Interaction

Interaction refers to the user's communication with the computer. The user and computer communicate through the use of various controls. Choosing a control is not just a matter of following a recipe. Selecting the right control means the designer needs to juggle industry standards, corporate standards, and user's needs. This section was developed with information from three sources: Microsoft's Web site (http://www.microsoft.com/win32dev/uiguide/default.htm); "The Windows Interface Guidelines for Software Design" published by Microsoft Press; and "GUI Design Essentials" by Weinschenk, Jamar and Yeo. Please refer to these publications for additional information or clarification. This document should be considered the "GUI Look and Feel Standard" to follow for interaction issues in all application developed by the DENR ITS department. If an area is not covered here or any of the other three sections (Presentation, Structure, Re-Use) of the Standards, then refer to one of the three sources mentioned above.

Command Buttons

Command buttons are the primary way that users take action within dialog boxes. Use command buttons to convey to users the major actions of a particular box. Users should be able to glance at a dialog box and know what to do there and what to do next, based on the names and placement of the command buttons.

Use command buttons only for frequent or critical immediate actions

Use command buttons when users are going to take immediate action that is frequent or critical (see Figure 9.1). Command buttons act as reminders of what actions can and should be taken. Limit command buttons to a maximum of six on a window. Command button actions can also appear as menu items. If an action is not frequent and not critical, place it on a drop-down menu.
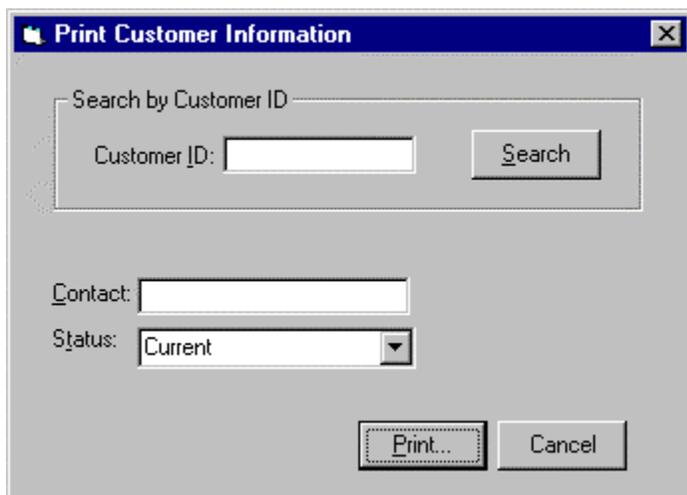

Figure 9.1. Command buttons are for frequent or critical actions.

Label buttons carefully

Make sure the label you use for a command button is clear and concise. For example, use Print Setup, not More. Use labels with multiple words when they are needed to clearly convey the meaning of the button, for example, use Print Current Orders, not Current. However, be concise and omit unnecessary words. Follow book title capitalization rules—capitalize the first letter of all major words.

Label buttons consistently

Choose specific labels for certain functions and use these labels throughout an application and from one application to another. For example, use List to display a table of choices, rather than sometimes List and sometimes Search.

Use industry standards for labels

Some labels have become standard across graphical user interfaces. Use these standard labels if you are performing the functions in Table 9.1.
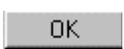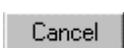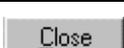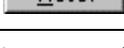
Label	Action	Keyboard Equivalent
OK	Makes changes and closes the window	the Enter key
Cancel	Does not make changes and closes the window	the Escape key
Close	Closes the window when changes can't be made or canceled	C
Reset	Resets to defaults, leaves window open	R
Apply	Makes changes, leaves window open	A
Help	Opens online help	H
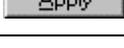
Table 9.1 Standard labels for frequently used actions.

NOTE: Exit should be reserved to exit the application entirely.

Consider replacing the OK button with a specific term

If the OK command button results in a specific function such as printing or deleting, consider using the specific term instead of the generic OK as shown in Figure 9.2.
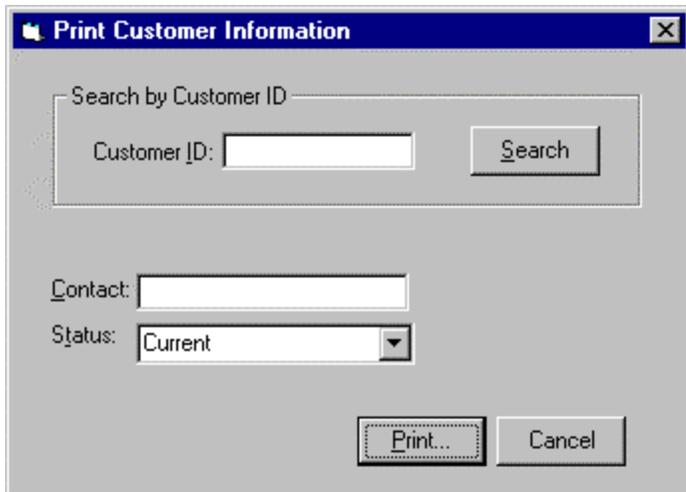
Figure 9.2 Print replaces a generic OK.

Size buttons relative to each other

If the length of text for a series of command buttons in a dialog box is similar, make all the buttons in the dialog box the size of the largest button as shown in Figure 9.3.

Figure 9.3 Buttons with similar length of text are the size of the largest button.

If the text length for a series of command buttons in a dialog box varies, use two button sizes—one for shorter text and another for longer text, as shown in Figure 9.4. This allows you the button size you need while avoiding too many different sizes. Do not use more than two different button sizes in a dialog box.
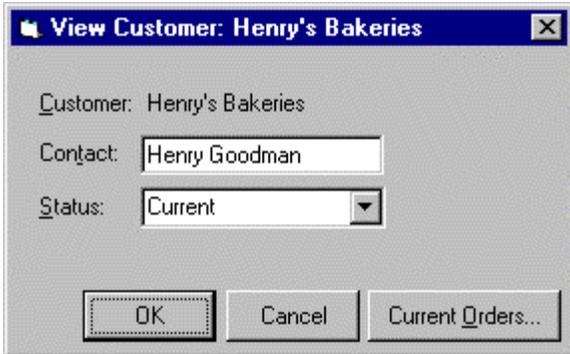
Figure 9.4 Current Orders is significantly longer than the other text of the other two buttons, so a different size button is used.

Separate buttons from the rest of the dialog box

Use white space to set off the buttons that pertain to the entire dialog box, as shown in Figure 9.5. Don't crowd buttons with the rest of the controls in the dialog box, as shown in Figure 9.6.
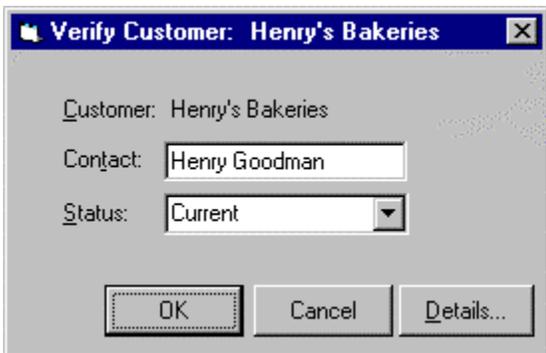

Figure 9.5 White space is used to set off buttons for the dialog box.

Figure 9.6 Don't crowd buttons with the rest of the controls in the dialog box.

Group buttons together

If you have more than three buttons, use white space to group buttons together (see Figure 9.7). Group buttons to identify:

● Buttons with similar functions

● Buttons to leave the window (OK, Cancel)
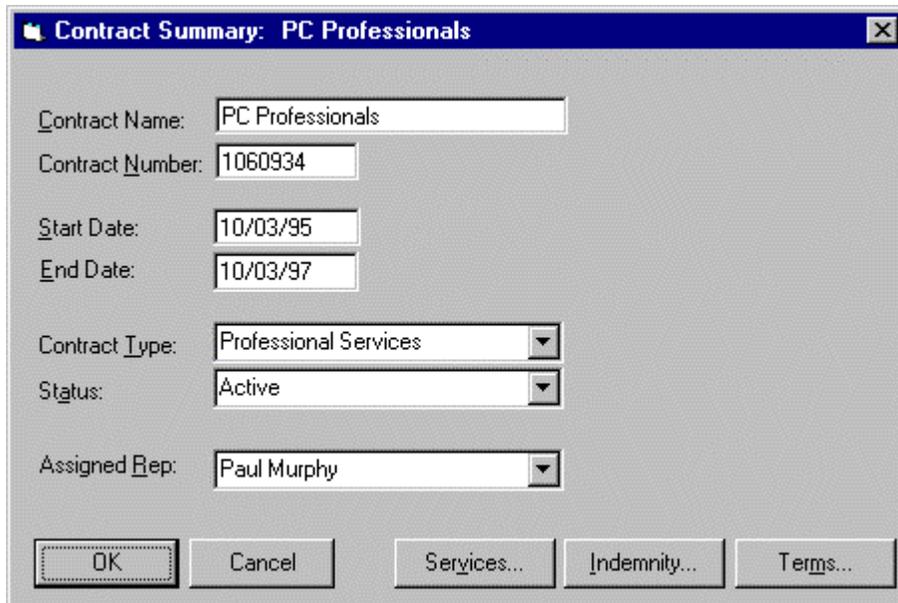
● Destructive actions (Delete)

Figure 9.7 Buttons with similar functions grouped by using white space.

Place buttons consistently

Use one of these locations for buttons:

● Top right of the window (Figures 9.8)

● Bottom right of the window for Windows 95 (Figure 9.12)

Do not place buttons in both bottom and right locations in one window.
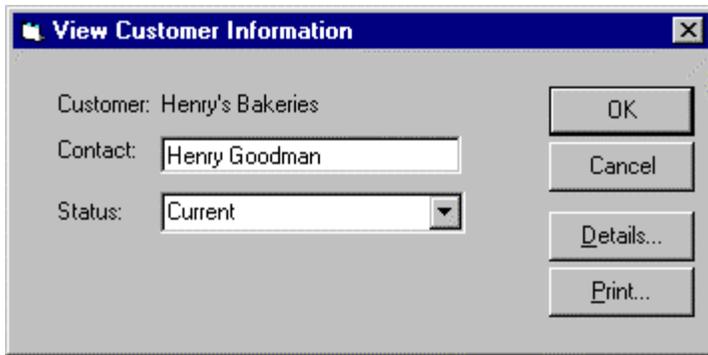
Figure 9.8 Windows 95 top right command buttons.
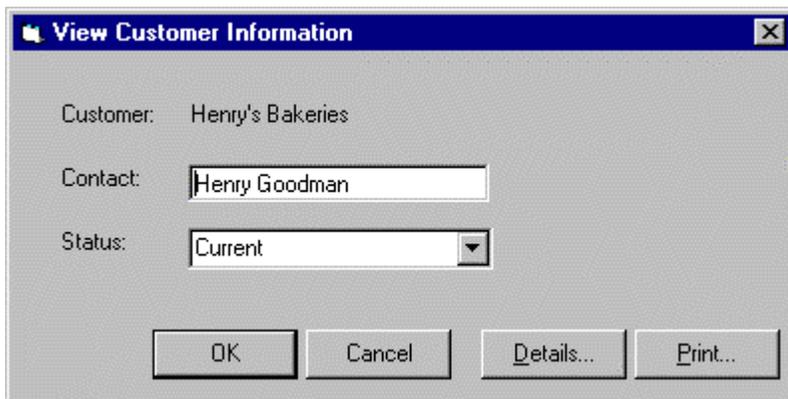

Figure 9.12 Windows 95 bottom right command buttons.

Match button position to the use of the window

Choose either a vertical or a horizontal design for a particular window and position the buttons to match the design. A horizontal design should have buttons on the top right, as shown in Figure 9.16. A vertical design should have buttons on the bottom, as shown in Figure 9.17.

Figure 9.16 Horizontal flow command button placement for Windows 95.
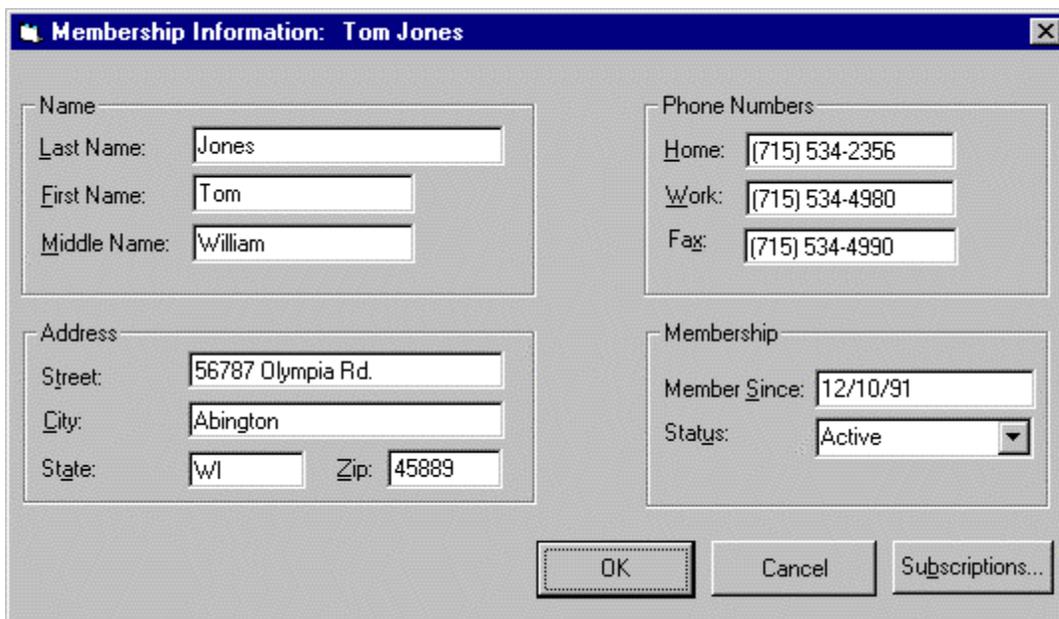
Figure 9.17 Vertical flow command button placement for Windows 95.

The grouping and layout of data in the window plays a role in determining which design to use. The length and number of buttons are also factors. If you have long button names or a lot of buttons, you may want to use a horizontal design with top right buttons. Careful consideration should be given to the number of buttons placed on the screen. You can make these decisions on a window-by-window or box-by-box basis. Window flow designs do not need to be the same across all windows or boxes.

Position limited action buttons where needed

If a command button pertains to only one part of the dialog box, place the button where it is needed. Figure 9.18 places the Search button in the box where it will be used.
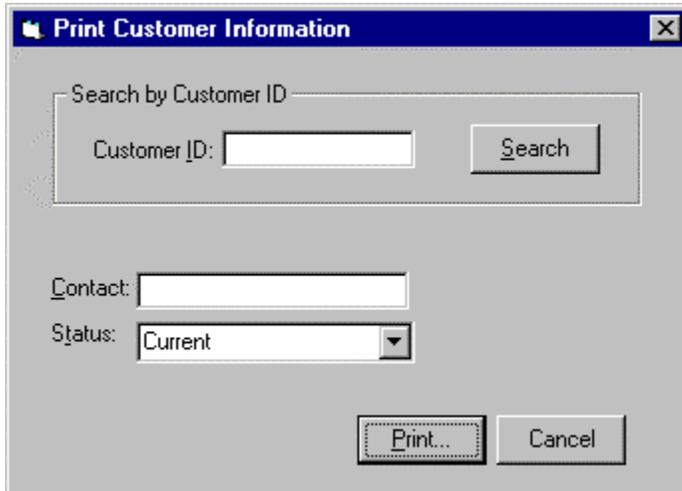
Figure 9.18 Search button placed in-group box where it is used.

Order buttons consistently

Whenever possible, place buttons in the following order:

1. Affirmative buttons to leave the window (OK)

2. Canceling actions to leave the window (Cancel)

3. Unique buttons for the window

The order is the same for bottom or top-right placement (see Figure 9.19).

Figure 9.19 Affirmative button (OK) is first, followed by canceling action (Cancel), and then a unique button for the window (Current Orders).

Use ellipses (…) to indicate that input is needed

If more input will be required to complete a button action, use ellipses (…) after the button name (see Figure 9.20).

Figure 9.20 Another dialog box is displayed when the user selects Details, therefore ellipses are shown after the button name.

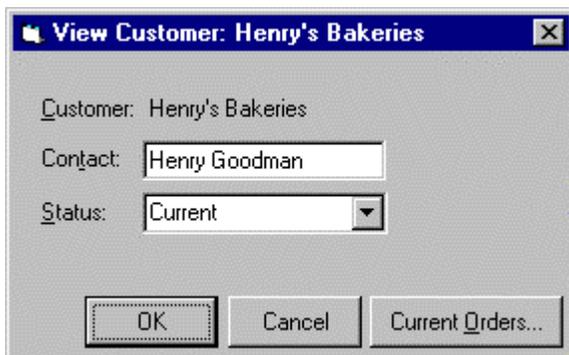## Gray out unavailable buttons

If a button is disabled, display the text as grayed out. For instance, certain actions might not be available in order to restrict a user's actions until another step is taken. Figure 9.21 shows a Search button when the Search action is available. In Figure 9.22, the Search action is not available, so the button is grayed out.

Graying out implies that there is an action the user can take to make the button available. If in fact there is no action the user can take to change the button's state (the button will never be usable) do not include the button.

Figure 9.21 Search action available.

Figure 9.22 Search action not available.

Assign a nondestructive default button

Choose one button on the window as the default. If the user presses the Enter key, that button is invoked. Make the most common or important action on that window the default, for example, Print on a print window. Do not use a destructive button, such as Delete, as a default, even if it is the most common or important action for the window.

Option Buttons

Option buttons, also known as radio buttons, replace many data entry actions.

Use option buttons for one choice

Use option buttons when users should pick one mutually exclusive choice from a list of options, for example, choosing a pay period in a personnel application.

Label option buttons descriptively

Pick a clear and descriptive label for each option button, for example, Send Course Description rather than Course.

Group option buttons together and label them

Place option buttons together in a group. Use a frame to show the group. Use a descriptive label for the entire group (see Figure 9.23).
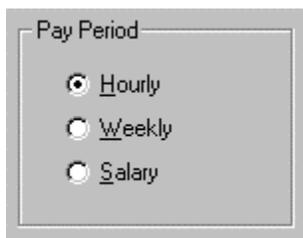

Figure 9.23 Option buttons grouped and labeled.

Align option buttons vertically

Line up option buttons vertically (Figure 9.24), if you have the space, rather than horizontally (Figure 9.25) to make them easier to scan.
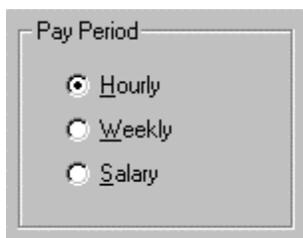

Figure 9.24 Align option buttons vertically.

Figure 9.25 Don't align option buttons horizontally.

Limit option buttons to six or fewer

Limit option buttons to six or fewer choices. If you have more choices, consider using a single selection list box or drop-down list box instead. List boxes are discussed later in this chapter.

Choose an order

Decide on the best order for the option buttons. Some ordering methods include:

● By frequency—most frequently used options at the top

● By task—if there is a usual order in which parts of a task are performed

● By logic—if there is a logical order, for instance a list of dates

● By alphabet—only use alphabetical order if the labels match the way your users think about the items.

Avoid binary option buttons

If users need to make yes/no or on/off choices, use a single check box (Figure 9.26) rather than option buttons (Figure 9.27). However, use two option buttons for distinct, mutually exclusive choices, such as male/female.
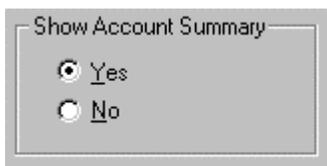

Figure 9.26 Use a check box for yes/no choices.

Figure 9.27 Don't use two option buttons for yes/no choices.

Check Boxes

Check boxes replace some data entry actions and provide a quick way to make multiple choices.

Use check boxes for choosing more than one option

Use check boxes when users can choose one or more options.

Use check boxes for toggling

Use check boxes when users are toggling a feature on or off, as shown in Figure 9.28. It is okay to have just one check box.

Figure 9.28 Use a check box for toggling a feature on or off.

Label check boxes descriptively

Pick a clear descriptive label that users will understand for each check box. For example, use Reverse Print Order, not Reverse.

Group and label check boxes

Place check boxes together in a group. Use a frame to show the group. Use a descriptive label for the entire group (see Figure 9.29).
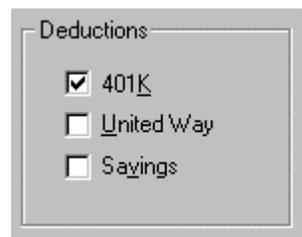

Figure 9.29 Windows 95 check boxes.

Align check boxes vertically

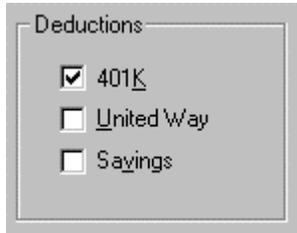Line up check vertically (Figure 9.33), if you have the space, rather than horizontallyto make them easier to scan.

Figure 9.33 Align check boxes vertically.
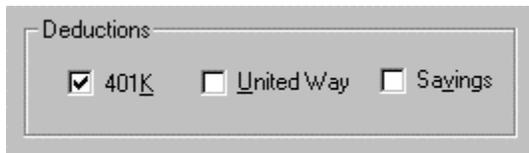
Figure 9.34 Don't align check boxes horizontally.

Limit check boxes to ten or fewer

Limit check boxes to ten or fewer choices. If you have more choices consider using a multiple select list box instead.

Choose an order

Decide on the best order for check boxes. Some ordering methods are:

● By frequency—most frequently used options at the top

● By task—if there is a usual order in which parts of a task are performed

● By logic—if there is a logical order, for instance a list of dates

● By alphabet—only use alphabetical order if the labels match the way your users think about the items.

Do not use Select All or Deselect All check boxes

If you anticipate users will want to select all of a set of check boxes, or turn them all off, consider using a multiple selection list box with Select All and Deselect All buttons (Figure 9.35) instead of check boxes (Figure 9.36). Multiple selection list boxes are discussed later in this chapter.
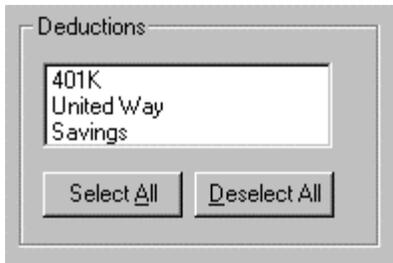
Figure 9.35 Use multiple selection list boxes with Select All and Deselect All command buttons.
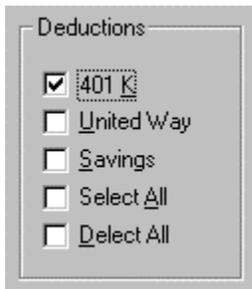
Figure 9.36 Don't use Select All and Deselect All check boxes.

Text Boxes

Text boxes are the main way for users to type in data.

Use a border to indicate data entry

Use a text box with a border to indicate that a user can enter or edit data, as shown in Figure 9.37.

Figure 9.37 Put a border around a text entry field.

Show display-only data without a box

If data is for display only and cannot be changed or added, do not place a box around it (see Figure 9.38).

Name: Shirley Columbo
TIN: 096-49-1372

Figure 9.38 Don't put a border around display-only data.

Gray out temporarily protected fields

If a particular text box is temporarily protected, gray out the box and label to signify that data cannot be entered or changed at this time. Figure 9.39 shows a field in which data can be changed; Figure 9.40, one where it cannot. For calculated fields, consider using a boxed text box with a gray background and read-only access.

Employer: Clean Spray Laundry

Figure 9.39 Data that can be changed.

Employer: Clean Spray Laundry

Figure 9.40 Data that cannot be changed is temporarily grayed out.

Use box length to signify approximate data length

Size text boxes to indicate the approximate length of the field as shown in Figure 9.41. If you have text boxes of similar length, make them the same length unless you need to show the exact size of the field. If the length of the field can vary, use text boxes of the same length to minimize the number of unique margins on the screen (Figure 9.42).

Hiring Information

Employee ID: 3476

Start Date: 02/22/1990

Group Code: Accounting104652

Figure 9.41 Each text box is a specific length to show the exact size of the field.
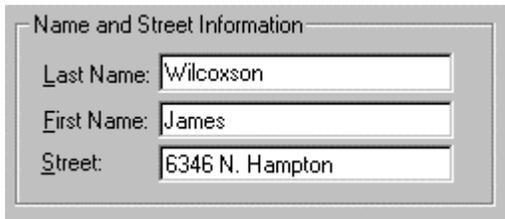
Figure 9.42 Text boxes are the same size if the data fields vary.

Align text boxes

Left align text boxes on the screen to minimize the number of different margins (see Figure 9.43). If a particular text box has a long label, use a different margin for that text box. Limit the number of unique margins to two.
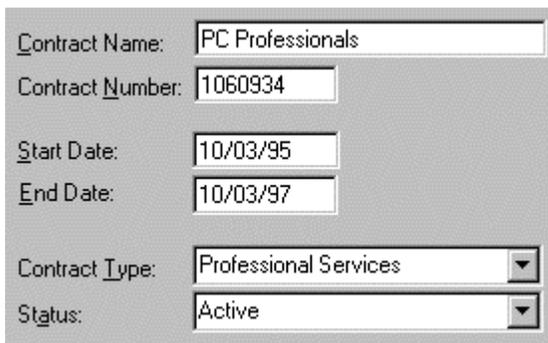
Figure 9.43 Text boxes are left aligned.

Group text boxes

If you have text boxes that all pertain to similar information, group them together in a frame and label the entire group.

Label all text boxes

Assign a descriptive label to every text box. Avoid acronyms or abbreviations unless you are sure all users will understand them. It is okay to use multiple-word text box labels; however, keep them concise. Capitalize the first letter of the initial word of a label.

Place labels to the left

Place labels for text boxes to the left of the box. Avoid placing labels on top of text boxes.

Align text box labels to the left

Align text box labels on the left (Figure 9.44). Do not right-align labels. Right-aligned labels produce a ragged left margin, which is hard to scan (Figure 9.45).
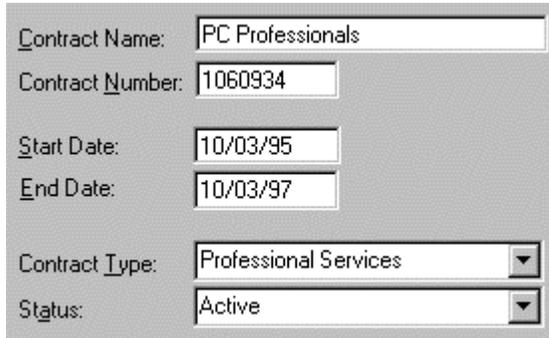
Figure 9.44 Left-align labels.
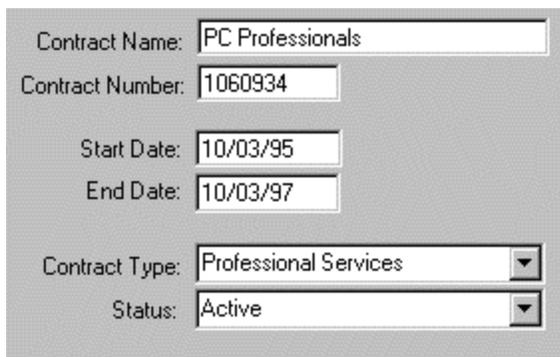
Figure 9.45 Don't use ragged left margins for labels.

Place a colon after text box labels

Use a colon after text box labels to distinguish between the label and the data that follows (see Figure 9.46). Allow two spaces between the colon and the text box for the longest label. Do not use colons after group frame names or column headings.
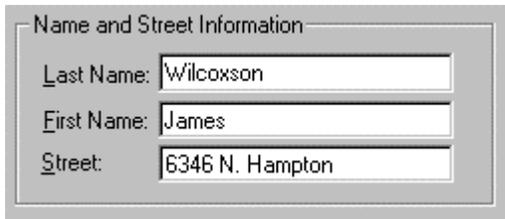
Figure 9.46 Use colons after text box labels. Do not use colons after group labels.

List Boxes

List boxes are an alternative to long option button lists (Figure 9.47). They are also an alternative to data entry and they ensure data integrity.

Use list boxes for long lists

Use list boxes rather than option buttons when you have a lot of options. When you have more than six option buttons use a single select list box.

Use list boxes for dynamic data

If data is likely to change over time, use a list box rather than option buttons. It is easier to change the choices that appear in a list box.

Show three to eight items at a time

Show at least three, but no more than eight items in a list box at a time. If you have more items use a scroll bar to view the rest of the items. See the guidelines on drop-down list boxes later in this chapter.
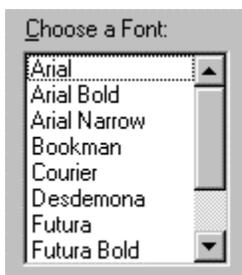
Figure 9.47 Windows 95 list box.

Label each list box

Choose a label for the entire list box that describes the items inside the box, for example Available Printers. Place the label on the top of the list, left justified, followed by a colon.

Use filters for large lists

If there are more than 40 items in a list, provide a way for users to filter the list to narrow down the number of options from which they must choose, as shown in Figure 9.51.
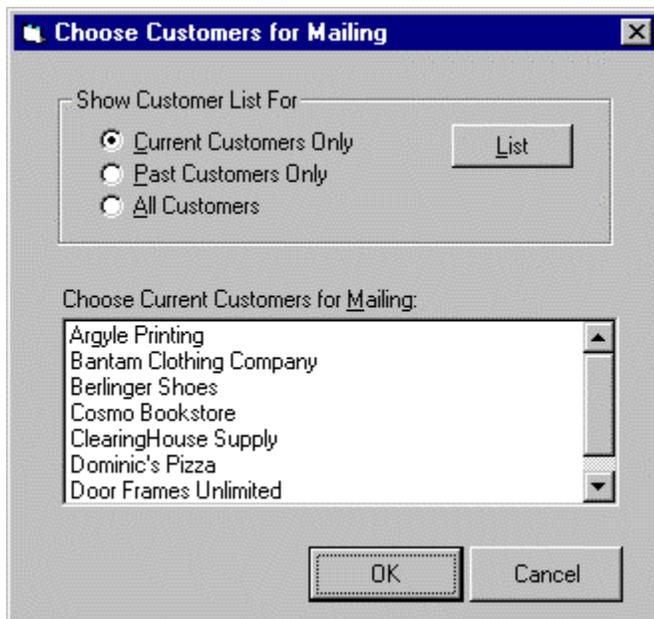
Figure 9.51 A filter is used for a long list of customers.

Use drop-down list boxes to save space

Drop-down list boxes allow you to save window space. Use a drop-down list box if most users will select the first item. However, list boxes hide all but the first option from the users. Users have to go through an extra step to get to the rest of the list. Do not use a drop-down list box if it is important for users to see all the options all the time.

Use a combination list box to allow users to type in an option

A combination list box lets users type in a choice as well as pick it from the list. Use a combination list box when most users know what they want and prefer just typing it in. A combination list box is also useful when the list is long and users could skip down to a lower point in the list by typing in one or more letters. Do not allow users to add items to a list by using a combination list box.

Multiple Selection List Boxes

Multiple selection list boxes are an alternative to long check box lists. Multiple selection list boxes, however, can be hard for users to use. You may need to compensate for their usability problems by following the guidelines below.

Use a multiple selection list box instead of check boxes

Consider using a multiple selection list box instead of check boxes if you have more than five options or your list is likely to change over time.

Consider instructions for multiple selection list boxes

Many users are not familiar with multiple selection list boxes. They might not know that they can choose more than one option or might not know how to choose more than one option. Consider including a line of instruction or a prompt that tells users that they can choose more than one (see Figure 9.52). Instructions are particularly important when one window contains both a single selection list box and a multiple selection list box.
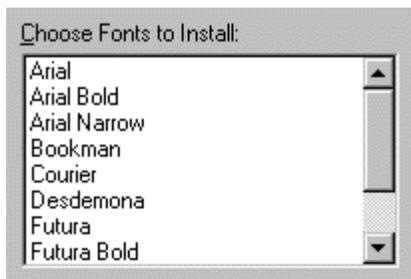
Figure 9.52 Instructions are included in label.

Consider a selection summary box

If you use a scrolling multiple selection list box, consider also displaying a box with a summary of what the user is selecting (see Figure 9.53). This way, the user does not have to continually move up and down the list to see what has already been chosen.
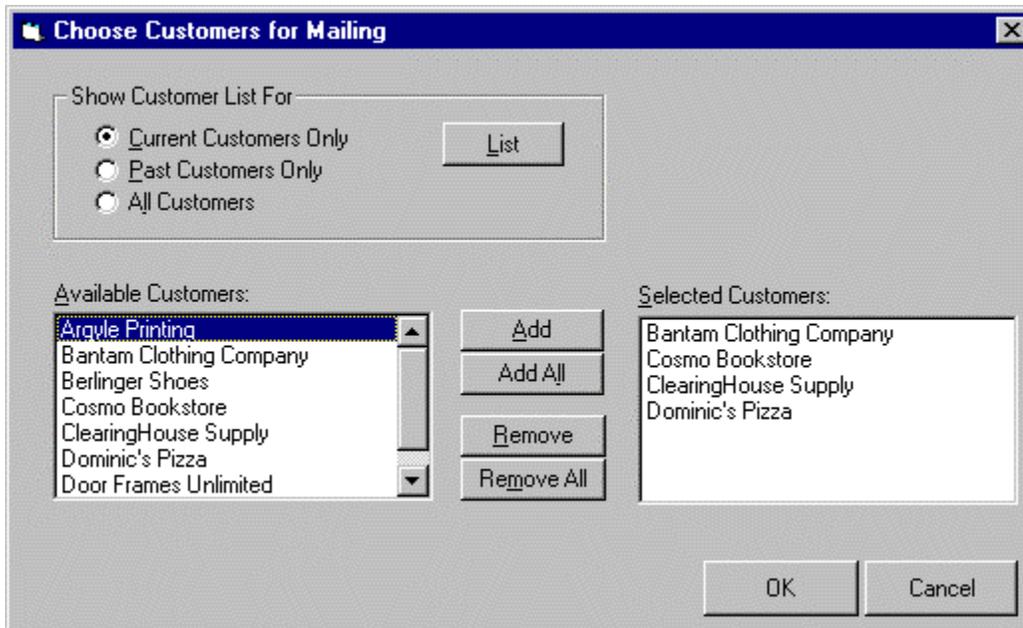
Figure 9.53 A selection summary box is used to display what the user has already selected.

Consider multiple selection checklists

Another way to show what the user is selecting is a multiple selection checklist. This combines a multiple selection list box with check boxes that the user can select.

Consider Select All or Deselect All buttons

If you have a set of options and anticipate that users will either want to select them all or turn them all off, consider using a multiple selection list box with Select All and Deselect All buttons, rather than check boxes.

Tables and Grids

Tables and grids allow users to enter or view larger amounts of information at a time.

Use tables for comparisons among data

Display a table if users need to compare two or three pieces of data and you can't predict ahead of time which they need (see Figure 9.54).

	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
East	20.4	27.4	90	20.4
West	30.6	38.6	34.6	31.6
North	45.9	46.9	45	43.9

Figure 9.54 Use tables for comparing data.

Use grids for multiple data entry

Use grids to allow users to enter several pieces of data at a time.

Label columns

Choose labels for columns that accurately reflect the data.

Use row labels if necessary

If rows contain different data, label each row.

Left justify labels

Left justify column and row labels. Do not use a colon after the label.

Spin Boxes

Spin boxes allow users an alternate way to enter data.

Use spin boxes for limited cycling

Use spin boxes to cycle through possible choices when the choice list is less than ten, as shown in Figure 9.55, and the order is predictable (such as days of the week).

Number of Exemptions: 1

Figure 9.55 Spin box.

Combine spin boxes with text boxes

If you use spin boxes, consider combining them with text boxes so that users can type in the specific value they want in addition to cycling through choices.

Sliders

Sliders are an effective way for users to quickly adjust values that do not need to be exact.

Use sliders for visually choosing values

Consider using a slider control to increase or decrease continuous values. They are especially effective if you show the result (see Figure 9.56).

Figure 9.56 Windows 95 sliders.

Use sliders for large data ranges

Do not use sliders for data choices fewer than ten. For small data ranges use a different control, for instance, a spin box or a text box for data entry. Spin boxes and text boxes are discussed earlier in this chapter.

Display results

Display the actual data value that the slider position represents.

Allow data entry

If users know the exact value, let them enter a value directly instead of using the slider.

Allow the use of arrows for small increments

Use arrows at either end of the slider for fine increments when users get close to the value they want.

Tree Views

Tree views show the relationship among items in a list.

Use tree views when hierarchy is important

A tree view displays the hierarchical relationship among elements (see Figure 9.60). It is useful when users need to select an item from a list, and the placement of the item depends on hierarchies, as in a file or directory system. Tree views are useful when the relationship of the item in the hierarchy helps the user to locate the item they are looking for. Expanding and collapsing allows the user to alter the amount of detail while they search.

Figure 9.60 Tree views show hierarchy.

Use tree views for more advanced users

Many users are unfamiliar with tree views because they are relatively new and are not used in all programming environments. The tree view can be hard for users to use if they do not understand the relationships among the items, and may not realize the functionality of expanding and collapsing.

Do not use tree views to replace menus, home bases, or launch pads

Tree views should not be used to replace menu systems, home bases, or launch pads. They are useful as a searching and selecting control only.

Fonts

Please refer to the Presentation Section of the Standards regarding the use of Fonts.

Colors

Please refer to the Presentation Section of the Standards regarding the use of colors.

Tab Control

The keyboard interface for navigation in secondary windows uses the TAB and SHIFT+TAB keys to move between controls, to the next and previous control, respectively. Each control has a property that determines its place in the navigation order. Set this property such that the user can move through the secondary window following the usual conventions for reading: in western countries, left-to-right and top-to-bottom, with the primary control the user interacts with located in the upper left area of the window. Order controls such that the user can progress through the window in a logical sequence, proceeding through groups of related controls. Command buttons for handling overall window transactions are usually at the end of the order sequence.

You need not provide TAB key access to every control in the window. When using static text as a label, set the control you associated with it as the appropriate navigational destination, not the static text field itself. In addition, combination controls such as combo boxes, drop-down combo boxes, and spin boxes are considered single controls for navigational purposes. Because option buttons typically appear as a group, use the TAB key for moving the input focus to the current set choice in that group, but not between individual options -- use arrow keys for this purpose. For a group of check boxes, provide tab navigation to each control because their settings are independent of each other.

Optionally, you can also use arrow keys to support keyboard navigation between controls in addition to the tab navigation technique wherever the interface does not require those keys. For example, you can use the up arrow and down arrow keys to navigate between single-line text boxes or within a group of check boxes or command buttons. Always use arrow keys to navigate between option button choices and within list box controls.

You can also use access keys to provide navigation to controls within a secondary window. This allows the user to access a control by pressing and holding the ALT key and an alphanumeric key that matches the access key character designated in the label of the control.

A group box is a special control you can use to organize a set of controls. A group box is a rectangular frame with an optional label that surrounds a set of controls. Group boxes generally do not directly process any input. However, you provide navigational access to items in the group using the TAB key or by assigning an access key to the group label.
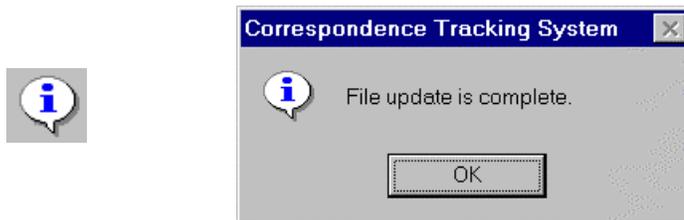
Messages

Message Boxes

A message box is a secondary window that displays a message or information about a particular situation or condition. Messages are an important part of the interface for any software product. Messages that are too generic or poorly written frustrate users, increase support costs, and ultimately reflect on the quality of the product. Therefore, it is worthwhile to design effective message boxes..

Title Bar Text

Use the title bar of a message box to appropriately identify the context in which the message is displayed, usually the name of the object. For example, if the message results from editing a document, the title text is the name of that document, optionally followed by the application name. If the message results from a nondocument object, then use the application name. Providing an appropriate identifier for the message is particularly important in the Windows multitasking environment, because message boxes might not always be the result of current user interaction. In addition, because OLE technology allows objects to be embedded, different application code may be running when the user activates the object for visual editing. Therefore, the title bar text of a message box provides an important role in communicating the source of a message. Do not use descriptive text for message box title text such as "warning" or "caution." The message symbol conveys the nature of the message. Never use the word "error" in the title text.

Message Box Types

Message boxes typically include a graphical symbol that indicates what kind of message is being presented. Most messages can be classified in one of the categories shown below:

Information   Provides information about the results of a command. Offers no user choices; the user acknowledges the message by clicking the OK button.

Warning   Alerts the user to a condition or situation that requires the user's decision and input before proceeding, such as an impending action with potentially destructive, irreversible consequences. The message can be in the form of a question -- for example, "Save changes to MyReport?".

Critical   Informs the user of a serious problem that requires intervention or correction before work can continue.

      The system also includes a question mark message symbol. This message symbol was used in earlier versions of Windows for cautionary messages that were phrased as a question. However, the message icon is no longer recommended as it does not clearly represent a type of message and the phrasing of a message as a question could apply to any message type. In addition, users can confuse the message symbol question mark with Help information. Therefore, do not use this question mark message symbol in your message boxes. The system continues to support its inclusion only for backward compatibility.

      You can include your own graphics or animation in message boxes. However, limit your use of these types of message boxes and avoid defining new graphics to replace the symbols for the existing standard types. Because a message box disrupts the user's current task, it is best to display a message box only when the window of the application displaying the message box is active. If it is not active, then the application uses its entry in the taskbar to alert the user. Once the user activates the application, the

message box can be displayed. Display only one message box for a specific condition. Displaying a sequential set of message boxes tends to confuse users.

Command Buttons in Message Boxes

Typically, message boxes contain only command buttons as the appropriate responses or choices offered to the user. Designate the most frequent or least destructive option as the default command button. Command buttons allow the message box interaction to be simple and efficient. If you need to add other types of controls, always consider the potential increase in complexity.

If a message requires no choices to be made but only acknowledgment, use an OK button -- and, optionally, a Help button. If the message requires the user to make a choice, include a command button for each option. The clearest way to present the choices is to state the message in the form of a question and provide a button for each response. When possible, phrase the question to permit Yes or No answers, represented by Yes and No command buttons. If these choices are too ambiguous, label the command buttons with the names of specific actions -- for example, "Save" and "Delete."

You can include command buttons in a message box that correct the action that caused the message box to be displayed. For example, if the message box indicates that the user must switch to another application window to take corrective action, you can include a button that switches the user to that application window. Be sure, however, to make the result of any such button's action very clear.

Some situations may require offering the user not only a choice between performing or not performing an action, but an opportunity to cancel the process altogether. In such situations, use a Cancel button. Be sure, however, to make the result of any such button's action very clear.

When using Cancel as a command button in a message box, remember that to users, Cancel implies restoring the state of the process or task that started the message. If you use Cancel to interrupt a process and the state cannot be restored, use Stop instead.

Message Box Text

The message text you include in a message box should be clear, concise, and in terms that the user understands. This usually means using no technical jargon or system-oriented information.

In addition, observe the following guidelines for your message text:

- State the problem, its probable cause (if possible), and what the user can do about it – no matter how obvious the solution may seem to be. For example, instead of "Insufficient disk space," use "'Sample Document' could not be saved, because the disk is full. Try saving to another disk or freeing up space on this disk."
- Consider making the solution an option offered in the message. For example, instead of "One or more of your lines are too long. The text can only be a maximum of 60 characters wide," you might say, "One or more of your lines are too long. Text can be a maximum of 60 characters in Portrait mode or 90 wide in Landscape. Switch to Landscape mode now?" Offer Yes and No as the choices.

- Avoid using unnecessary technical terminology and overly complex sentences. For example, "picture" can be understood in context, whereas "picture metafile" is a rather technical concept.
- Avoid phrasing that blames the user or implies user error. For example, use "Cannot find filename" instead of "Filename error." Avoid the word "error" altogether. Make messages as specific as possible.
- Avoid mapping more than two or three conditions to a single message. For example, there may be several reasons why a file cannot be opened; provide a specific message for each condition.
- Avoid relying on default system-supplied messages, such as MS-DOS® extended error messages and Kernel INT 24 messages; instead, supply your own specific messages wherever possible.
- Be brief, but complete. Provide only as much background information as necessary. A good rule of thumb is to limit the message to two or three lines. If further explanation is necessary, provide this through a command button that opens a Help window.
- Informative messages that do not require interaction from the user can be placed in the status bar and a beep issued to alert the user to the message. For example, upon leaving a particular field an automatic update to the database may take place. The user needs to be notified of the situation but need not respond to a message.

Please see the Re-Use Section of the Standards for instructions on how to use the DENR Standard Message Box Routine. All messages for all DENR ITS applications can be read from a read-only text file maintained by the Message Coordinator. The Message Coordinator will be responsible for creating text for all new messages.