CHAPTER 6

Output and User Interface Design
(Phase 3: Systems Design)

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OUTPUT DESIGN

Before designing output, ask yourself several questions:

- What is the purpose of the output?
- Who wants the information, why is it needed, and how will it be used?
- What specific information will be included?
- Will the output be printed, viewed on-screen, or both? What type of device will the output go to?
- When will the information be provided, and how often must it be updated?
- Do security or confidentiality issues exist?

The design process should not begin until you have answered those questions.
Type of Output

- Internet-Based Information Delivery
  Millions of firms use the Internet to reach new customers and markets around the world. To support the explosive growth in e-commerce, Web designers must provide user-friendly screen interfaces that display output and accept input from customers.

- E-Mail
  E-Mail has become an essential means of internal and external business communication. Employees send and receive e-mail on local or wide area networks, including the Internet. Companies send new product information to customers via e-mail, and financial services companies use e-mail messages to confirm online stock trades.
- Audio
  
  Audio output can be attached to an e-mail message or inserted as an audio clip in a Microsoft Word document.

- Automated Facsimile Systems
  
  Some firms use automated facsimile, sometimes called faxback systems, to allow a customer to request a fax using e-mail, via the company Web site, or by telephone.

- Computer Output Microfilm (COM)
  
  Computer output microfilm (COM) systems, such as microfilm and microfiche, capture an image of a document and produce film output.

- Computer Output To Laser Disk (COLD)
  
  Computer output to laser disk (COLD) is another way to store images of paper documents. Using COLD technology, a paper document is scanned, and the digital image is stored on a high-density laser disk medium.
SPECIALIZED FORMS OF OUTPUT

An incredibly diverse marketplace requires a variety of specialized output. Consider the following examples:

- **Retail point-of-sale terminals** that handle computer-based credit card transactions, print receipts, and update inventory records.
- **Automatic teller machines (ATMs)** that process bank transactions and point deposit and withdrawal slips.
- **Special-purpose printers** that produce labels, photos, driver’s licenses and, in some states, lottery tickets.
- **Plotters that produce high-quality images** such as blueprints, maps, and electronic circuit diagrams.
- **Digitized photo** that companies can print on employee identification cards.
- **Programmable devices** such as television sets, VCRs, and microwave ovens that display visual output.
PRINTED AND SCREEN OUTPUT

Report

Whether printed or viewed on-screen, reports should be attractive and easy to understand. Systems analysts should realize managers sometimes judge an entire project by the quality of the reports they receive.

Detail Reports

A detail report produces one or more lines of output for each record processed. Each line of output printed is called a detail line.
<table>
<thead>
<tr>
<th>Month</th>
<th>Employee Name</th>
<th>Practice Area</th>
<th>Total Hours</th>
<th>Chargeable Hours</th>
<th>Gross Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 09</td>
<td>Gary Miller</td>
<td>Business Intelligence</td>
<td>140</td>
<td>120</td>
<td>$18000</td>
</tr>
<tr>
<td>Jan 09</td>
<td>William Campbell</td>
<td>ERP</td>
<td>160</td>
<td>110</td>
<td>$16500</td>
</tr>
<tr>
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<td>Application Development</td>
<td>136</td>
<td>100</td>
<td>$15000</td>
</tr>
<tr>
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<td>CRM</td>
<td>140</td>
<td>100</td>
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<td>Chris Norris</td>
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<td>$15750</td>
</tr>
</tbody>
</table>

**Figure 6-1** A detail report with one printed line per employee.
This detail report contains the same data.
Exception Reports

An exception report displays only those records that meet a specific condition or conditions. Exception reports are useful when the user wants information only on records that might require action, but does not need to know the details.

Figure 6-3 An exception report by sales name
Summary Report

Upper-level managers often want to see total figures and do not need supporting details.

Figure 6-4 Summary report
○ **User Involvement in Report Design**

  Printed reports are an important way of delivering information to users, so recipients should approve all report designs in advance. To avoid problem, you should submit each design for approval as you complete it, rather than waiting until you finish all report designs.

○ **Report Design Principles**

  Printed reports must be attractive, professional, and easy to read. Good report design, like any other aspect of the user interface, requires effort and attention to detail.
• Report Headers And Footers

Every report should have a report header and a report footer. The report header, which appears at the beginning of the report, identifies the report, and contains the report title, date, and other necessary information. The report footer, which appears at the end of the report, can include grand totals for numeric fields and other end-of-report information.

• Page Headers And Footers

Every page should include a page header, which appears at the top of the page and includes the column headings that identify the data. The headings should be short but descriptive. Avoid abbreviations unless you know that users will understand them clearly. Either a page header or a page footer, which appears at the bottom of the page, is used to display the report title and the page number.
• **Column Heading Alignment**

String should be left-justified, number should be right-justified, and some data should be center-justified.

• **Column Spacing**

You should space columns of information carefully. A crowded report is hard to read, and large gaps between columns make it difficult for the eye to follow a line.

• **Grouping Detail Lines**

Often, it is meaningful to arrange detail lines in groups, based on a control field.
Guidelines for User Interface Design

It is important to design a user interface that is easy to use, attractive, and efficient. When you create a user interface, you should follow eight basic guidelines. These guidelines also apply to data entry screen design.

1. Focus on basic objectives.
2. Build an interface that is easy to learn and use.
3. Provide features that promote efficiency.
4. Make it easy for users to obtain help or correct errors.
5. Minimize input data problems.
6. Provide feedback to users.
7. Create an attractive layout and design.
8. Use familiar terms and images.
Focus On Basic Objectives

- Facilitate the system design objectives, rather than calling attention to the interface.
- Create a design that is easy to learn and remember.
- Design the interface to improve user efficiency and productivity.
- Write commands, actions, and system responses that are consistent and predictable.
- Minimize data entry problems.
- Allow users to correct errors easily.
- Create a logical and attractive layout.
Build An Interface That Is Easy To Learn And Use

• Label clearly all controls, buttons, and icons.

• Select only those images that users can understand easily, if you use images to identify icons or controls. Also, provide on-screen instructions that are logical, concise, and clear.

• Show all commands in a list of menu items, but dim any commands that are not currently available.

• Make it easy to navigate or return to any level in the menu structure.
Provide Features That Promote Efficiency

- Organize tasks, commands, and functions in groups that resemble actual business operation. You should group functions and submenu items in a multilevel menu hierarchy, or tree, that is logical and reflects how users typically perform the tasks,
- Create alphabetical menu lists or place the selections used frequently at the top of the menu list. No universally accepted approach to menu item placement exists. The best strategy is to design a prototype and obtain feedback from users. Some applications, such as Microsoft Word, even allow menus to show recently used commands first. Some users might accept that design, but others might find it distracting.
- Provide shortcuts so experienced users can avoid multiple menu levels. You can create shortcuts using hot keys that allow a user to press the ALT key + the underlined letter of a command.
• Use default values if the majority of values in a field are the same.
• Use a duplicate value function that enables users to insert the value from the same field in the previous record.
• Use a natural language feature that allows users to type commands or requests in normal English phrases.

Make It Easy For Users To Obtain Help Or Correct Errors

• Ensure that Help is always available. Help screens should provide information about menu choices, procedures, shortcuts, and error.
• Provide user-selected Help and context sensitive Help. User-selected Help displays information when the use requests it. By making appropriate choices through the menus and submenus, the user eventually reaches a screen with the desired information.
• Provide a direct route for users to return to the point form where Help was requested. Title every Help screen to identify the topic, and keep Help text simple and concise. Insert blank lines between paragraphs to make Help easier to read, and provide examples where appropriate.

• Include contact information, such as a telephone extension or e-mail address if a department or Help desk is responsible for assisting users.

• Require user confirmation before data deletion and provide a method of recovering data that is deleted inadvertently. Build in safeguards that prevent critical data from being changed or erased.

• Provide an Undo key or a menu choice that allows the user to eradicate the results of the most recent command or action.

• When a user-entered command contains an error, highlight the erroneous part and allow the user to make the correction without retyping the entire command.

• Use hypertext links to assist users as they navigate through Help topics.
Minimize Input Data Problems

• **Provide data validation checks.** More information on data validation techniques is provided in the section on input design later.

• **Display even-driven messages and reminders.** Just as context-sensitive Help is important to users, it is desirable to display an appropriate message when it is time for the user to perform a certain task.

• **Establish a list of predefined values that users can click to select.** Predefined values prevent spelling errors. Avoid inappropriate data in a field, and make the user’s job easier.

• **Build in rules that enforce data integrity.**

• **Use input masks,** which are templates or patterns that make it easier for users to enter data.
Provide Feedback To Users

- Display messages at a logical place on the screen, and be consistent.
- Alert users to lengthy processing times or delays. Give users an on-screen progress report, especially if the delay is lengthy.
- Allow messages to remain on the screen long enough for users to read them.
- Let the user know whether the task or operation was successful or not.
- Provide a text explanation if you use an icon or image on a control button. This helps the user to identify the control button when moving the mouse pointer over the icon or image.
- Use messages that are specific, understandable, and professional. Avoid messages that are cute, cryptic, or vague, such as: ERROR—You have entered an unacceptable value or Error DE4-16. Better example are: Enter a number between 1 and 5.
Create An Attractive Layout And Design

- Use appropriate colors to highlight different areas of the screen; avoid gaudy and bright colors.
- Use special effects sparingly.
- Use hyperlinks that allow users to jump to related topics.
- Group related objects and information. Visualize the screen the way a user will see it, and simulate the tasks that the user will perform.
- Screen density is important. Keep screen displays uncluttered, with enough space to create an attractive, readable design.
- Display titles, messages, and instructions in a consistent manner and in the same general locations on all screens.
- Use consistent terminology.
- Ensure that commands always will have the same effect.
• **Provide Features That Promote Efficiency**
  
  • Organize tasks, commands, and business operation. You should group functions and submenu items in a multilevel menu hierarchy, or tree, that is logical and reflects how users typically perform the tasks.
  
  • Ensure that similar mouse actions will produce the same results throughout the application. The results of pointing, clicking, and double-clicking should be consistent and predictable.
  
  • When the user enters data that completely fills the field, do not move automatically to the next field. Instead, require the user to confirm the entry by pressing the ENTER key or TAB key at the end of every fill-in field.

**Use Familiar Terms And Images**

• Remember that users are accustomed to a pattern of red = stop, yellow = caution, and green = go. Stick to that pattern and use it when appropriate to reinforce on-screen instructions.

• **Provide a keystroke alternative** for each menu command, with easy-to-remember letters, such as **File**, **Exit**, and **Help**.
• Provide a Windows look and feel in your interface design if users are familiar with Windows-base applications.
• Avoid complex terms and technical jargon; select terms that come from everyday business processes and the vocabulary of a typical user.

**User Interface Controls**

The designer can include many control features, such as menu bars, toolbars, dialog boxes, command buttons, spin bars, and calendar controls, among others.

The menu bar at the top of the screen displays the main menu options. Some software packages allow you to create customized menu bars and toolbars. You can add a shortcut feature that lets a user select a menu command either by clicking the desired choice or by pressing the ALT key + the underlined letter. Some forms also use a toolbar that contains icons or buttons that represent shortcuts for executing common commands.
A command button initiates an action such as printing a form or requesting Help.

- **A dialog box** allows a user to enter information about a task that the system will perform.
- **A text box** can display messages or provide a place for a user to enter data.
- **A toggle button** is used to represent on or off status — clicking the toggle button switches to the other status.
- **A list box** displays a list of choices that the user can select. If the list does not fit in the box, a scroll bar allows the user to move through the available choices.
- **A drop-down list box** displays the current selection; when the user clicks the arrow, a list of the available choices displays.
• A check box is used to select one or more choices from a group. Selected options are represented by a checkmark or an X.

• A calendar control allows the user to select a date that the system will use as a field value.

Reference