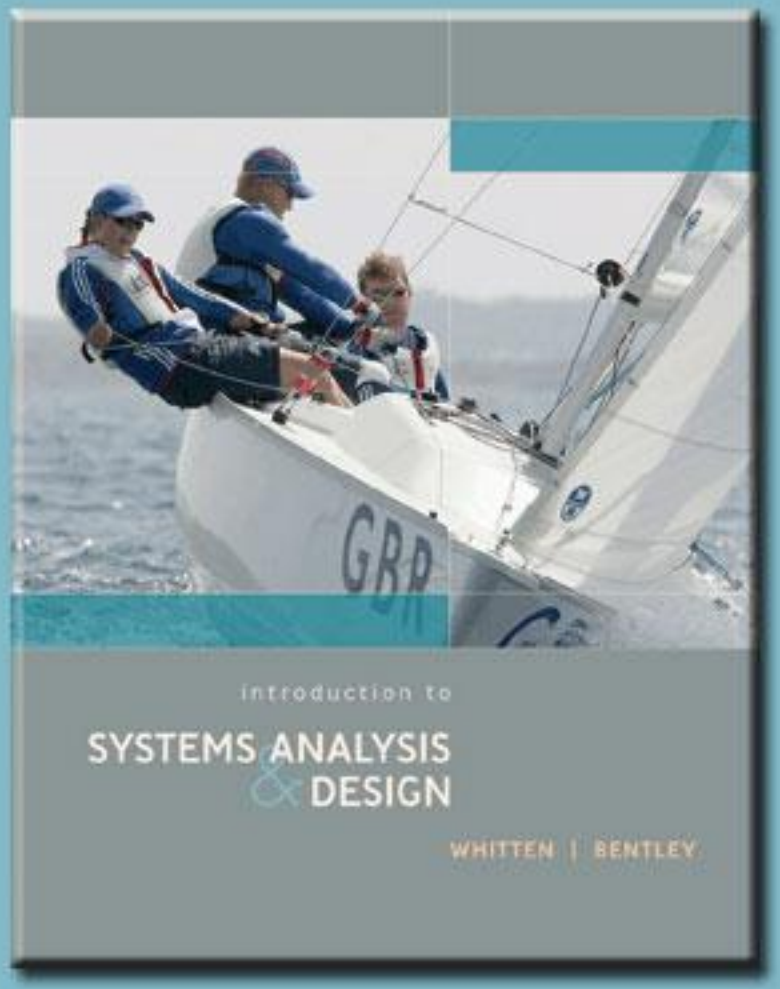

Chapter 14

Output Design and Prototyping

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Objectives

- Distinguish between internal, external, and turnaround outputs.
- Differentiate between detailed, summary, and exception reports.
- Identify several output implementation methods.
- Differentiate among area, bar, column, pie, line, radar, donut, and scatter charts and their uses.
- Describe several general principles that are important to output design.
- Design and prototype computer outputs.

Taxonomy for Computer-Generated Outputs

Distribution / Delivery	Internal Output (reporting)	Turnaround Output (external; then internal)	External Output (transactions)
Printer	Detailed, summary, or exception information printed on hard-copy reports for internal business use.	Business transactions printed on business forms that will eventually be returned as input business transactions.	Business transactions printed on business forms that conclude the business transactions.
Screen	Detailed, summary, or exception information displayed on monitors for internal business use.	Business transactions displayed on monitors in forms or windows that will also be used to input other data to initiate a related transaction.	Business transactions displayed on business forms that conclude the business transactions.
Point-of-Sale Terminals	Information printed or displayed on special-purpose terminals dedicated to specific internal business functions.	Information printed or displayed on a special-purpose terminal for the purpose of initiating a follow-up business transaction.	Information printed or displayed on special-purpose terminals dedicated to customers.

Taxonomy for Computer-Generated Outputs (concluded)

Distribution / Delivery	Internal Output (reporting)	Turnaround Output (external; then internal)	External Output (transactions)
Multimedia (audio or video)	Information transformed into speech for internal users.	Information transformed into speech for external users who respond with speech or tone input data.	Information transformed into speech for external users.
E-mail	Displayed messages related to internal business information.	Displayed messages intended to initiate business transactions.	Displayed messages related to business transactions.
Hyperlinks	Web-based links to internal information that is enabled via HTML or XML formats.	Web-based links incorporated into Web-based input pages to provide users with access to additional information.	Web-based links incorporated into Web-based transactions.
Microfiche	Archival of internal management reports to microfilm that requires minimal physical storage space.	Not applicable unless there is an internal need to archive turnaround documents.	Not applicable unless there is an internal need for copies of external reports.

Internal Outputs

Internal output – an output intended for system owners and system users within an organization.

Detailed report – an internal output that presents information with little or no filtering

- Example: A listing of all customers

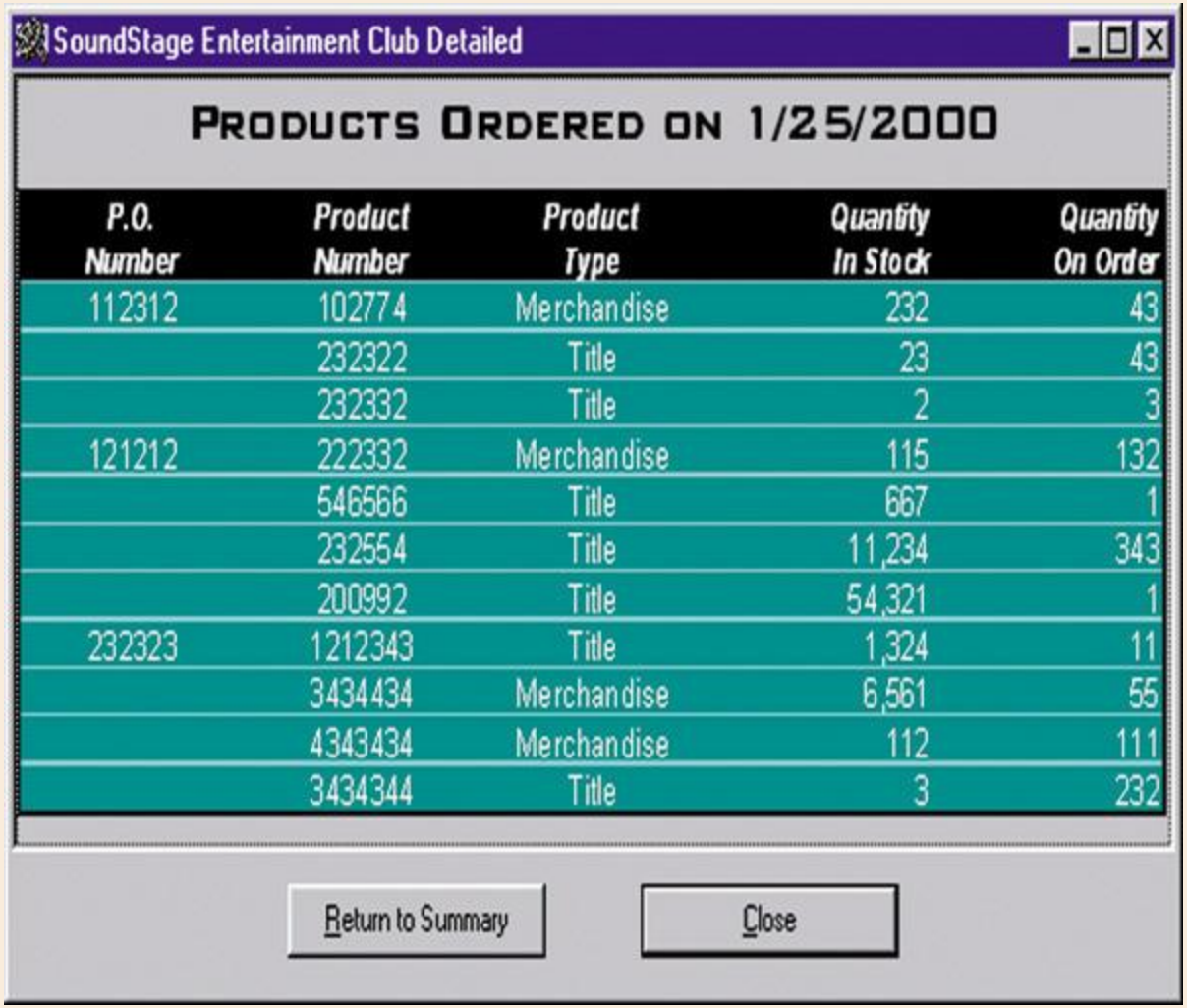
Summary report – an internal output that categorizes information for managers

- Do not have to wade through details.
- Increasingly presented in graphical formats using charts
- Example: A count of customers by region

Exception report – An internal output that filters data to report exceptions to some condition or standard.

- Example: A listing of customers with past due accounts

Detailed Report


SoundStage Entertainment Club Detailed

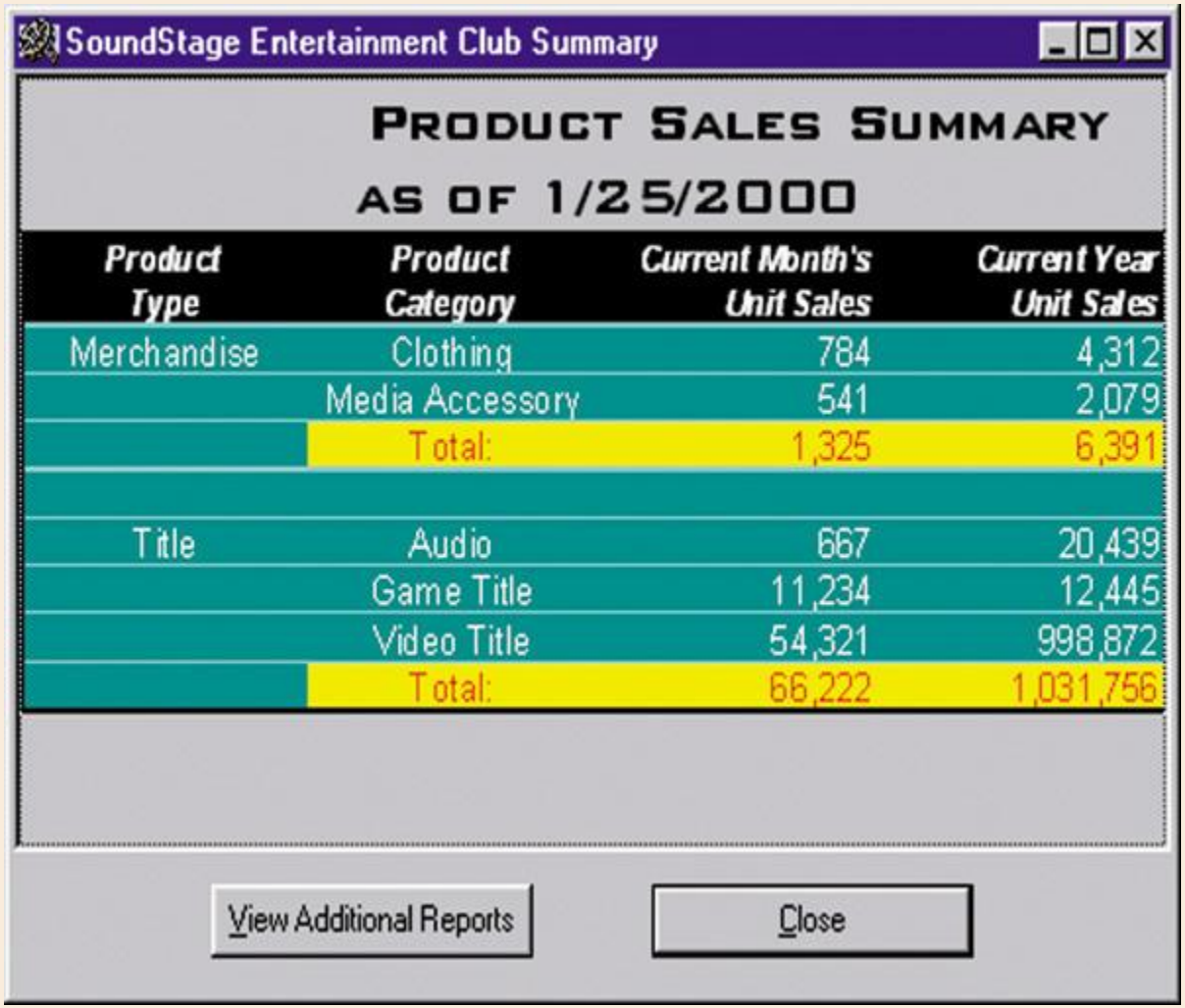
PRODUCTS ORDERED ON 1/25/2000

P.O. Number	Product Number	Product Type	Quantity In Stock	Quantity On Order
112312	102774	Merchandise	232	43
	232322	Title	23	43
	232332	Title	2	3
121212	222332	Merchandise	115	132
	546566	Title	667	1
	232554	Title	11,234	343
	200992	Title	54,321	1
232323	1212343	Title	1,324	11
	3434434	Merchandise	6,561	55
	4343434	Merchandise	112	111
	3434344	Title	3	232

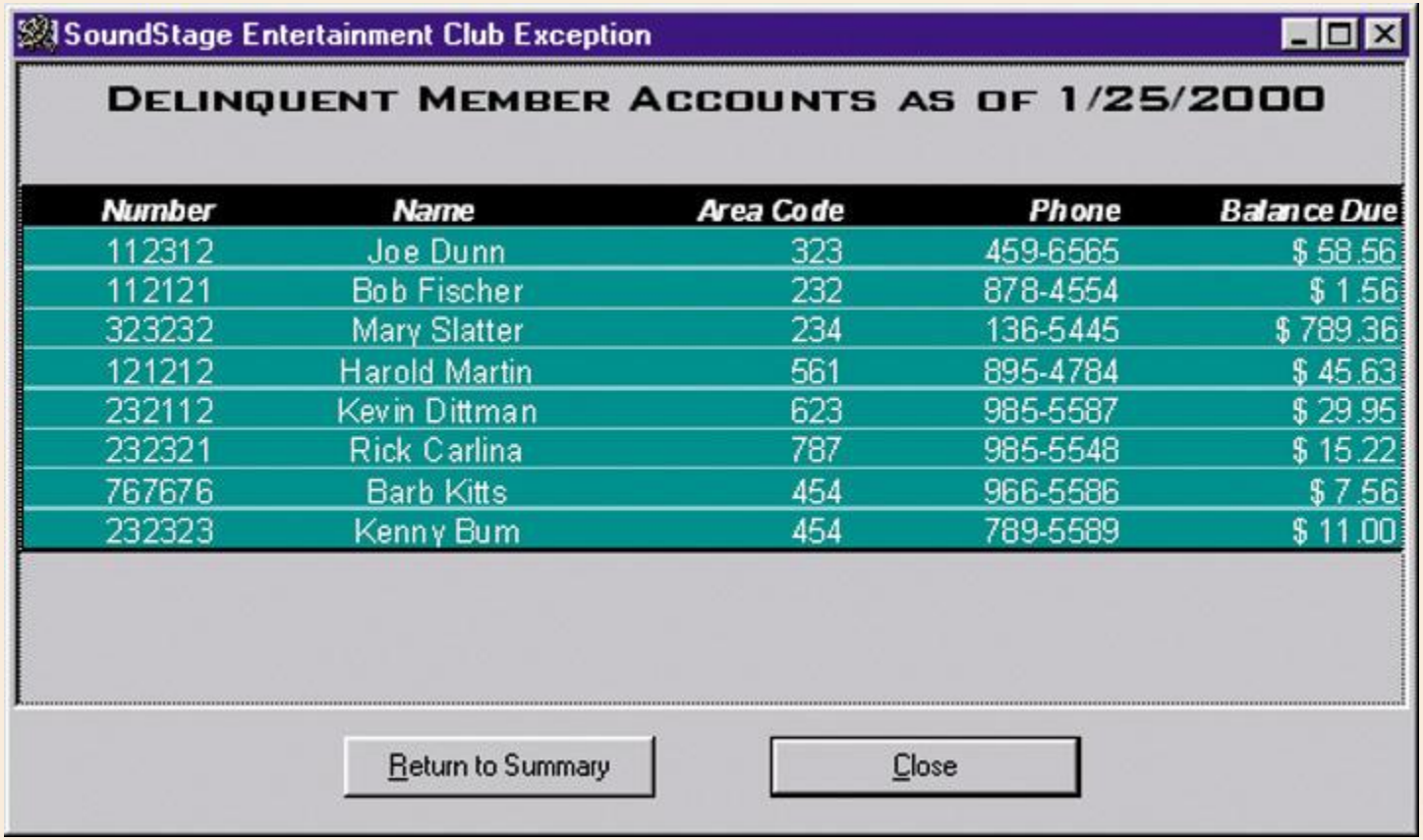
Return to Summary

Close

Summary Report



Exception Report



External Outputs

External outputs – an output that leaves the organization organization.

- Intended for customers, suppliers, partners, or regulatory agencies.

Turnaround documents – an external output that may re-enter the system as an input.

- Most “bills” and invoices include a stub to be returned by the customer with payment.

External Document

SoundStage Entertainment Club
Fax 317-494-5222

PURCHASE ORDER

The following number must appear on all related correspondence, shipping papers, and invoices:
P.O. NUMBER: 712812

To:
CBS Fox Video Distribution
26253 Rodeo Dr
Hollywood, CA

Ship To:
SoundStage Entertainment Club
Shipping/Receiving Station
Building A
2630 Darwin Drive
Indianapolis, IN 45213

P.O. DATE	REQUISITIONER	SHIP VIA	F.O.B. POINT	TERMS
5-3-06	LDB	UPS		Net 30

QTY	DESCRIPTION	UNIT PRICE	TOTAL
20000	Star Wars: Revenge of the Sith (VHS)	15.99	319,800.00
3000	Star Wars: Revenge of the Sith (DVD Dolby Digital)	19.9	59,970.00
500	Star Wars: Revenge of the Sith (DVD DTS)	24.99	12,495.00
8000	Star Wars: Revenge of the Sith (PlayStation II)	16.99	135,920.00
400	Star Wars: Revenge of the Sith Soundtrack (CD)	16.99	6,796.00
600	Star Wars: Revenge of the Sith Theater Poster	4.99	2,994.00
		Subtotal	537,975.00
		Tax	37,658.25
		Total	575,633.25

1. Please send two copies of your invoice.
2. Enter this order in accordance with the prices, terms, delivery method, and specifications listed above.
3. Please notify us immediately if you are unable to ship as specified.

Madge Worthy 5-4-06
Authorized by Date

Turnaround Document

SoundStage Entertainment Club
2630 Darwin Drive - Bldg B
Indianapolis, IN 45213
317 496 0998 fax 317 494 0999

Invoice No. 301231

INVOICE

Customer

Name	KATRINA SMITH			
Address	3019 DURAC DR			
City	LITTLE ROCK	State AR	ZIP 42653	
Phone	502-430-4545			

Due Date	2/24/06
Order No.	346910

Payment Amt

Detach and return top portion with payment

Qty	Description	Unit Price	TOTAL
1	EAGLES HELL FREEZES OVER (DVD DD)	$19.99	$19.99
1	THE GRAMMY BOX (CD) ***COUNTS AS 3 CREDITS	$21.99	$21.99
1	GONE WITH THE WIND DIRECTORS CUT (DVD DS)	$17.99	$17.99
1	SIXTH SENSE (VHS)	FREE SS CR	$0.00
1	A BUG'S LIFE (VHS)	FREE SS CR	$0.00
1	NASCAR 2000 (VHS) *** CLOSEOUT (NO SS CR)	$9.99	$9.99
	10 SOUNDSTAGE CREDITS WERE USED TO PAY FOR PART OF THIS PURCHASE		
	WE APPRECIATE THE FINE MANNER IN WHICH YOU HAVE PAID ON YOUR ACCOUNT. IN APPRECIATION WE HAVE ADDED 7 SOUNDSTAGE CREDITS TO YOUR ACCOUNT		
	YOU CAN EARN 7 CREDITS BY PAYING THIS INVOICE BY THE DUE DATE		
		SubTotal	$69.96
		Shipping & Handling	$7.00
		Taxes	$2.95
		TOTAL	$79.91

Payment Details

- ◯ Cash
- ◯ Check
- ◯ Credit Card

Name _____
CC # _____
Expires _____

Office Use Only

Please return top portion invoice with payment. Make checks payable to: SoundStage Entertainment Club.

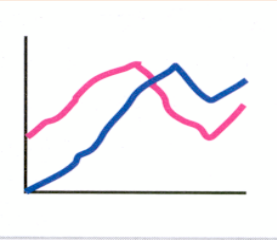
RETURN TOP PORTION WITH PAYMENT

Implementation Methods for Outputs

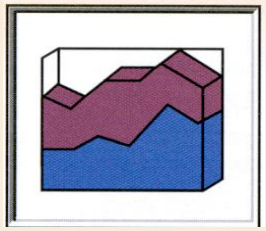
- Printed output
  - Tabular output presents information in columns.
  - Zoned output places text and numbers into designated areas
- Screen output
  - Graphic output is the use of pictorial charts to convey information and demonstrate trends and relationships that cannot be easily seen in tabular formats.
- Point-of-sale terminals
- Multimedia
- E-mail
- Hyperlinks
- Microfilm or microfiche

Chart Types

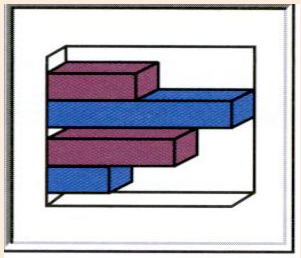
Line charts show one or more series of data over a period of time. They are useful for summarizing and showing data at regular intervals. Each line represents one series or category of data.



Area charts are similar to line charts except that the focus is on the area under the line. That area is useful for summarizing and showing the change in data over time. Each line represents one series or category of data.



Bar charts are useful for comparing series or categories of data. Each bar represents on series or category of data.



Column charts are similar to bar charts except that the bars are vertical. Also, a series of column charts may be used to compare the same categories at different times or time intervals. Each bar represents one series or category of data.

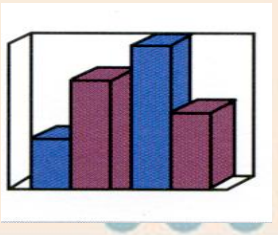
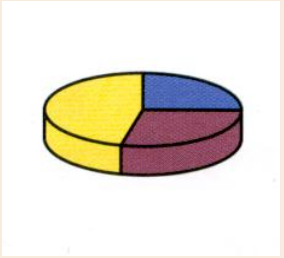
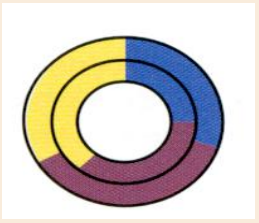


Chart Types (concluded)

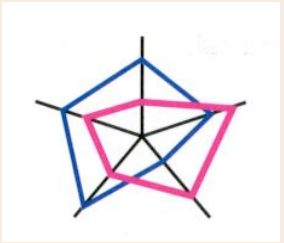
Pie charts show the relationship of parts to a whole. They are useful for summarizing percentages of a whole within a single series of data. Each slice represents one item in that series of data.



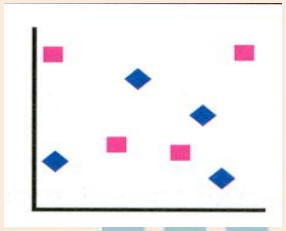
Donut charts are similar to pie charts except that they can show multiple series or categories of data, each as its own concentric ring. Within each ring, a slice of that ring represents one item in that series of data.



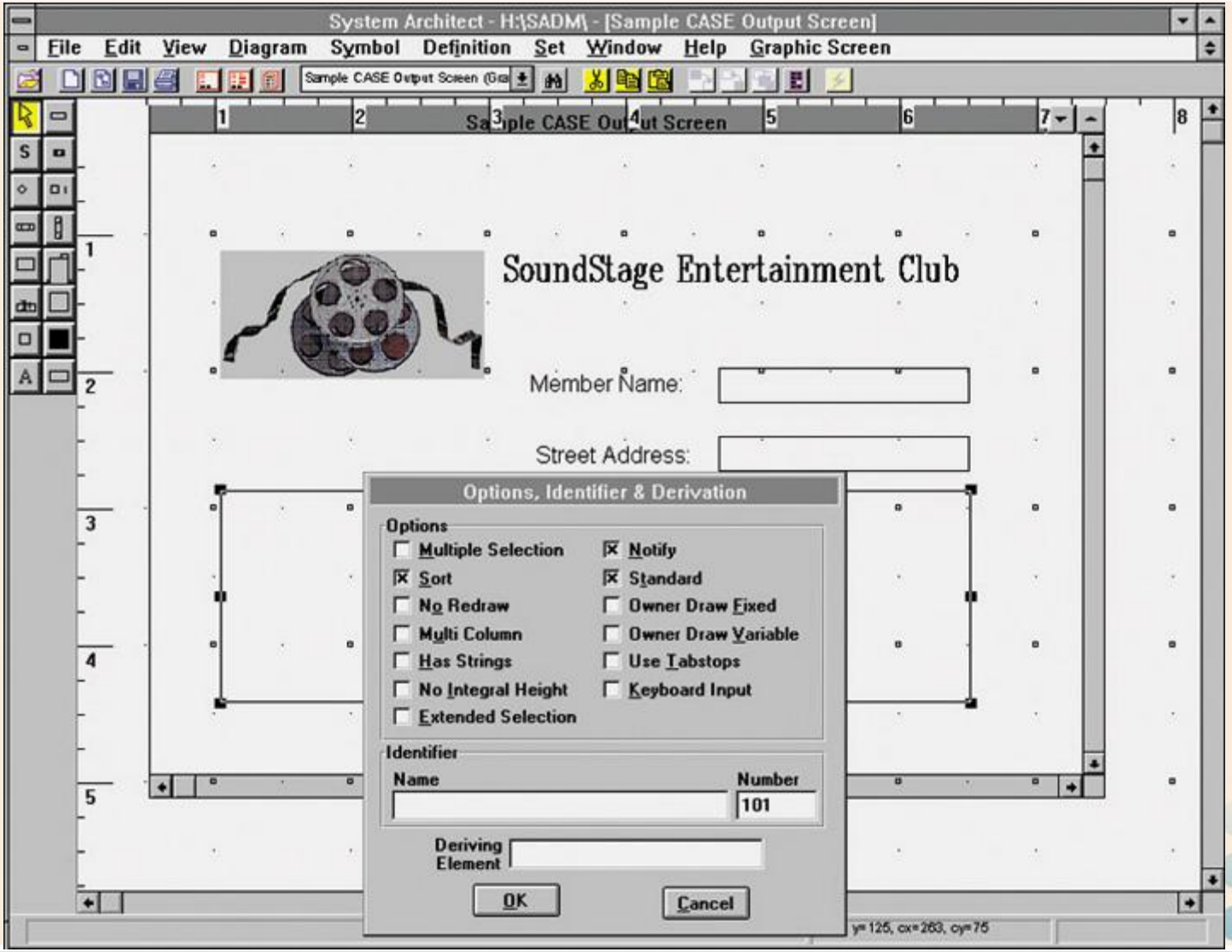
Radar charts are useful for comparing different aspects of more than one series or category of data. Each data series is represented as a geometric shape around a central point. Multiple series are overlaid so they can be compared.



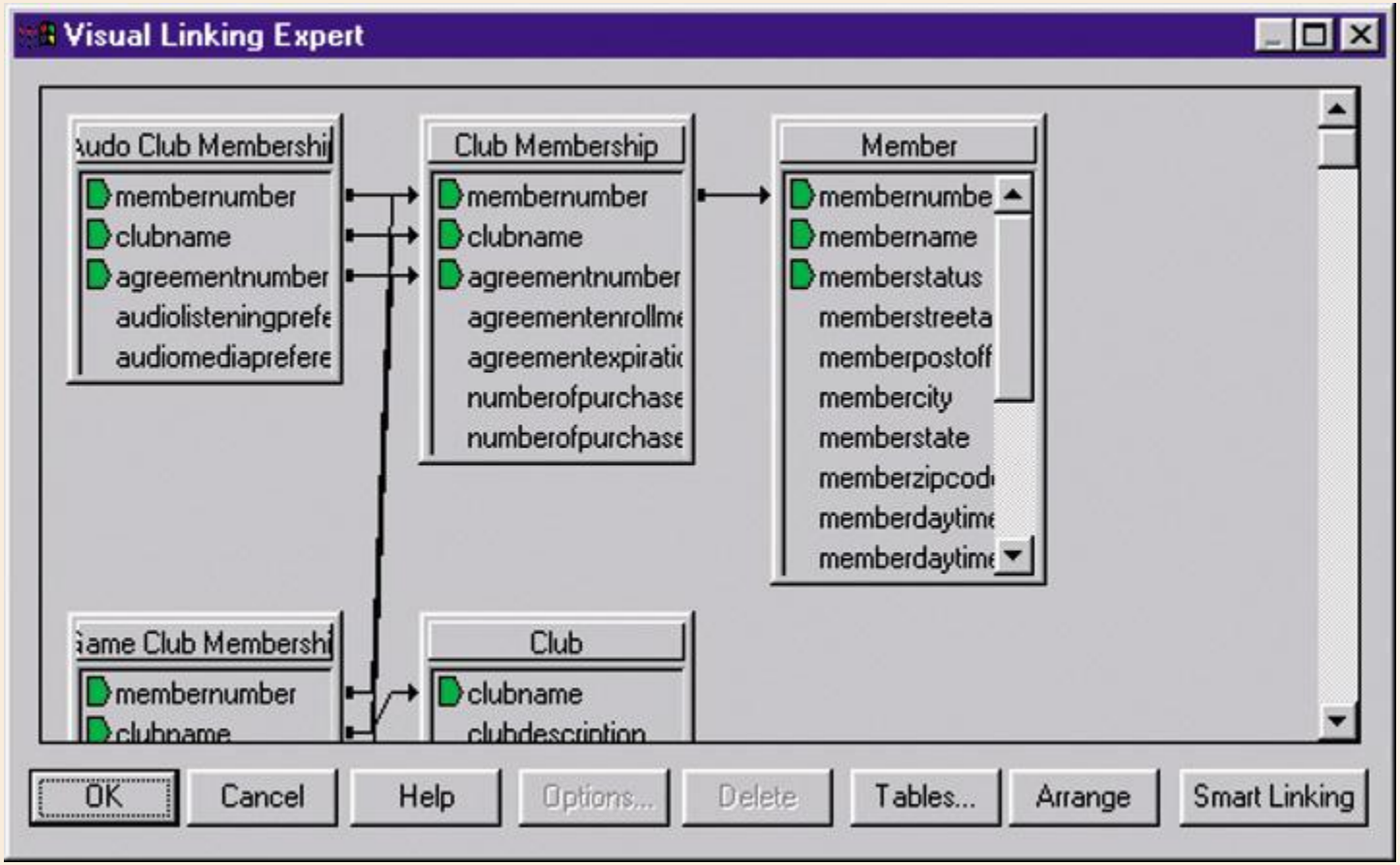
Scatter charts are useful for showing the relationship between two or more series or categories of data measured at uneven intervals of time. Each series is represented by data points using either different colors or bullets.



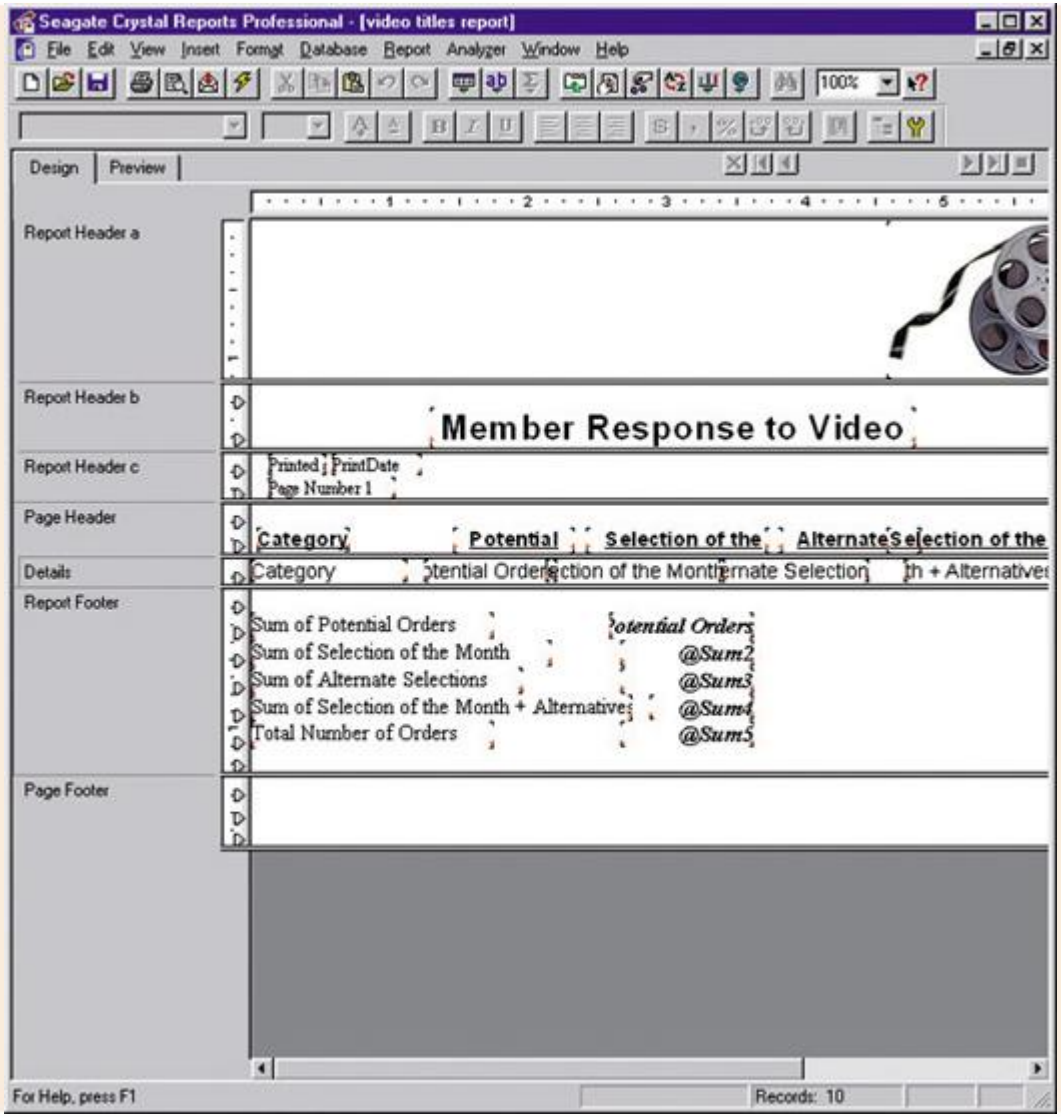
Output Design with a Modern CASE Tool



Output Design with a Report Writer Tool



Output Design with a Report Writer Tool (continued)



Output Design Guidelines

1. Outputs should be simple to read and interpret.
   - Include a title.
   - Date and time stamp.
   - Include sections and headings to segment information.
   - Clearly label all fields and columns.
   - Include legends for all abbreviations.
   - Include only required information. Online provide methods to expand and contract information.
   - Report information in format that does not have to be manually edited.
   - Information should be balanced across the page or screen.
   - Provide for easy navigation.
   - Avoid computer jargon and error messages.

Output Design Guidelines (cont.)

2. The timing of outputs is important.
   - This can affect how the output is designed an implemented
3. The distribution of (or access to) outputs must be sufficient to assist all relevant users.
   - The choice of implementation method affects distribution
4. Outputs must be acceptable to the system users who will receive them.
   - Systems analyst must understand how the recipient plans to use the output

Output Design Process

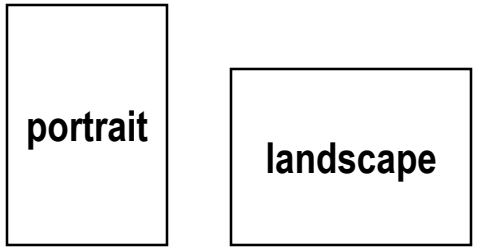
1. Identify system outputs and review logical requirements.
2. Specify physical output requirements.
3. As necessary, design any preprinted forms.
4. Design, validate and test outputs using some combination of:
    1. Layout tools (e.g., hand sketches, spacing charts, or CASE tools.
    2. Prototyping tools (e.g., spreadsheet, PC DBMS, 4GL)
    3. Code generating tools (e.g., report writer)

A Logical Data Structure for Output Requirements

```
INVOICE  =   INVOICE NUMBER
             +   INVOICE DATE
             +   CUSTOMER NUMBER
             +   CUSTOMER NAME
             +   CUSTOMER BILLING ADDRESS = ADDRESS >
             +   1 {  SERVICE DATE +
                      SERVICE PROVIDED +
                      SERVICE CHARGE  } n
             +   PREVIOUS BALANCE DUE
             +   PAYMENTS RECEIVED
             +   TOTAL NEW SERVICE CHARGES
             +   INTEREST CHARGES
             +   NEW BALANCE DUE
             +   MINIMUM PAYMENT DUE
             +   PAYMENT DUE DATE
             +   ( DEFAULT CREDIT CARD NUMBER )
             +   (  [  CREDIT MESSAGE, PAYMENT MESSAGE  ]  )

ADDRESS      =   (  POST OFFICE BOX NUMBER  )
             +   STREET ADDRESS
             +   CITY
             +   STATE
             +   POSTAL ZONE
```

Tabular Report Design Principles

Design Issue	Design Guideline	Examples
Page Size	Today the page sizes of choice are standard (8½" x 11") and legal (8½" x 14").	Not applicable
Page Orientation	Portrait orientation is often preferred because it is oriented the way we orient most books and reports; however, landscape is often necessitated for tabular reports because more columns can be printed.	
Page Headings	At a minimum, page headers should include a recognizable report title, date and time, and page numbers.	JAN 4, 2004 Page 4 of 8 Oversubscriptions By Course
Report Legends	A legend is an explanation of abbreviations, colors, or codes used in a report. In a printed report, a legend can be printed on only the first or last page. On a display screen, a legend can be made available as a pop-up dialogue box.	REPORT LEGEND SEATS – Number of seats in classroom LIM – Course Enrollment Limit

Tabular Report Design Principles (cont.)

Design Issue	Design Guideline	Examples
Column Headings	Column headings should be short and descriptive. Avoid abbreviations or include a Report Legend	Self-explanatory
Heading Alignments	Alignment should be tested with users for preferences with a special emphasis on the risk of misinterpretation of the information.	NAME STATUS AMOUNT XXXXXXX XXX X $X.XX
Column Spacing	If columns are too close, users may not properly differentiate between the columns. If they are too far apart, the user may have difficulty following a single row. Rule of thumb is to use 3-5 spaces between each.	Self explanatory
Row Headings	The first one or two columns should identify data that differentiates each row. Rows should be sequenced in a fashion that supports their use. Frequently rows are sorted on a numerical key or alphabetically.	STUDENT ID STUDENT NAME 999-38-8476 Mary Ellen Kukow 999-39-5857 Robert Flynn

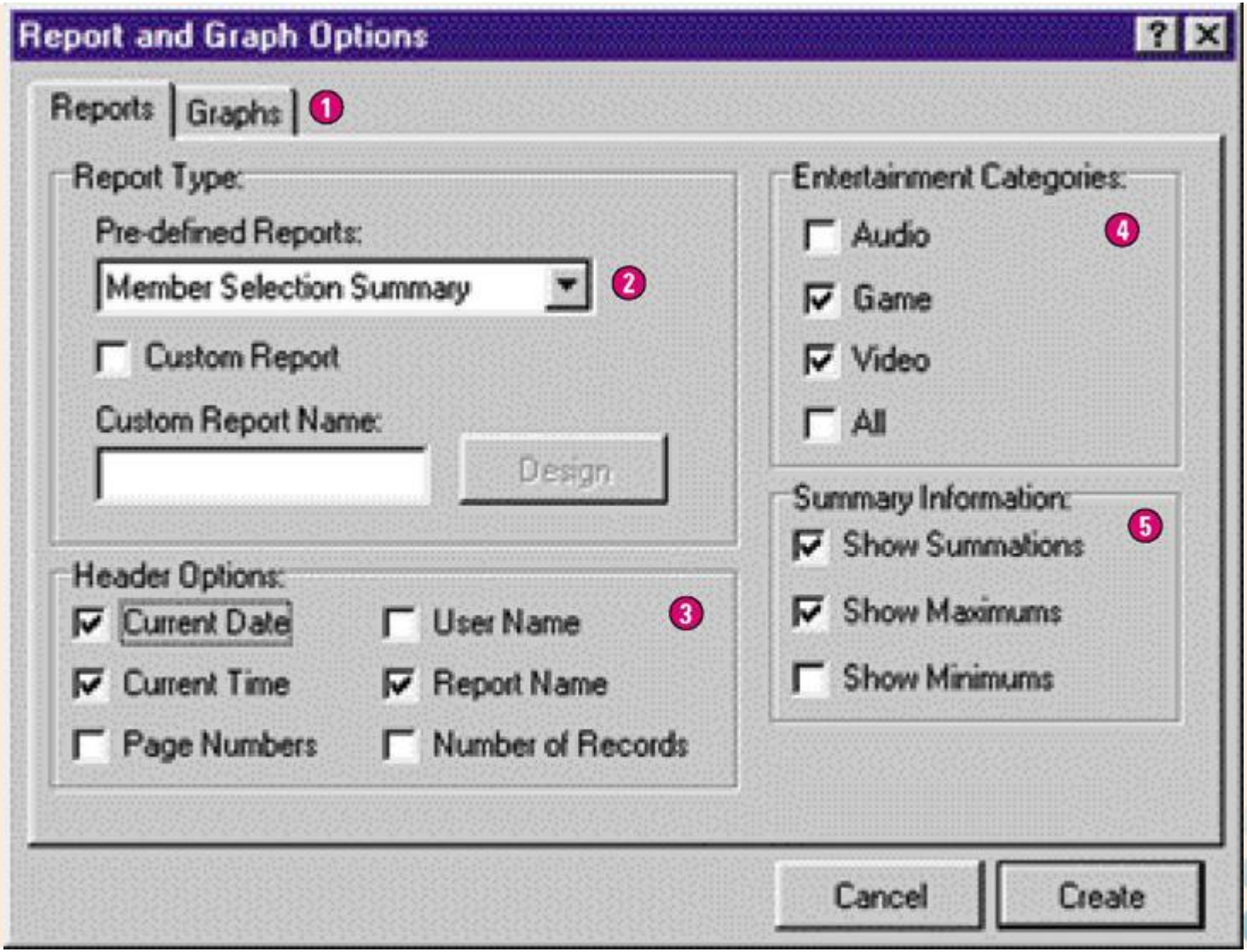
Tabular Report Design Principles (concluded)

Design Issue	Design Guideline	Examples
Formatting	Data is often stored without formatting characters to save storage space. Outputs should reformat data to match the users' norms.	As stored: 307877262 8004445454 02272004 As output: 307-87-7262 (800) 444-5454 Feb 27, 2004
Control Breaks	Groups of rows should be logically grouped in the report. The transition from one group to the next is called a control break and is frequently followed by subtotals for the group.	RANK NAME SALARY CPT JANEWAY, K 175,000 CPT KIRK, J 225,000 CPT PICARD, J 200,000 CPT SISKO, B 165,000 CAPTAINS TOTAL 765,000 LTC CHAKOTAY 110,000 OTC DATA 125,000 LTC RICKER, W 140,000 LTC SPOCK, S 155,000 EXEC OFFCR TOTAL 530,000
End of Report	The end of a report should be clearly indicated to ensure that users have the entire report.	*** END OF REPORT ***

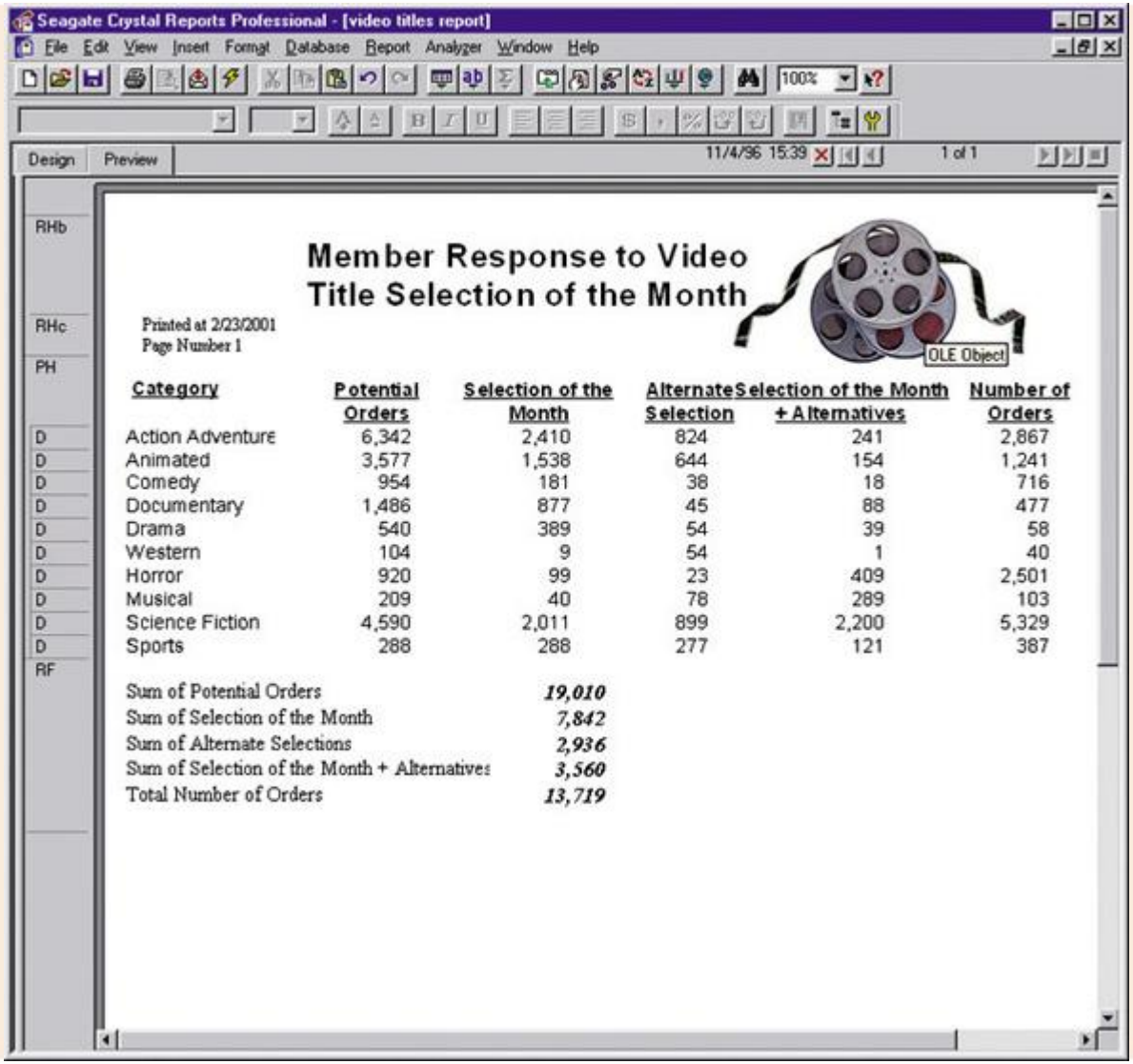
Screen Output Design Principles

Screen Design Consideration	Design Guidelines
Size	The designer should consider the “lowest common denominator.” The default window size should be less than or equal to the worst resolution display in the user community.
Scrolling	On-line outputs have the advantage of not being limited by the physical page. This can also be a disadvantage if important information such as column headings scrolls off the screen. If possible, freeze important headings at the top of a screen.
Navigation	Users should always have a sense of where they are in a network of on-line screens. Users also require the ability to navigate between screens.
Partitioning	In Windows, zones are forms within forms. On the Internet, frames are pages within pages.
Information Hiding	On-line applications offer capabilities to hide information until it is either needed or becomes important. Techniques include drill-down and pop-up dialogue boxes.
Highlighting	Highlighting can call users’ attention to erroneous data, exception data, or specific problems. Highlighting can also be a distraction if misused.
Printing	Always provide users the option to print a permanent copy of the report.

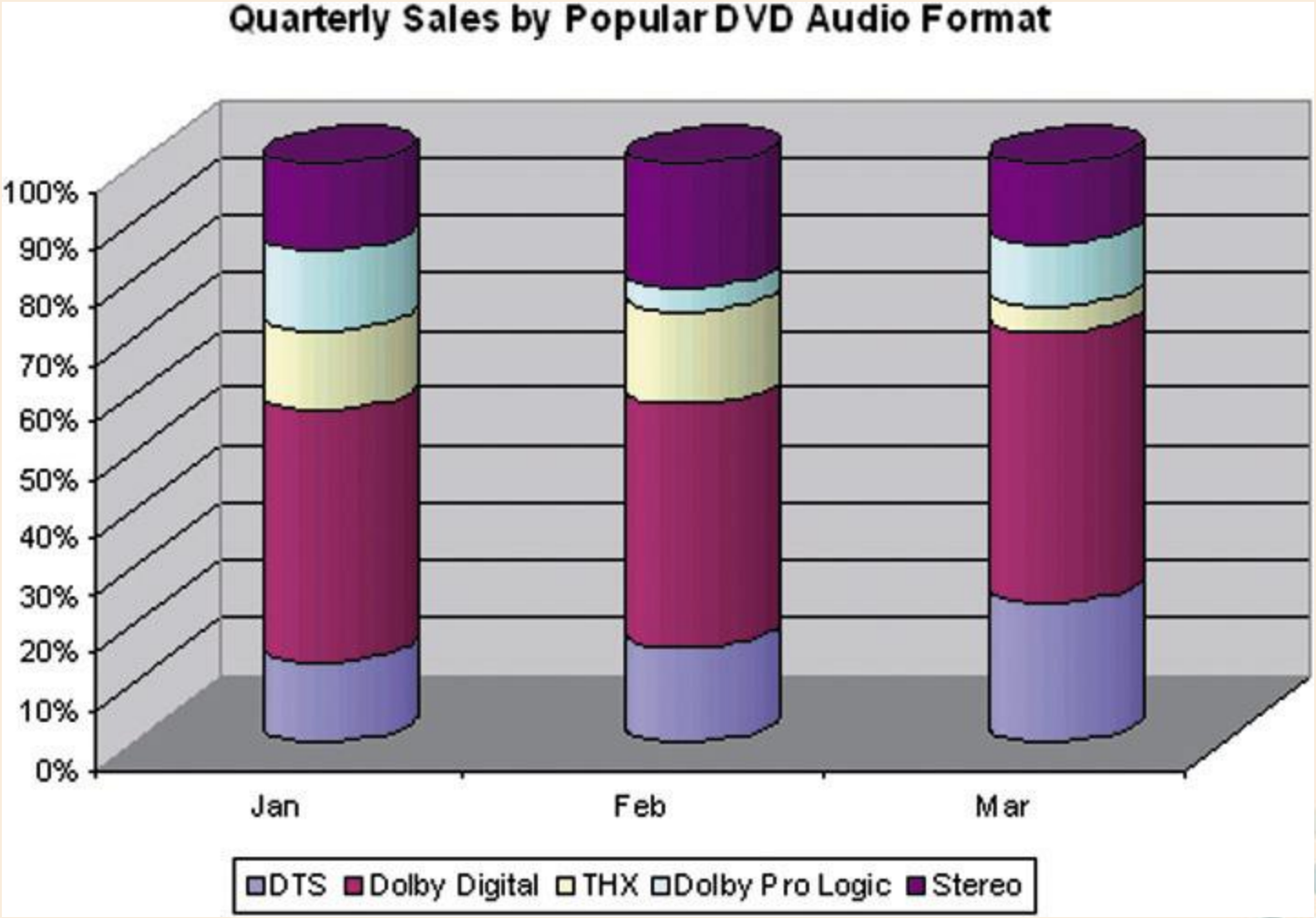
Report Customization



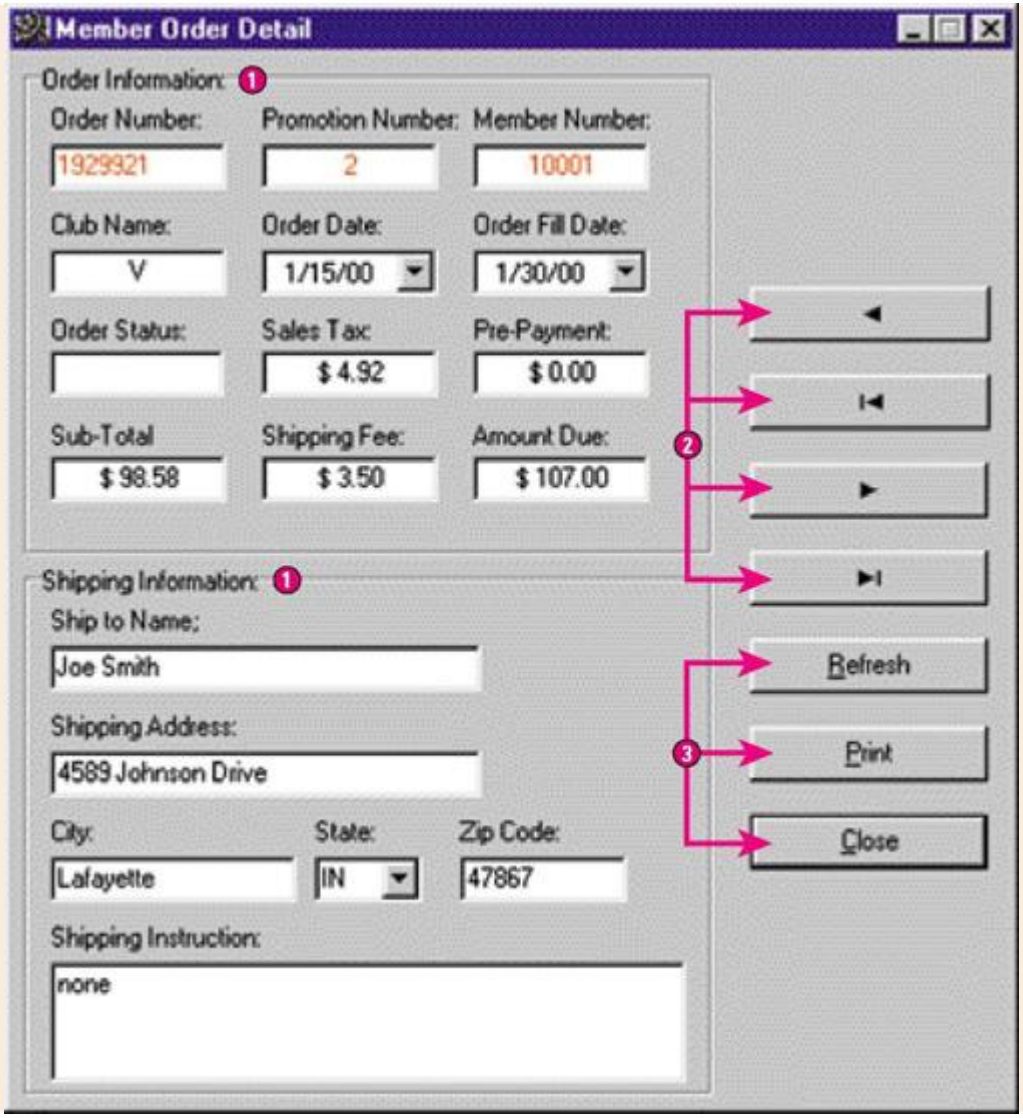
Tabular Report Prototype



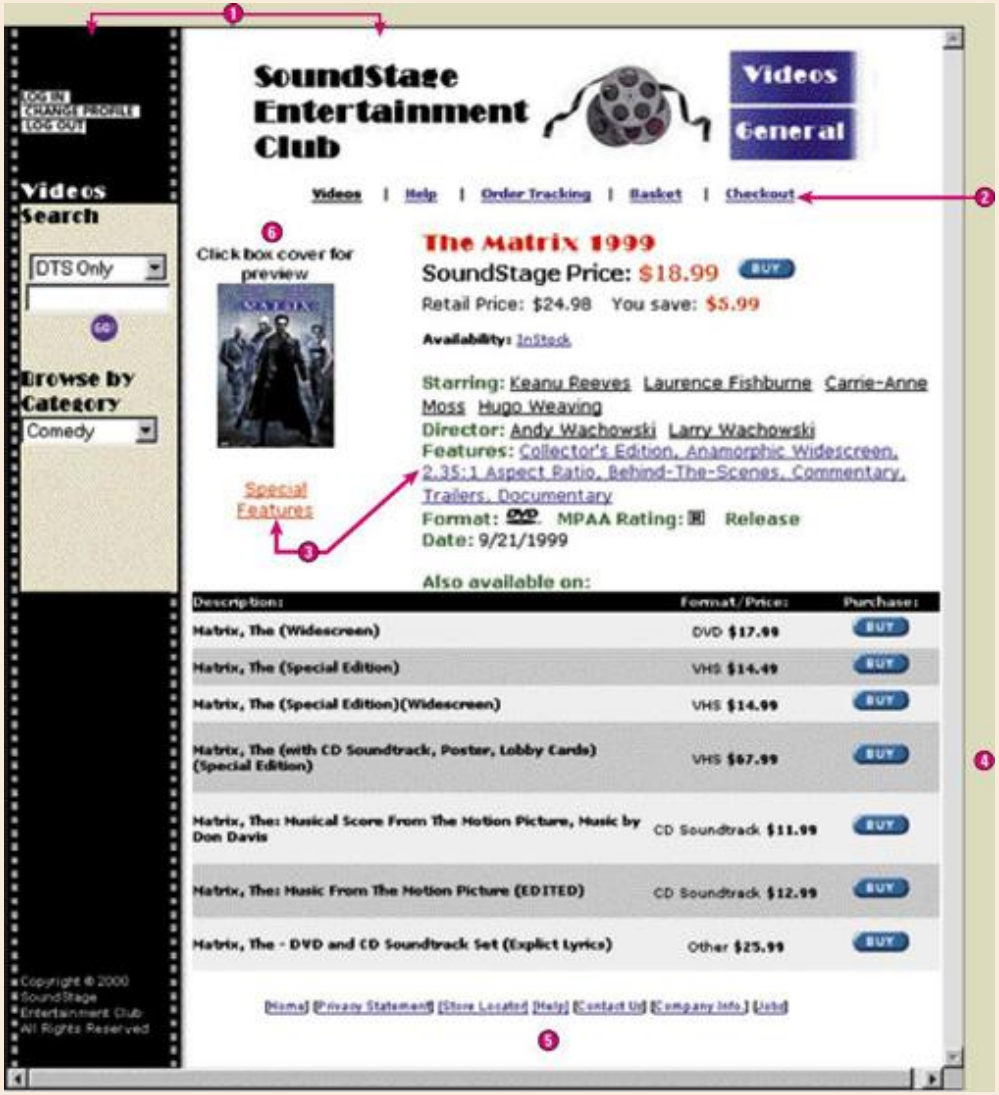
Graphical Report Prototype



Record-at-a-Time Output Prototype



Web Database Output Prototype



Windows/Web Media Player Output Prototype