPT	255L	Lab	6	1	Th 9.30-11.20	no	no	0	KNOY	228	24			
118	CPT	267	Prim	1	1	WF 12.30-1.20	yes	yes	38	KNOY	B035	42			
119	CPT	267L	Lab	1	1	Th 7.30-9.20	no	no	19	PHYS	116	24			
120	CPT	267L	Lab	2	1	Th 9.30-11.20	no	no	19	PHYS	116	24			
121	CPT	267L	Lab	3	1	Th 1.30-3.20	no	yes	94	SC	239	96			
122	CPT	267L	Lab	4	1	Th 3.30-5.20	no	no	32	KNOY	B035	42			
123	CPT	267L	Lab	5	1	Th 5.30-7.20	no	no	31	KNOY	B035	42			
124	CPT	280J	Pso	3	1	W 10.30-11.20	no	no	31	KNOY	B035	42			
125	CPT	299	Ind	1	1	arrange hours	no	no	999	NA	NA	NA			
126	CPT	305	Prim	1	1	MW 1.30-2.20	no	yes	24	KNOY	B035	42			

供选择的、与文本有关的操作

Ready

Start Removable Disk (F:) Temp 5ed Chapter 15 User Interf... 4ed Chapter 14 User Interf... Microsoft Excel - Fall ... Jasc Paint Shop Pro 1:17 PM

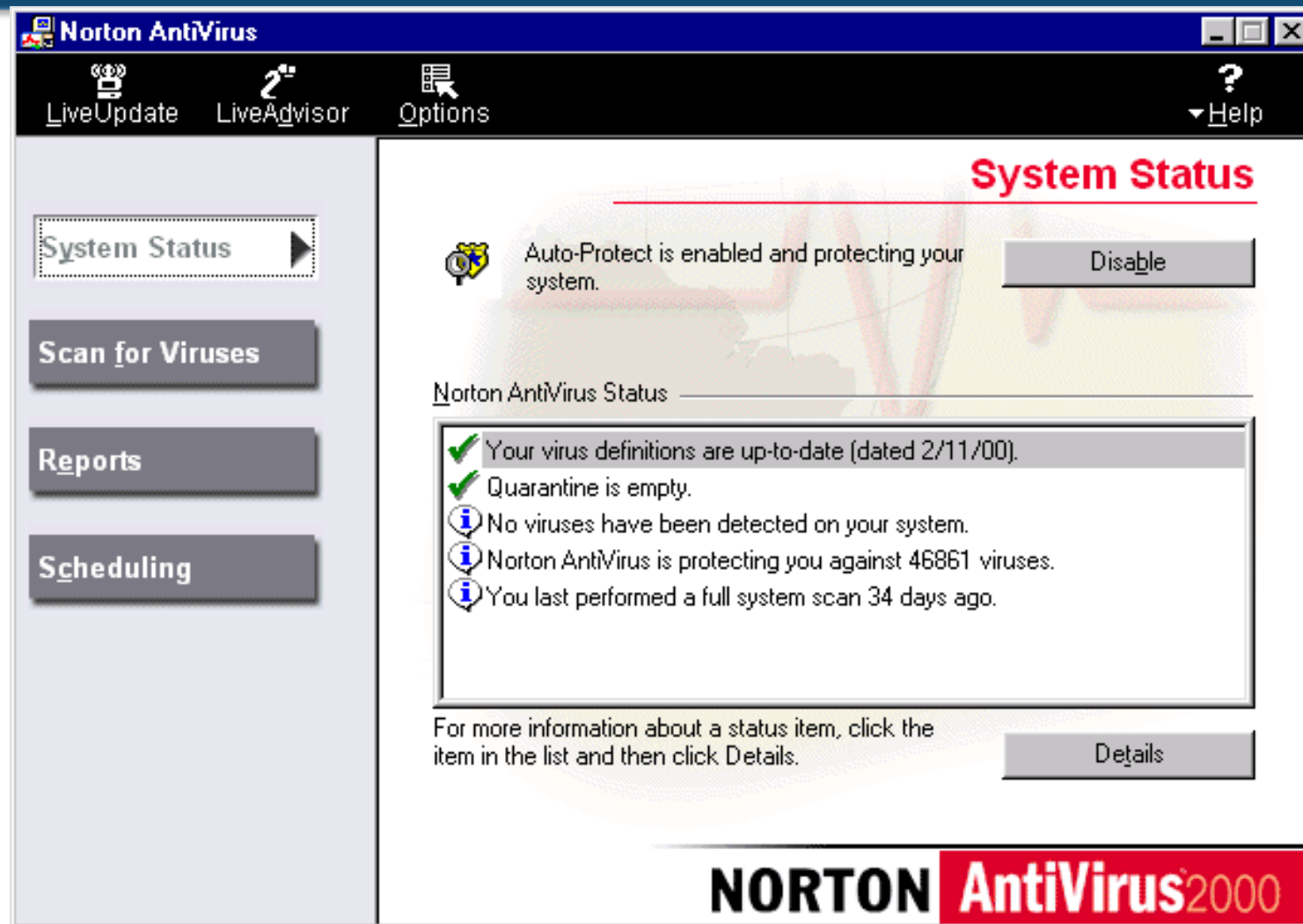
Tool Bars



Iconic Menus



Consumer-Style Interface



More Web-like

Hybrid Windows/Web Interface

The screenshot displays the Quicken 2000 Home & Business - QDATA - [Investing] window. The interface is a hybrid of a traditional Windows application and a web browser, featuring a menu bar, a toolbar, and a sidebar with navigation links.

Investing Center

Activities

- Enter a [new investment](#)
- [Rebalance](#) my portfolio
- Estimate my [capital gains](#)
- Get my [transactions online](#)
- [Research](#) a stock or mutual fund
- [Get online quotes](#) and news
- Download [historical prices](#)
- Set up to [export my portfolio](#)
- [Chart](#) multiple securities

Questions

- [What should my asset allocation be?](#)
- [How should I invest my money?](#)
- [How are my investments doing?](#)

Investment Accounts Daily

Info	Account	Mkt Value	MktVal Chg	%
Total		0.00		

OBSERVATIONS **ACTIONS**

You have not set up any investment accounts in Quicken. Use EasyStep [Investment Account Setup](#) to get started!

[Add](#) an investment
[Use One Step Update](#) to download all of your financial data
[View](#) my full portfolio

Watch List

Symbol	Price	Chg
--------	-------	-----

OBSERVATIONS **ACTIONS**

You can use the Watch List to track the prices of stocks and mutual funds you are interested in. [Learn how](#) to get started.

[Edit](#) my watch list
[Get](#) online quotes and news
[Research](#) a stock or mutual fund
[Set](#) a price alert

Asset Allocation Monitor 2/20/00

OBSERVATIONS **ACTIONS**

You have not set up any investment accounts in Quicken. Use EasyStep [Investment Account Setup](#) to get started!

[Learn](#) about asset allocation

Returns By Security 1/00 - 2/00

OBSERVATIONS **ACTIONS**

You have not set up any investment accounts in Quicken. Use EasyStep [Investment Account Setup](#) to get started!

[Select](#) accounts & securities to include
[View](#) my full portfolio

My Finances

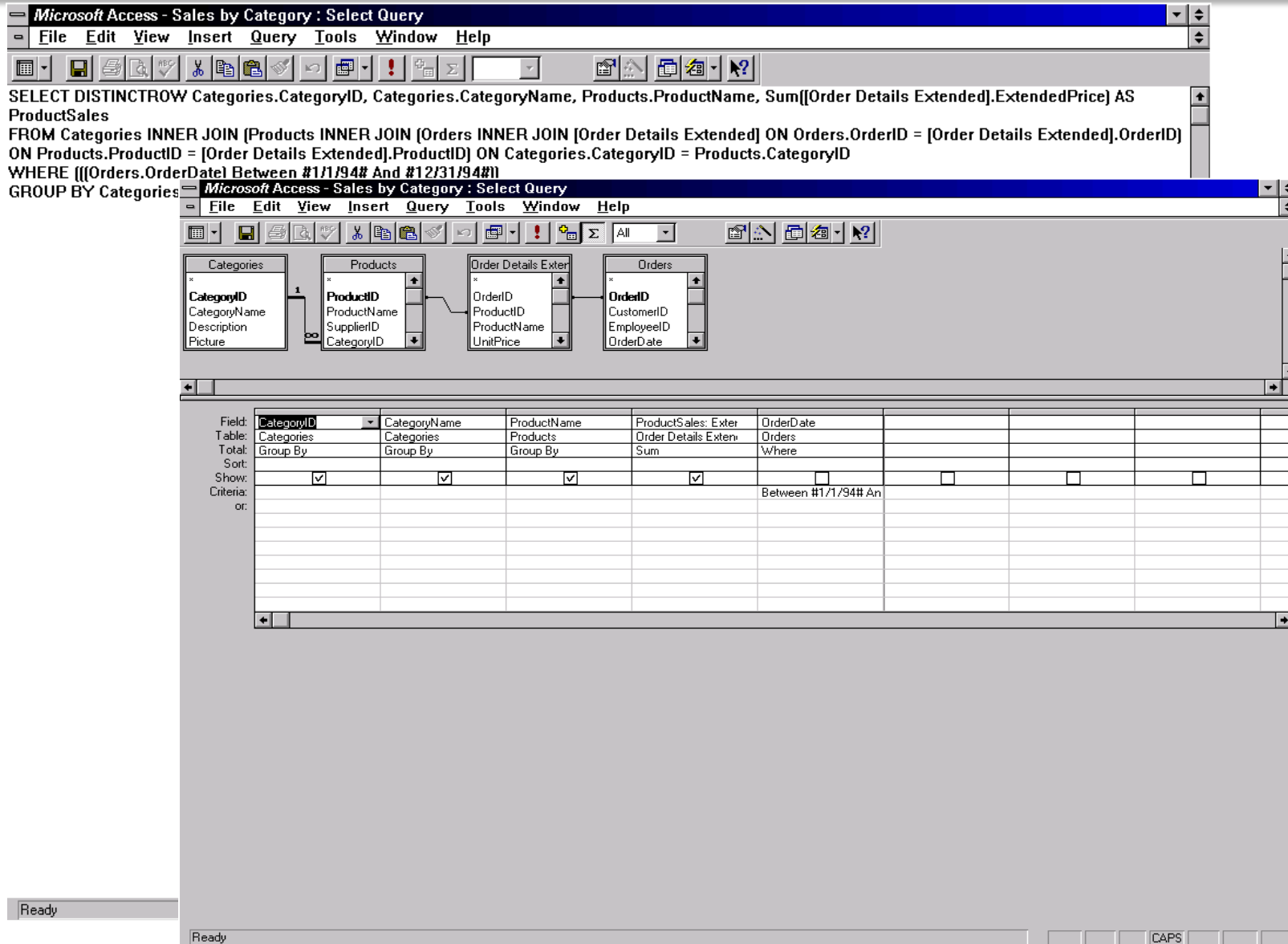
- Accounts
- Reminders
- Calendar
- Banking**
 - Register
 - Sched. Txns
- Investing**
- Household**
- Taxes**
- Planning**
 - Savings Goals
- Business**
- Reports & Graphs**

Summary 2/18/00 Alerts What's my car worth?

Instruction-Driven Interface

- ☼ Most suitable for expert users.
- ☼ Three types of syntax:
 - A **language-based syntax** is built around a widely accepted command language that can be used by the user to invoke action (e.g., QBE, SQL).
 - A **mnemonic (记忆的) syntax** is built around commands defined for custom information system applications.
 - A **natural language syntax** allows users to enter questions and commands in their native language.

Instruction-Driven Interface



Question-Answer Dialogues

- ✿ A question-answer dialogue style is primarily used to supplement either menu-driven or instruction-driven dialogues.
- ✿ This strategy requires that you consider all possible correct answers and deal with the actions to be taken if incorrect answers are entered.

Special Considerations for User Interface Design

- ❁ Internal controls - Authentication and Authorization (鉴别与授权) .
- ❁ On-line Help.

Authentication Log-in Screen

Security Authorization



Warning: This computer program is protected by copyright law and international treaties. Unauthorized reproduction or distribution of this program, or any portion of it, may result in civil and criminal penalties, and will be prosecuted to the maximum extent possible under the law.

Welcome to the
***Soundstage
Entertainment
Club***

User ID Information:

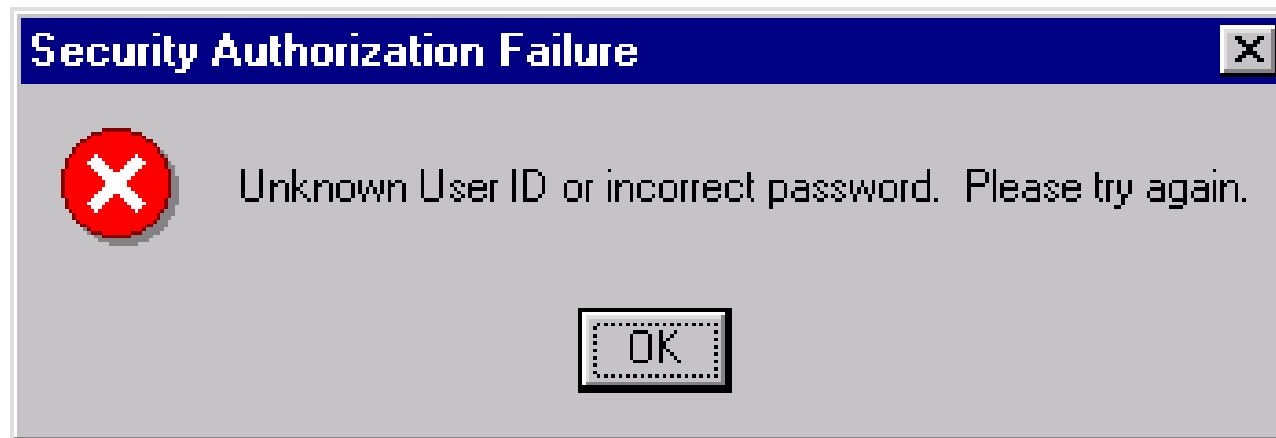
User ID:

Password:

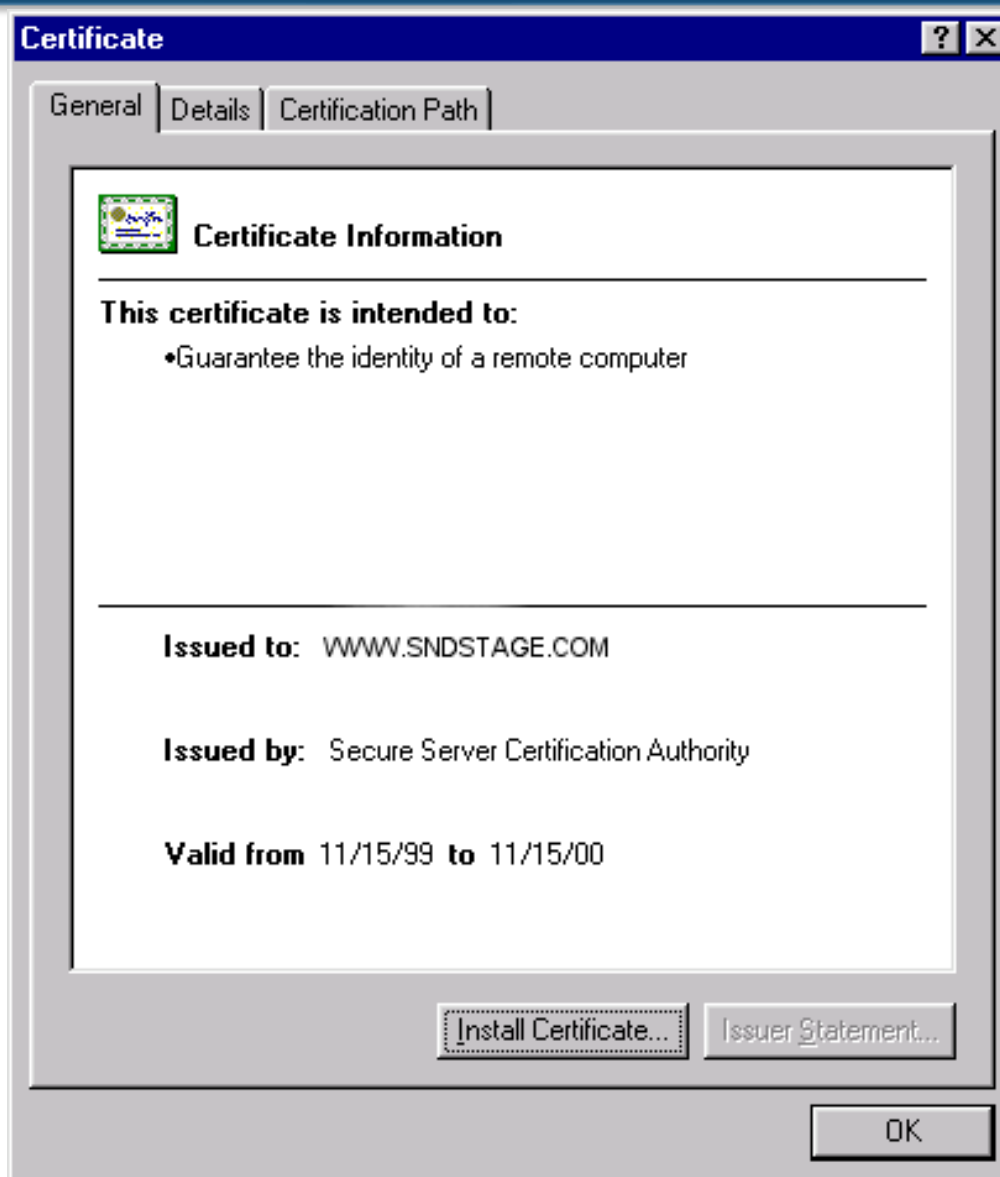
Login

Cancel

Authentication Error Screen



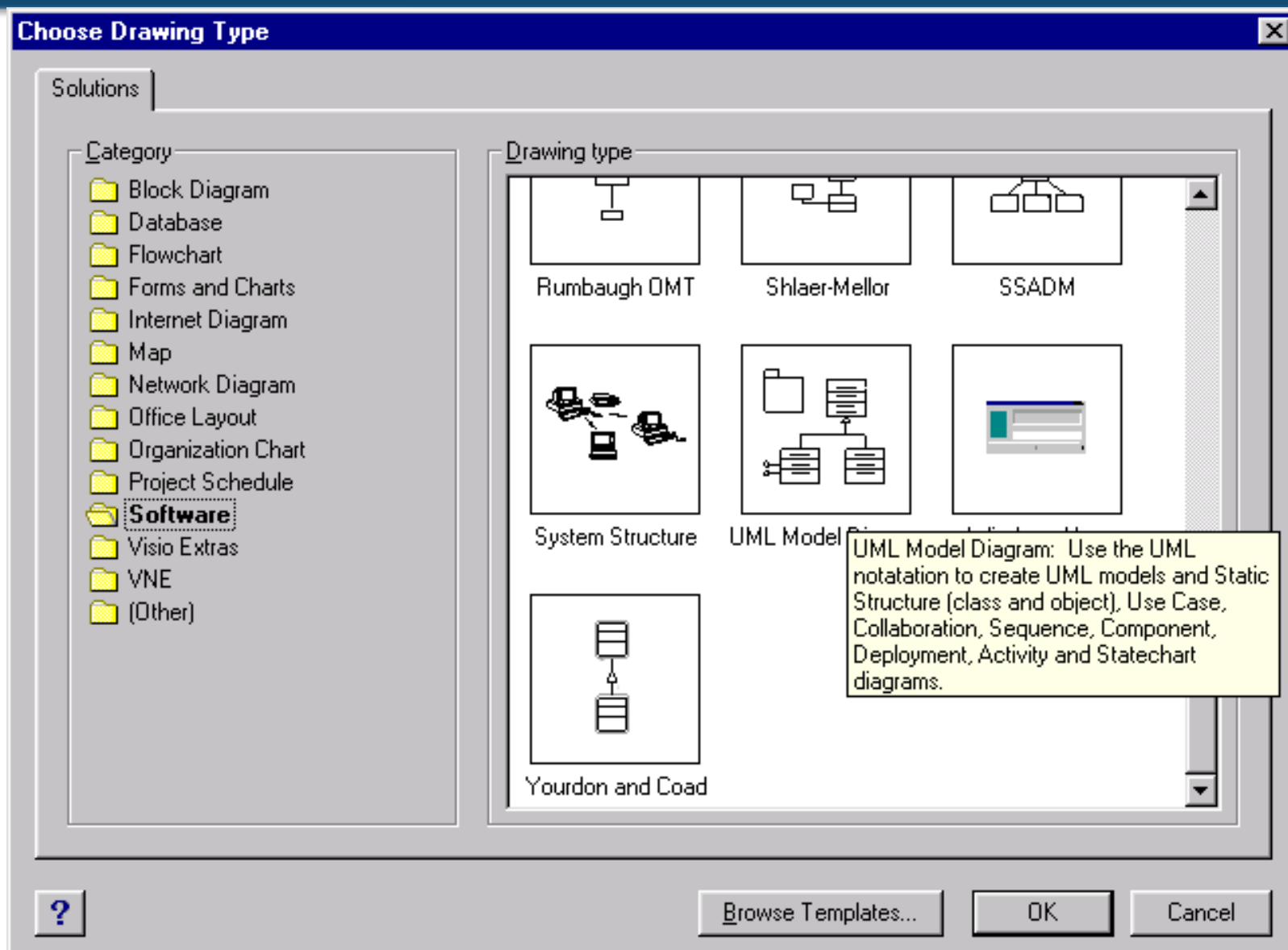
Server Security Certificate



Special Considerations for User Interface Design

- ❁ Internal controls - Authentication and Authorization (鉴别与授权) .
- ❁ On-line Help.

Help Tool Tip



Help Wizard

Instructions

The screenshot shows a 'Create New Account' dialog box with a title bar containing a close button. The main content area has the heading 'Choose the type of account to create.' and three columns of radio button options: 'Banking & Cash' (Checking, Savings, Credit Card, Money Market, Cash), 'Investments' (Brokerage, IRA or Keogh, 401(k), Dividend Reinvestment Plan, Other Investment), and 'Home & Business' (House, Vehicle, Asset, Liability, Invoices / Receivables, Bills / Payables). A note at the bottom states: 'If you are trying to set up a security such as a stock or bond, you should probably choose Brokerage. Click help for more information.' The bottom of the dialog features 'Cancel', 'Help', and 'Next' buttons. Red lines connect external text boxes to specific elements: 'Instructions' points to the title bar, 'Additional or subsequent steps' points to the 'Next' button, 'Explanations' points to the 'Help' button, and 'More detailed help' points to the 'Help' button's text.

Create New Account

Choose the type of account to create.

Banking & Cash

- ☐ Checking
- ☐ Savings
- ☒ Credit Card
- ☐ Money Market
- ☐ Cash

Investments

- ☐ Brokerage
- ☐ IRA or Keogh
- ☐ 401(k)
- ☐ Dividend Reinvestment Plan
- ☐ Other Investment

Home & Business

- ☐ House (with or w/o Mortgage)
- ☐ Vehicle (with or w/o Loan)
- ☐ Asset
- ☐ Liability
- ☐ Invoices / Receivables
- ☐ Bills / Payables

■ If you are trying to set up a security such as a stock or bond, you should probably choose Brokerage. Click help for more information.

Cancel Help Next

Additional or subsequent steps

Explanations

More detailed help

Help Wizard

Instructions

Create New Account

Choose the type of account to create.

Banking & Cash	Investments	Home & Business
<input type="radio"/> Checking	<input type="radio"/> Brokerage	<input type="radio"/> House (with or w/o Mortgage)
<input type="radio"/> Savings	<input type="radio"/> IRA or Keogh	<input type="radio"/> Vehicle (with or w/o Loan)
<input checked="" type="radio"/> Credit Card	<input type="radio"/> 401(k)	<input type="radio"/> Asset
<input type="radio"/> Money Market	<input type="radio"/> Dividend Reinvestment Plan	
<input type="radio"/> Cash	<input type="radio"/> Other Investment	

▪ If you are trying to set up a security such as a stock or bond, you probably choose Brokerage. Click help for more information.

Explanations

More detailed help

Credit Card Account Setup

EasyStep Summary

Account Information

Account Name: Credit Card

Description: My New Credit Card

Balance: 3.00 as of 2/21/00

Financial Institution: Ashburn Bank

Online Information

☐ Enable Online Account Access

Optional Information

Credit Limit, if Applicable: 5,000.00

Additional Information: Tax Info:



How to Design and Prototype a User Interface?



Visual Basic Menu Construction

Menu Editor [X]

Caption: OK

Name: Cancel

Index: Shortcut: [v]

HelpContextID: NegotiatePosition: [v]

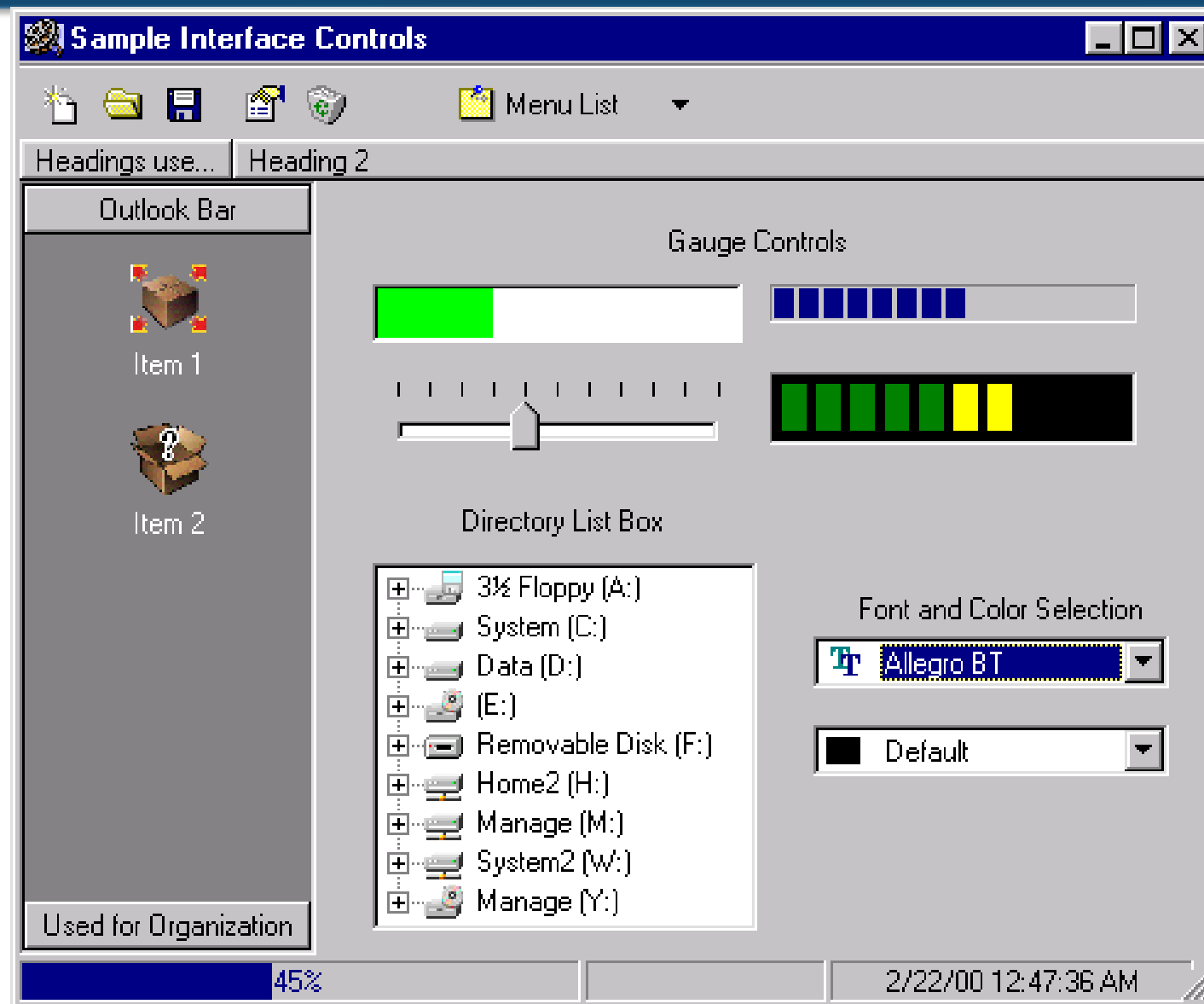
☐ Checked ☒ Enabled ☒ Visible ☐ WindowList

[<] [>] [↑] [↓] [Next] [Insert] [Delete]

- &File
 - ...&Open
 - ...&New
 - ...**E&xit**
- &Edit
- &Reports
- &Operations
- &Maintenance
- &Help



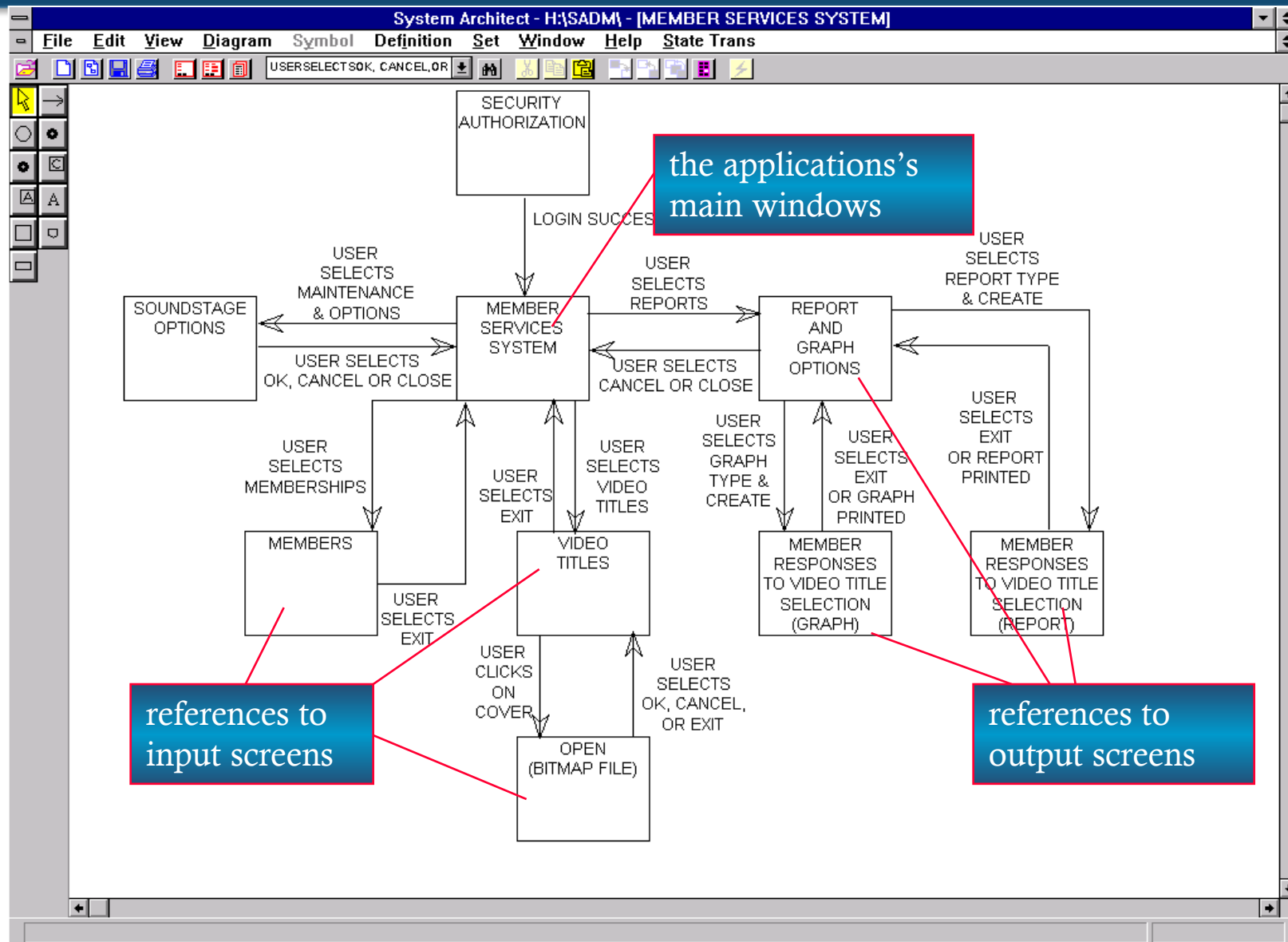
Additional User Interface Controls



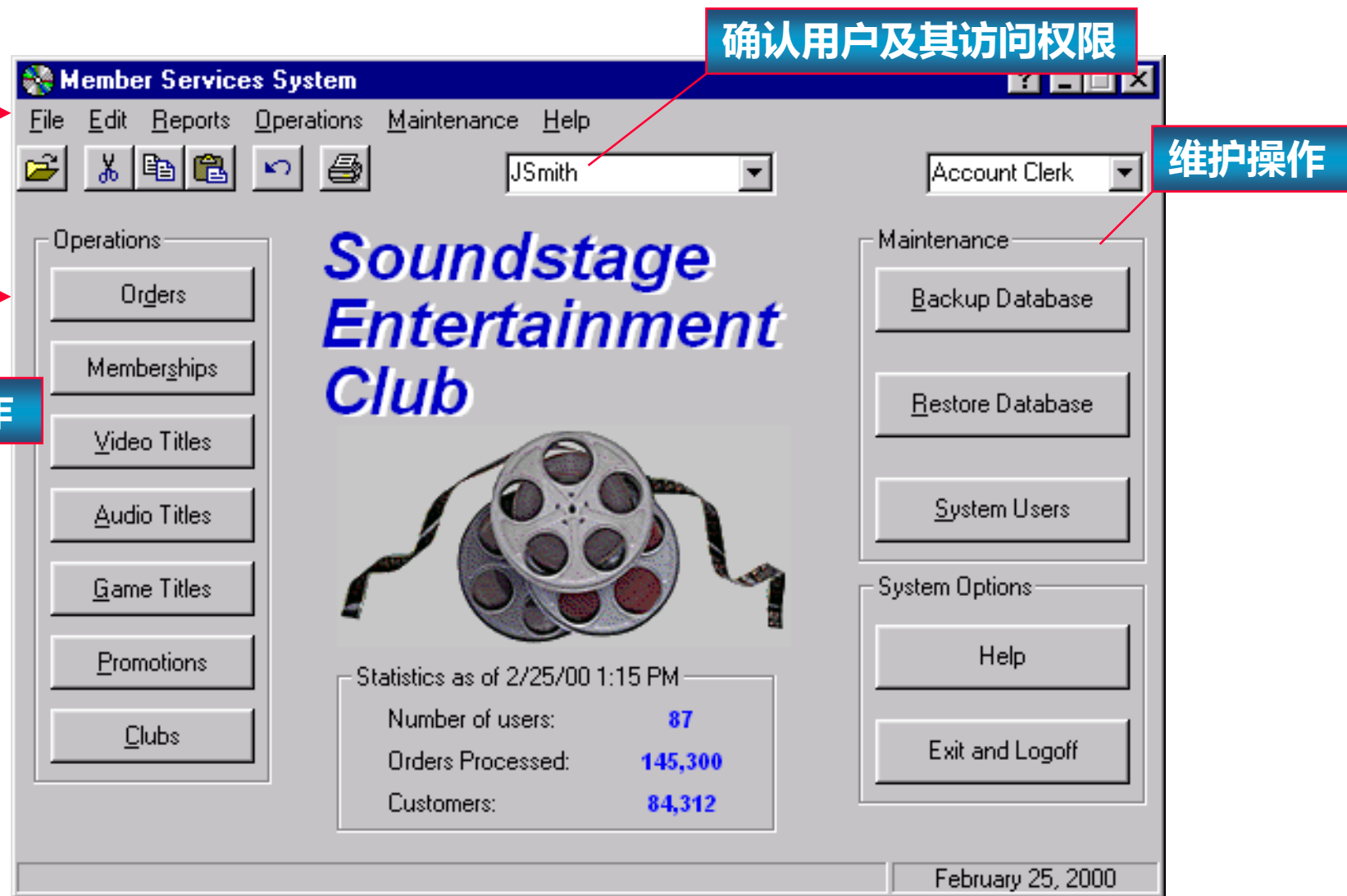
The User Interface Design Process

- ❁ 1. Chart the user interface dialogue.
- ❁ 2. Prototype the dialogue and user interface.
- ❁ 3. Obtain user feedback.
- ❁ 4. If necessary, return to step 1 or 2.

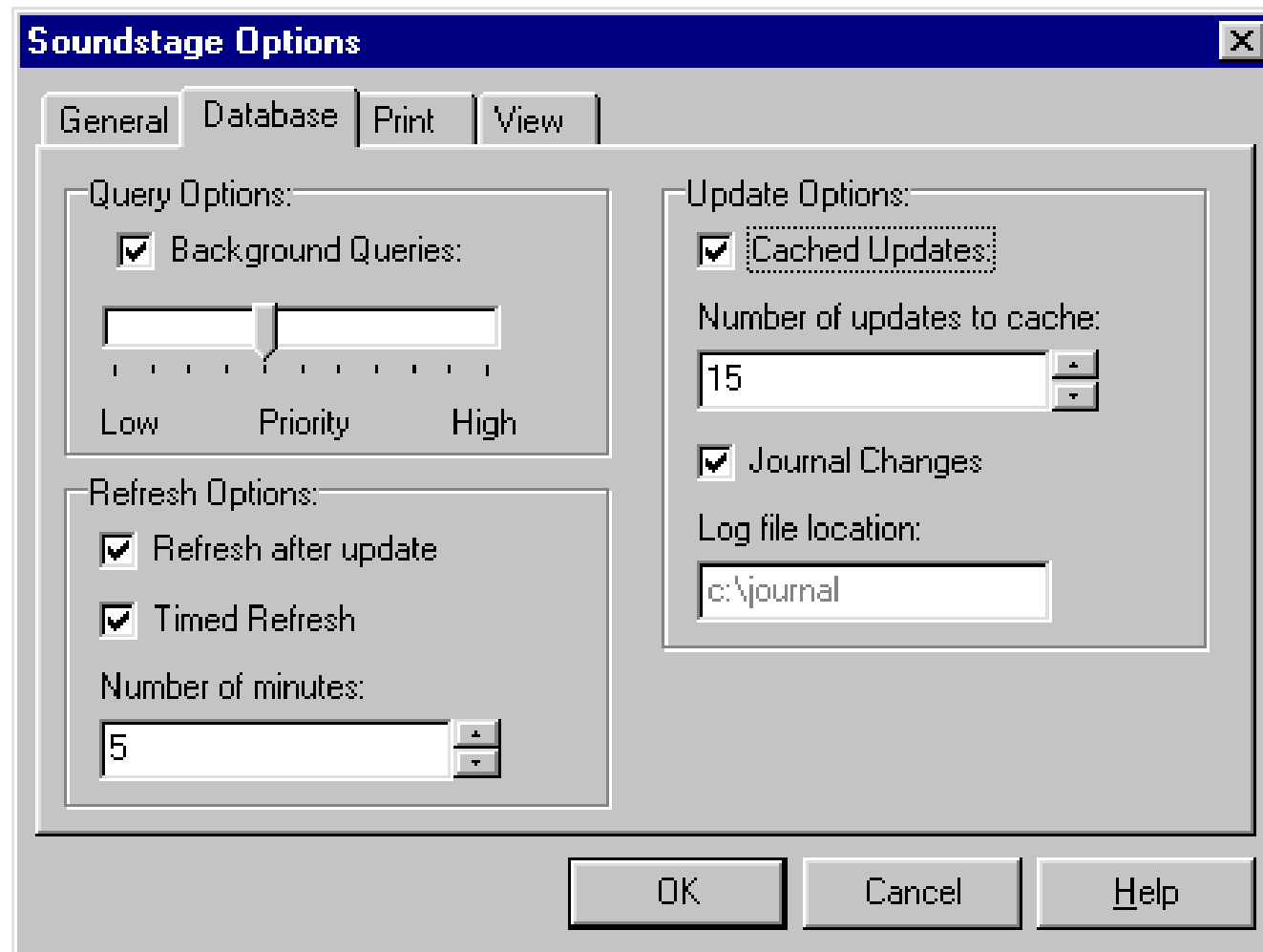
SoundStage Partial State Transition Diagram



SoundStage Main Menu



SoundStage Options and Preferences Screen



The image shows a Windows-style dialog box titled "Soundstage Options". It has four tabs: "General", "Database", "Print", and "View". The "General" tab is selected. The dialog is divided into two main sections: "Query Options" on the left and "Update Options" on the right. At the bottom are three buttons: "OK", "Cancel", and "Help".

Soundstage Options

General Database Print View

Query Options:

- ☒ Background Queries:
- Slider: Low Priority High

Refresh Options:

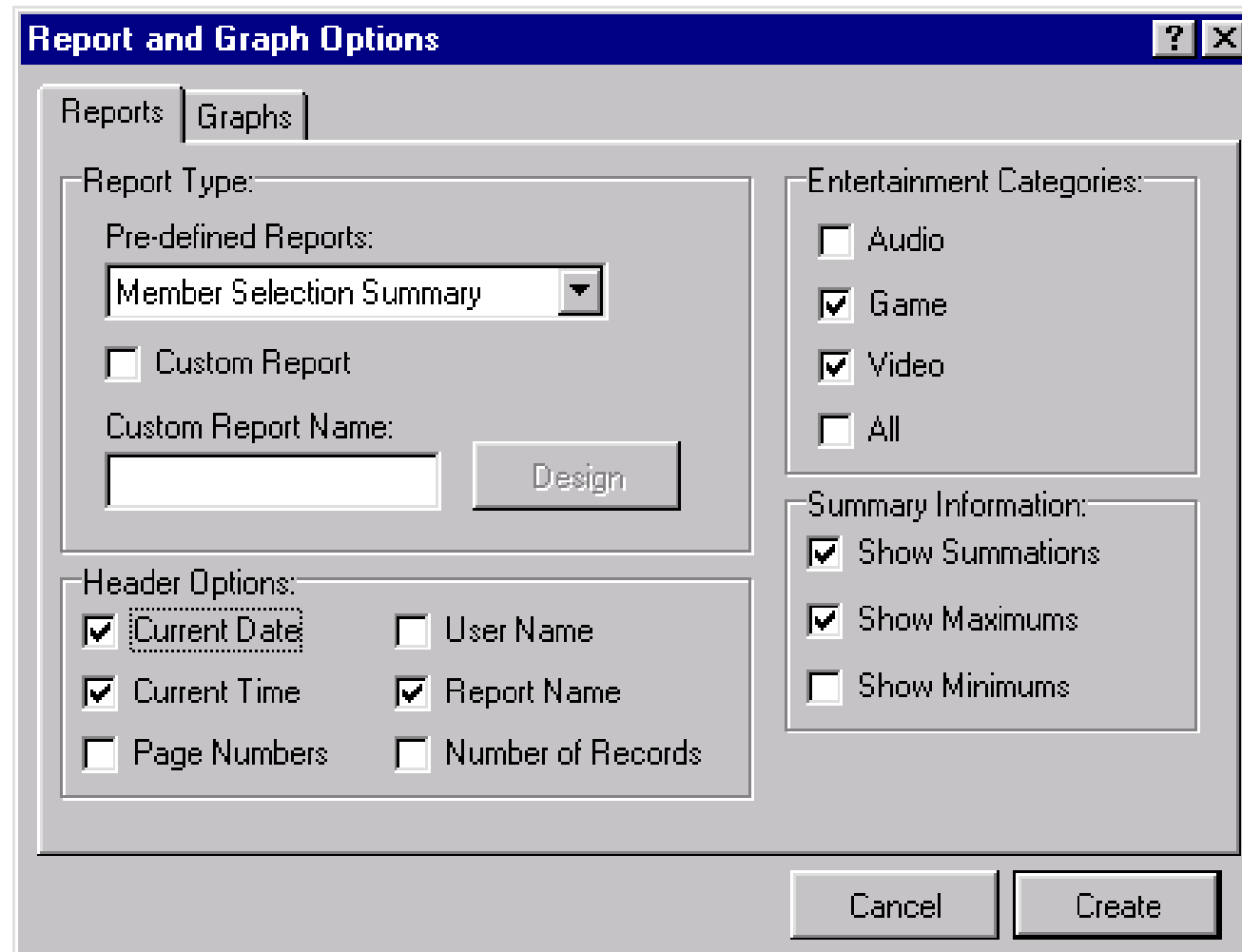
- ☒ Refresh after update
- ☒ Timed Refresh
- Number of minutes: 5

Update Options:

- ☒ Cached Updates
- Number of updates to cache: 15
- ☒ Journal Changes
- Log file location: c:\journal

OK Cancel Help

SoundStage Report Customization Dialogue



The image shows a Windows-style dialog box titled "Report and Graph Options". It has two tabs: "Reports" (selected) and "Graphs". The "Reports" tab contains several sections: "Report Type:" with a "Pre-defined Reports:" dropdown menu set to "Member Selection Summary" and an unchecked "Custom Report" checkbox; a "Custom Report Name:" text field with a "Design" button; "Header Options:" with checkboxes for "Current Date" (checked), "Current Time" (checked), "Page Numbers" (unchecked), "User Name" (unchecked), "Report Name" (checked), and "Number of Records" (unchecked); "Entertainment Categories:" with checkboxes for "Audio" (unchecked), "Game" (checked), "Video" (checked), and "All" (unchecked); and "Summary Information:" with checkboxes for "Show Summations" (checked), "Show Maximums" (checked), and "Show Minimums" (unchecked). At the bottom right are "Cancel" and "Create" buttons.

Report and Graph Options

Reports | Graphs

Report Type:

Pre-defined Reports:

Member Selection Summary

☐ Custom Report

Custom Report Name:

Design

Header Options:

☒ Current Date ☐ User Name

☒ Current Time ☒ Report Name

☐ Page Numbers ☐ Number of Records

Entertainment Categories:

☐ Audio

☒ Game

☒ Video

☐ All

Summary Information:

☒ Show Summations

☒ Show Maximums

☐ Show Minimums

Cancel Create

要点与引申

- ❁ 据统计，软件系统中70%左右的代码与人机交互有关。
- ❁ 用户界面的设计强烈地受到平台（如 Windows 和 Web browser）的影响。
- ❁ 同一个产品系列、同一个组织的信息系统，通常有统一的用户界面风格。
- ❁ 请大家从人机工程中学习更多的用户界面设计知识与技能。