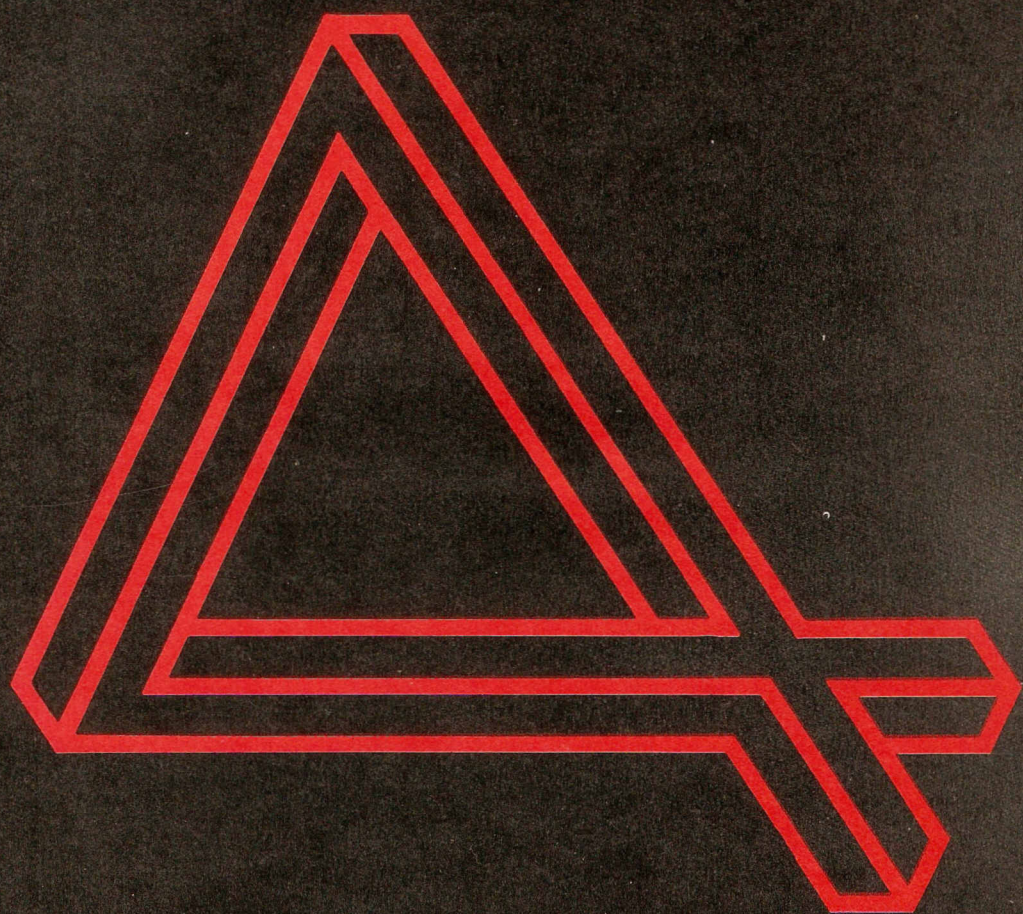


TUTORIALS

4th DIMENSION[®]

451



Binder 2

Ver 2.1 1985/1990

4th DIMENSION TUTORIALS

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4th DIMENSION TUTORIALS

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PREFACE

PREFACE

WELCOME TO THE 4th DIMENSION TUTORIALS

WELCOME TO THE 4TH DIMENSION TUTORIALS

Before you start these tutorials, you should have worked through the *4th DIMENSION Quick Start*. The introductory *Quick Start* chapters provide you with a complete basic introduction to the program. Even if you are familiar with 4th DIMENSION, you should read it through.

This book begins where the *4th DIMENSION Quick Start* leaves off. *Quick Start* teaches you the basic skills you need to use 4th DIMENSION productively in your own work. You can create useful databases based on the basic knowledge you have obtained. This book is designed to help you take advantage of 4th DIMENSION's more advanced features.

About the Manuals

The *4th DIMENSION Quick Start* and *4th DIMENSION Tutorials* lead you through example lessons where you create and use a 4th DIMENSION database. These examples provide hands-on experience and help you become familiar with the concepts and features of 4th DIMENSION.

The *4th DIMENSION Design Reference* serves as a reference guide to 4th DIMENSION's design environment and provides detailed descriptions of 4th DIMENSION operations that you can perform in this environment.

The *4th DIMENSION User Reference* provides a description of the environment where you will use the databases and layouts to enter and manipulate data.

The *4th DIMENSION Language Reference* is a guide to using the 4th DIMENSION language. Use this manual to learn how to use the language to customize a database.

The *4th DIMENSION Utilities Guide* provides a guide to the utilities available with 4th DIMENSION, such as 4D Tools, 4D Customizer, and 4D External Mover.

The *4th DIMENSION Glossary and Master Index* provides a glossary that defines terms and an index to all 4th DIMENSION documents.

About This Tutorial

This book offers you a series of tutorials, step-by-step explanations that teach you how to use many of the special features of 4th DIMENSION. You don't need to work through the whole book. But you should glance over any chapters you skip, because later chapters assume knowledge of earlier chapters. This book is divided into six parts:

Total
5 hours

2 hours

Part I: Customizing the User Interface

- Creating multi-page layouts
- Formatting numbers and dates
- Changing the data entry order
- Creating and using lists
- Using scripts

1 hour

Part II: Using Relational Databases and Subfiles

- Adding a second file
- Relating one file to another
- Using related files
- Creating and using subfiles

10 min

10 min

Part III: Using the Search Editor

- Using search conditions
- Searching on fields from another file

1 hour

Part IV: Working with Reports

- Creating a Quick Report with totals and subtotals
- Using other summary calculations
- Using an output layout for reporting

40 min

Part V: Creating Custom Menus

- Creating menus and menu items
- Writing procedures that add records and print reports

10 min

Part VI: Using the Password Access System

- Setting up a password access system
- Protecting individual menu items

Turn to any chapter to learn about the specific feature mentioned in the title. To a large extent you can skip around, learning what you need to use. In some cases, however, you need to understand an earlier section.

How the Tutorials Work

As you follow the tutorials in this book, you will add to the database application you started in *Quick Start*: a database that keeps personnel records for the employees of a (fictional) company.

The tutorials are designed to be practical, so that you learn 4th DIMENSION concepts while actually using the program.

Tutorial Text Conventions

The tutorials provide specific steps for you to follow as well as general information that explains the program. Steps are usually followed by a short comment or explanation. The format for steps and explanations looks like this:

1. The numbered step tells you exactly what to do.

Following the numbered step is a separate paragraph that offers a pertinent explanation or comment.

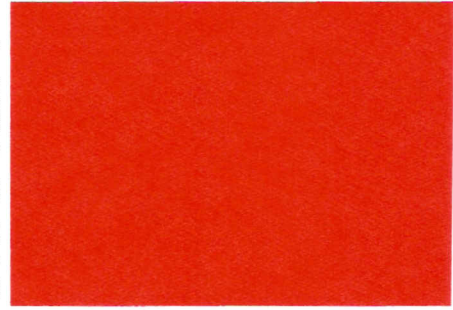
Another formatting element you will see is the note, often called Comment in this Tutorial:



Note: This format is used for comments about the operation of some of 4th DIMENSION's features. If your main interest is the topic of the tutorial, don't be distracted by these notes.

CUSTOMIZING THE USER INTERFACE

CHAPTER 1



USING THE LAYOUT EDITOR

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USING THE LAYOUT EDITOR

Database: Personnel 1

Estimated time to complete: 20 minutes

4th DIMENSION's Layout editor includes a simple but powerful drawing program that allows you to make the screen design for your database exactly the way you want it. In addition, the Layout editor provides many additional functions that affect the fields and how they work with information.

In this chapter you will learn how to

- open a layout in the Layout editor
- select, move, and change elements on a layout
- change text on a layout
- draw lines and shapes
- use fill patterns
- set the display format for numbers and dates

Modifying the Layout

Modifying your layout will introduce you to the tools of the Layout editor. These tools give you complete control over the appearance of your screens and printed reports.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 1 database.

Personnel 1 starts in the Design environment.

2. Choose Layout from the Design menu.

4th DIMENSION opens the Layout dialog box. You can open any layout from this dialog box.

3. Click Expand.

4th DIMENSION expands the list to show the [Employees] file layouts.

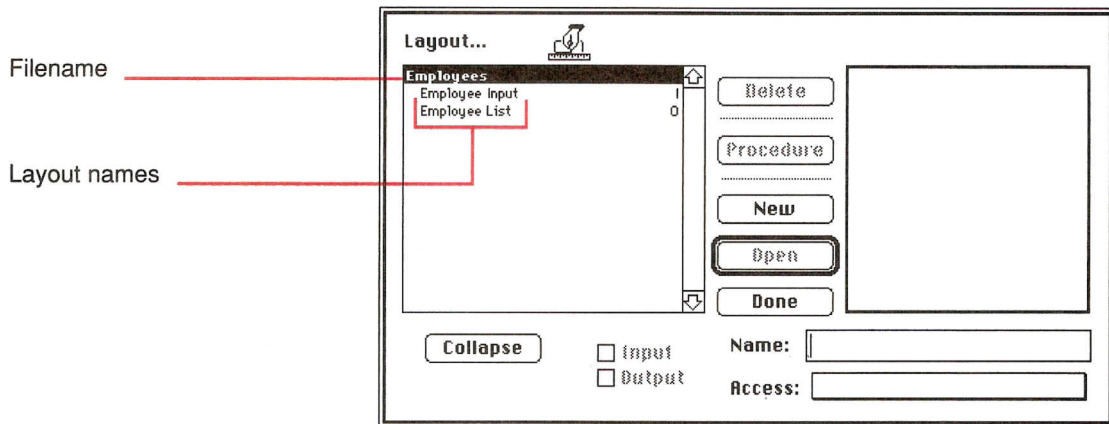


Figure 1-1
The Layout dialog box

4. Select Employee Input, and then click Open.

4th DIMENSION displays the layout in its own window.

5. Expand the window by clicking the zoom box or dragging the size box so that the layout window fills the whole screen.

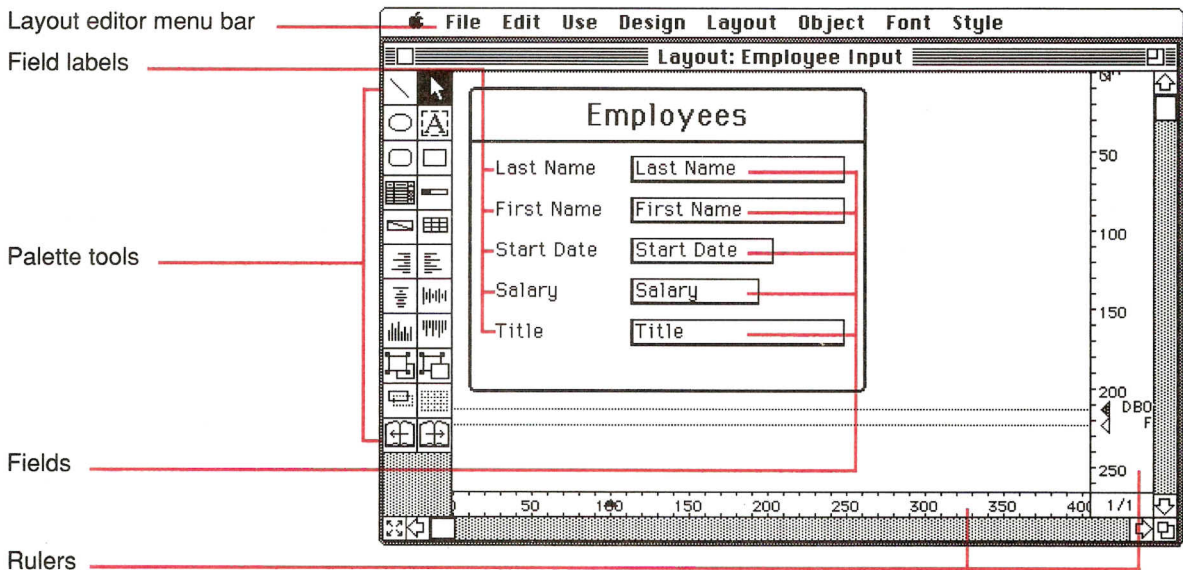


Figure 1-2
The expanded Layout window

The Layout editor is similar to a Macintosh drawing program. You can change the background patterns and line widths, enter additional descriptive text, and change the style and font of the typeface. The palette tools and menu commands allow you to create exactly the layout you want to use. And if you make a mistake, you can simply choose Undo from the Edit menu and your last action is undone.

The layout has been given a title that is the same as the filename, *Employees*. Because this particular layout will be used to enter and modify information for each employee, you decide to change the title to *Employee Information*.

Each element on the layout is an object that you select in order to change it. You can move the object simply by selecting it and dragging it to its new location. You use the handles that appear on the boundary of an object (an invisible rectangle enclosing the object) to change the size of the object.

6. Click once on the title Employees.

Be sure to click on the word itself.

4th DIMENSION displays the handles around the title.



Figure 1-3
The handles around a selected element

The title area is a graphic object, as is each element on the layout. When it is selected, handles appear on each corner of the boundary. In step 8, you'll use one of the handles to resize the title area.

If you like, select different objects in the layout area. You will see that the handles always show the selected object. Be sure to select the title again before going on to the next step.

7. Drag the title area to the left, placing it just within the border of the layout.

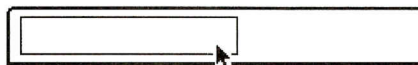


Figure 1-4
Dragging a selected object

You drag an object by putting the pointer on it, pressing the button on the mouse, and holding it down while you move the object to its new location.

When you start to move the title area, it becomes a blank rectangle.

8. Resize the title area by making it as wide as the border of the layout.

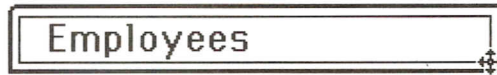


Figure 1-5
Resizing an object

You resize an object by placing the tip of the pointer on one of the handles (so that it changes into a pointer made of four arrows) and then dragging the handle.

Feel free to resize several of the objects on the screen. You can always return to the original layout by choosing Revert to Saved from the File menu. At any point, you can go back one step by choosing Undo from the Edit menu. Be sure to leave your screen looking like the illustration in Figure 1-5 before continuing.



9. Select the Text Area tool from the palette.
10. Drag the I-beam pointer across the entire title.



Figure 1-6
Dragging the I-beam pointer

You are going to replace the title with Employee Information.

11. Type **Employee Information**.

The new title replaces the old one.



Note: The layout title has nothing to do with the layout name; the title is strictly a text element added to the layout. When you refer to this layout in procedures, you will use Employee Input, the name you gave this particular layout.

12. Choose Center from the Style menu to center the new title.

Your final screen looks like this:

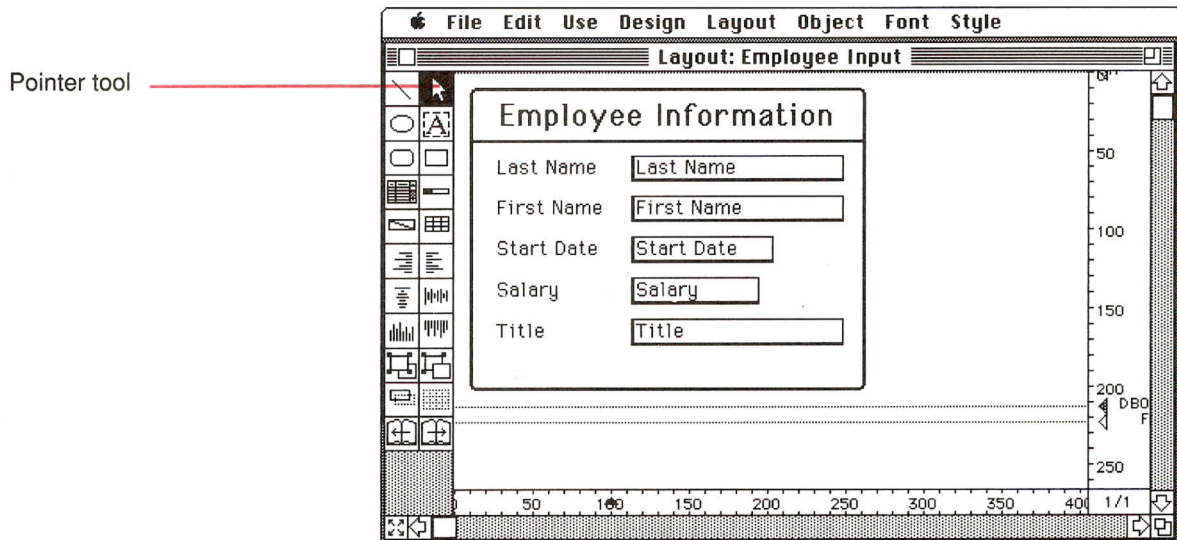


Figure 1-7
An improved layout

13. To prepare for the next steps, click the pointer tool.

The mouse pointer changes to an arrow.

Using the Layout Editor Drawing Tools

The 4th DIMENSION Layout editor has graphic design features that allow you to create borders, lines, and patterns to enhance your layout. Objects can be layered, that is, placed on top of or beneath another object. Any object on the layout can be moved back or forward so that it disappears beneath or appears on top of other objects.

In this section you explore some of the capabilities of the Layout editor.

1. Choose Save Layout:Employee Input from the File menu.

It is always a good idea to save a layout you are happy with, so that if you don't like the changes you make, you can return to the previous acceptable version of the layout.

2. Click within the border of the layout, but not on another object, so that the border rectangle is selected.

Handles appear at the corners of the layout border.

In the next step you will choose a new fill pattern from a submenu. Choosing from a submenu is a two-step process.

3. Pull down the Object menu, then drag the pointer to the Fill menu item.

The Fill Pattern submenu appears to the right of the Object menu.

4. Still holding the mouse button down, drag the pointer to the right and then to the pattern you want to try, then release the mouse button.

Handles show that the border rectangle is selected

Submenu offers choices of fill patterns

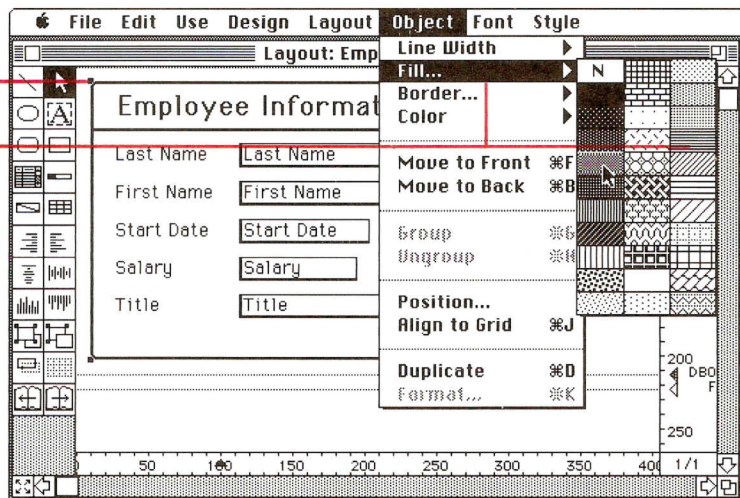


Figure 1-8
Choosing a fill pattern from a submenu

4th DIMENSION displays the border rectangle with the fill pattern you have chosen. As you see on your screen, and in Figure 1-9, the field labels, fields, and title are not obscured by the fill pattern. This is because they are in front of the background and border.

In the next step you will choose a new line width for the border from another submenu.

5. Choose the widest line width from the Line Width submenu.

4th DIMENSION displays the background with the new line width.



Fields and labels show because they are in front of the background

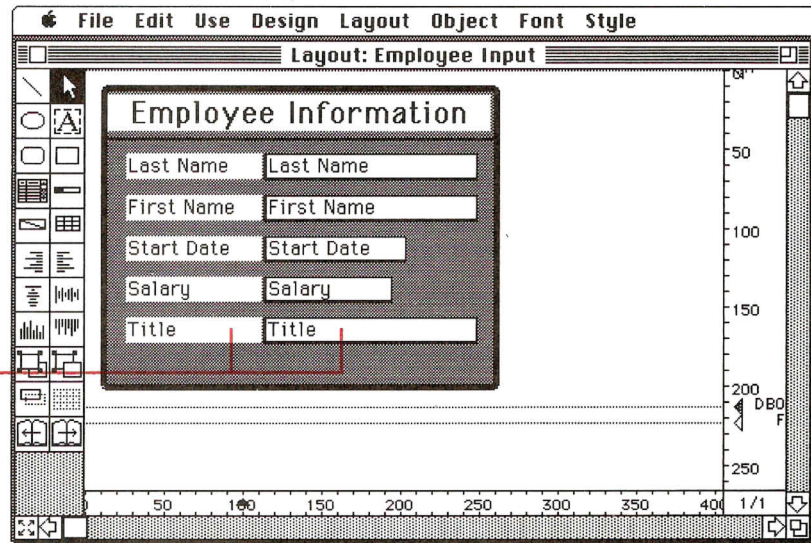


Figure 1-9
Background with new line width and fill pattern

In the next steps you will draw some shapes and experiment with the Move to Front and Move to Back tools.



6. Click the Oval tool, then draw an oval below the border of the layout.

The screen scrolls to make room for the oval if you draw below the bottom of the window.

7. Choose a new fill pattern from the Fill submenu.

For the next step, you want to distinguish the oval pattern from the background pattern you chose for the layout.

8. Drag the oval onto the layout.

The oval covers whatever is beneath it.



9. Click the Move to Back tool to move the oval beneath the layout.

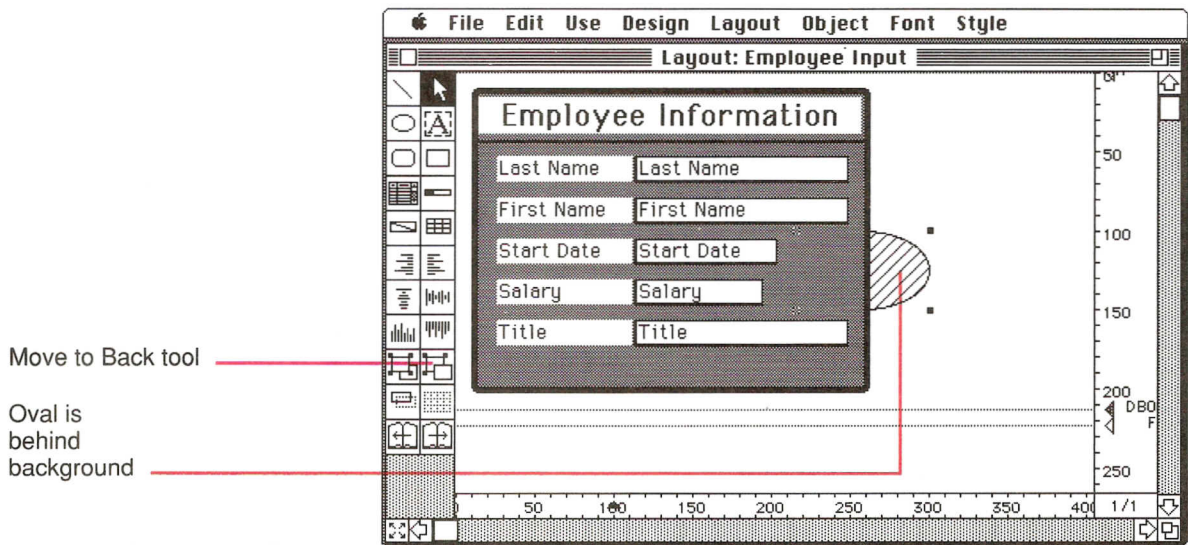


Figure 1-10
Using Move to Back to place oval beneath the layout background

Feel free to use the other drawing tools to draw any lines, rectangles, or rounded rectangles you want. Drag them to different locations, and resize them into different shapes. This kind of experimentation can spark ideas of how to use the different shapes to create interesting and useful layout designs.

10. Finally, when you are finished, choose Revert to Saved from the File menu. Click Yes.

The layout you have been working on is replaced by the version you saved at the beginning of this section.

Using the Alignment Tools

When you modify a layout by moving things around, adding objects, or rearranging layout elements, you often want to align things in relation to each other. 4th DIMENSION provides alignment tools that allow you to align selected objects precisely.

In this section you will explore the effects of the alignment tools.

1. Use the Rectangle tool to create a rectangle below the current layout border, and then fill it with a pattern (see Figure 1-11). Deselect the rectangle by clicking somewhere outside of the layout.



You will use this rectangle to see how the alignment tools work.

2. Hold down the Shift key while you click each of the fields on your layout.

Shift-Click is one way to select more than one object at the same time.



3. Drag the selected fields into the new rectangle. Drag any one field and the others follow along. Click the Move to Front icon to put the fields on top of the rectangle.

Dragging the fields off of the layout background leaves boxes that were placed beneath the fields. These boxes are the blank field spaces on the data entry screen.

Boxes that were behind the fields remain

Handles show that all the fields are selected

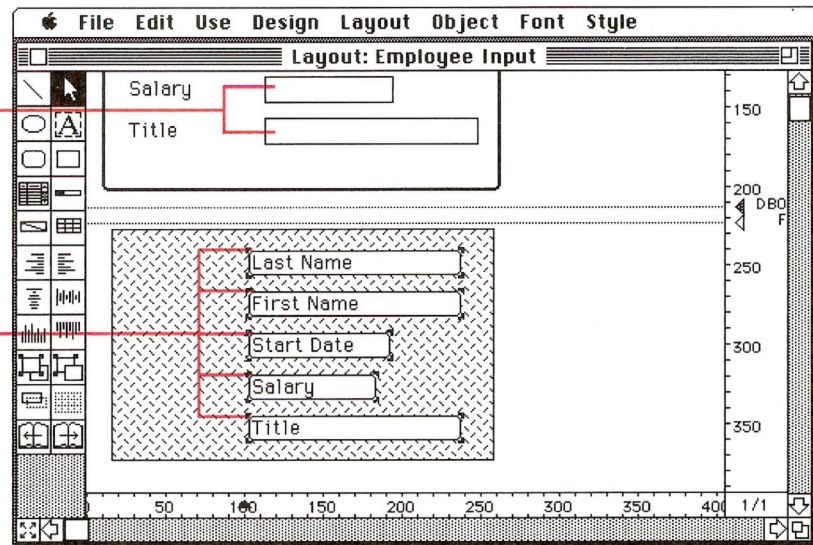


Figure 1-11
Fields in the new rectangle area



4. Leaving all the fields selected, click the Align Right icon.

The fields align with their right edges vertically aligned.

5. Click the Align Center Vertical icon.

The fields align with their centers vertically aligned.

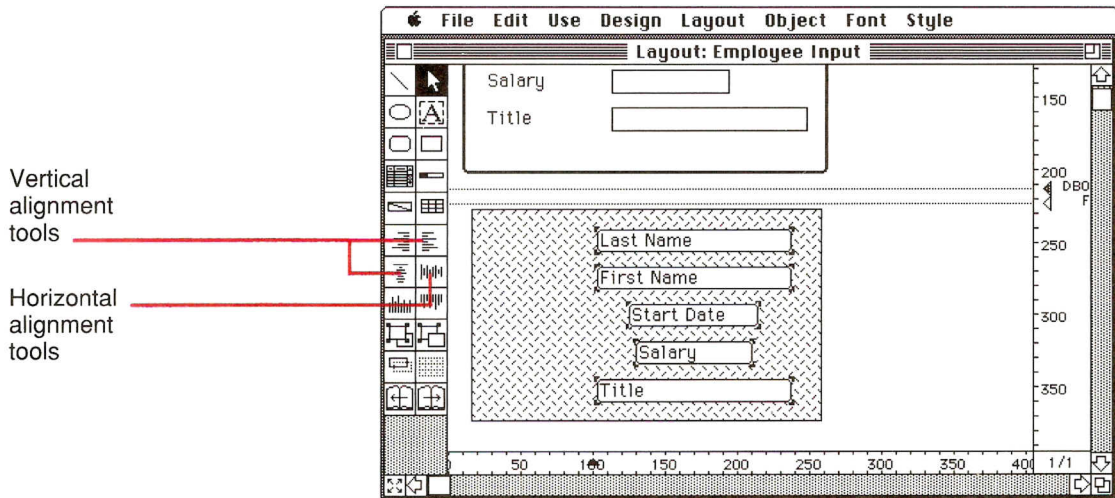


Figure 1-12
Fields aligned at their center

You have been using the vertical alignment tools, because the objects you are aligning are arranged vertically. If you use any of the horizontal alignment tools, the fields will be aligned, certainly, but you will be able to see only one of them. If you inadvertently use a horizontal alignment tool, simply drag the fields off the stack one at a time.

6. Use Shift-Click, as in step 2, to select the new rectangle, and then experiment with the alignment tools.

4th DIMENSION aligns the fields and the rectangle.

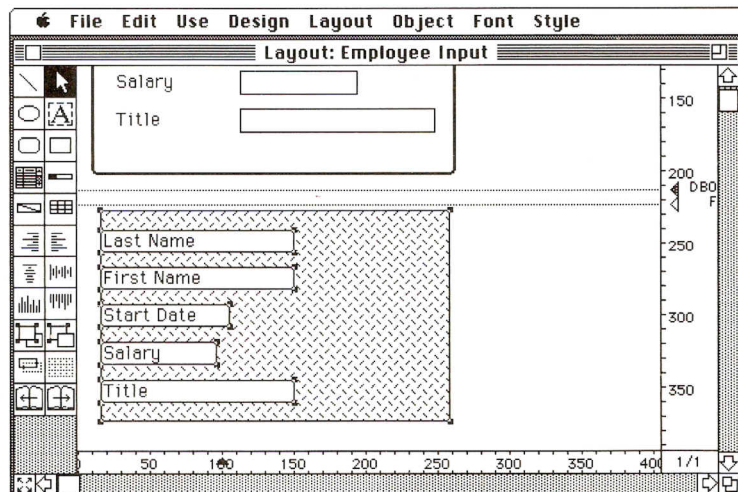


Figure 1-13
Fields aligned to rectangle

7. When you are finished, choose Revert to Saved to restore the Layout. Click Yes.

Setting Display Formats

4th DIMENSION allows you to set the display format for data. The display format determines how the entries in each field are displayed on your screen and printed.

You set the display format using the Layout editor. Each layout can use a different format for the same information. On one layout you may want numbers to be displayed in one of these ways:

- 1234.567
- 1,234.57
- \$1,234.57

On another layout you might want the format to include dollar signs, commas, and a row of asterisks for printing the number on a check:

\$*****1,234.57

Display formats are separate from the data you enter in the fields. The display format does not affect the way you enter the information, only the way it is displayed.

For the Employee input layout, you will set the display formats for the Start Date and Salary fields. For our example database, you have decided to show the start date in this format: *Mon, Jan 13, 1990*. For Salary, you want a dollar sign, a comma, and two digits to the right of the decimal: *\$35,550.00*.

To set the display formats:

1. Select the Start Date field.

You select the field by clicking on it. Be sure to select the field, not the field label. The field has a box around it, while the field label is a text element without a box.

Handles on
selected object

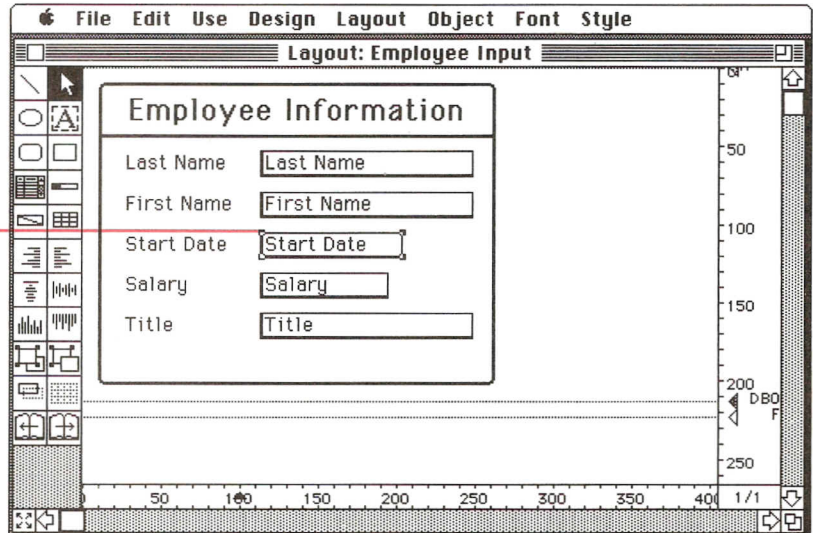


Figure 1-14
Selecting the Start Date field

2. Choose Format from the Object menu.

4th DIMENSION displays the Field Definition dialog box.

Format pop-up
menu

Format
editing box

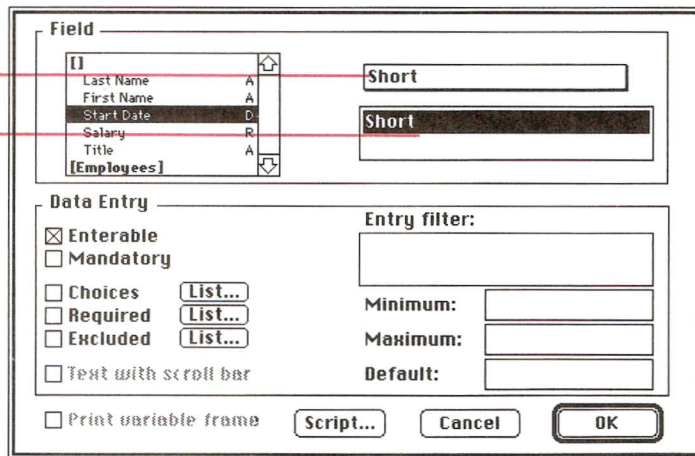


Figure 1-15
The Field Definition dialog box

The Field Definition dialog box allows you to set the display format and control several other aspects of a field. You will find an introduction to the advanced features in later chapters. For now, we will use only the boxes in the upper panel.

The fields in the file are listed in the box on the left. The Start Date field is highlighted. The date format choices appear in a pop-up menu on the right. You set the format for the field by choosing it from the pop-up menu. The current format for the Start Date field is shown in the pop-up menu.

3. Choose Abbreviated from the pop-up menu.

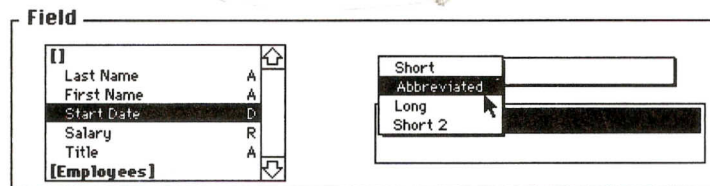


Figure 1-16
Choosing from a pop-up menu

A pop-up menu is indicated by a drop shadow below the box. You choose from a pop-up menu just as you do from any menu. The only difference is that the menu appears on the screen, not on the menu bar. Press and hold the Format entry to display the menu. Then drag the mouse to highlight the choice you want and release the mouse button.

The Abbreviated choice displays the date in the *Mon, Jan 12, 1989* format. The Long format would show it as *Monday, January 12, 1989*. The Short format would show it as *1/12/89*.

4. Click OK.

4th DIMENSION displays the layout again. Although there is no indication on the layout itself, 4th DIMENSION has accepted your instruction for displaying the Start Date. From now on, when you use this layout, the start date is displayed in the format you have chosen.

The date field needs to be made larger to accommodate the display format you have chosen.

5. Select the Start Date field (not the field label), and drag the handle on the lower right corner to the right to make the field longer.

You are now ready to set the display format for salaries.

6. Double-click on the Salary field.

Double-clicking is a shortcut to display the Field Definition dialog box. 4th DIMENSION displays the dialog box again, this time highlighting the Salary field.

7. Display the pop-up menu to see the format choices.

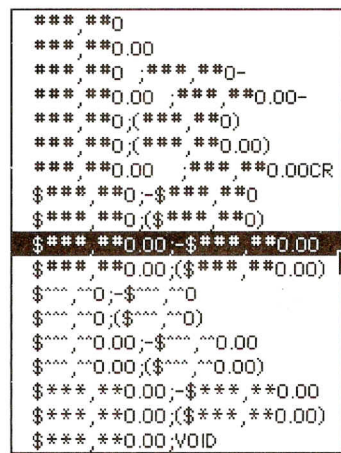


Figure 1-17
Numeric display format choices

You can set the display format by selecting it from the choices shown, by selecting and modifying it, or by entering the format character by character.

The formal structure of the number display format has three parts. The first part is the format for positive numbers, the second part is the format for negative numbers, and the third part is the format for displaying zero.

8. Choose \$###,##0.00;-\$###,##0.00

4th DIMENSION displays the format in the Format Editing box. The number signs show that you can display up to six digits; the zeros show that 4th DIMENSION automatically displays two digits after the decimal (if they are not entered, 4th DIMENSION displays two zeros). A negative number is preceded by a minus sign. There is no special format for zero.

9. Click OK.

4th DIMENSION again displays the layout. You have established the display format for the Salary field.

Seeing the Layout in Action

You can go directly to the User environment to see the results of your changes.

1. Choose User from the Use menu.

4th DIMENSION automatically saves your layout, including the display formats you have selected, and displays the records on the output layout.

2. Select any record, and then choose Modify Record from the Enter menu.

The record appears on the input layout you have been working with. The layout title has been changed, the Start Date and Salary are displayed in the formats you selected.

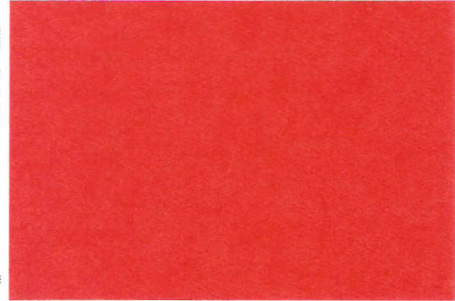
The Next Step

You often modify layouts in 4th DIMENSION—when you add fields, rearrange layout elements, or design a custom layout. The palette tools provide the power to make any layout clear, attractive, and useful.

If you want to, you can change the display format for Salary on your output layout as well. You can use the same format as the one on the input layout, or you can use a different one.

In the next chapter you will learn how to add custom buttons to the layout.

CHAPTER 2

***ADDING BUTTONS TO
THE LAYOUT***

ADDING BUTTONS TO THE LAYOUT

Database: Personnel 2

Estimated time to complete: 15 minutes

4th DIMENSION provides more than a dozen automatic Macintosh buttons that you can use to perform functions, such as accepting the record, displaying the first record, going to the next page in a multi-page layout, and deleting the current record.

In this chapter you will learn how to

- create buttons on a layout
- use your custom buttons to save, cancel, and move between records

Up to now, when you entered or modified a record, you used 4th DIMENSION's control panel to accept, cancel, and move from record to record. The control panel is always on the left side of the screen, with the buttons stacked vertically. Your custom buttons will automatically replace the control panel. When you have finished with this tutorial, your data entry screen will look like this:

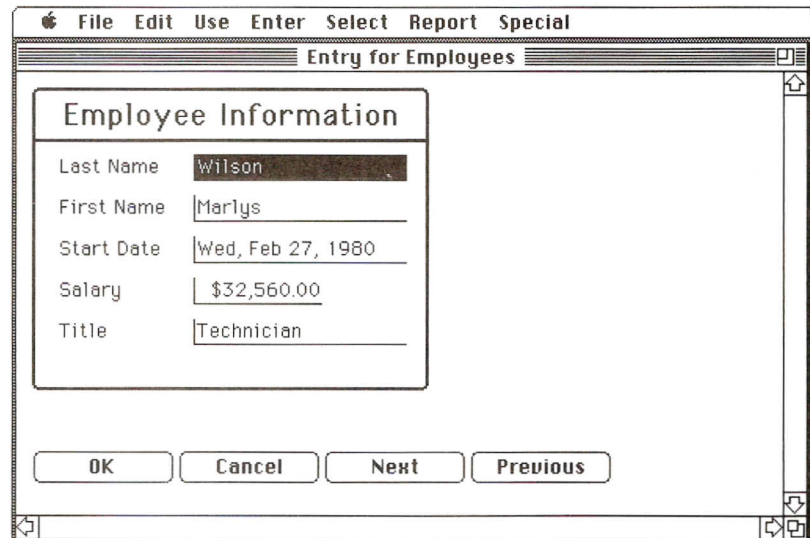


Figure 2-1
Macintosh buttons on the layout

In this tutorial you will add four buttons to your layout, OK, Cancel, Next Record, and Previous Record. A button is one of several layout objects that allow special Macintosh features on your layouts—buttons, check boxes, pop-up menus, areas to display graphs, rulers, dials, and thermometers, and scrollable areas from which to select items in a list.

Creating an OK Button

You're now going to replace the Enter and Cancel buttons provided by the control panel with your own custom buttons. You will place them on the layout and include your own text on them. In this section you will create an OK button.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 2 database.

Personnel 2 starts in the Design environment.

2. Double-click the [Employees] filename.

4th DIMENSION displays the Layout dialog box. Double-clicking a filename in the Structure window is a shortcut that opens the Layout dialog box with the file already expanded to show the layouts for that file.

3. Open the Buttons layout.

4. Click the zoom box or use the resize box to expand the window to fill the entire screen.

You are going to position the buttons below the border, separate from the portion of the layout that contains the fields.

5. Click the Create Active Object icon on the palette.

Clicking this icon informs 4th DIMENSION that the next area you define on the layout will contain an active object.

6. Draw a rectangle below the frame and below the report control marks, about 1 inch long and 1/2 inch high. Start in line with the left edge of the border of the data entry area.



Layout



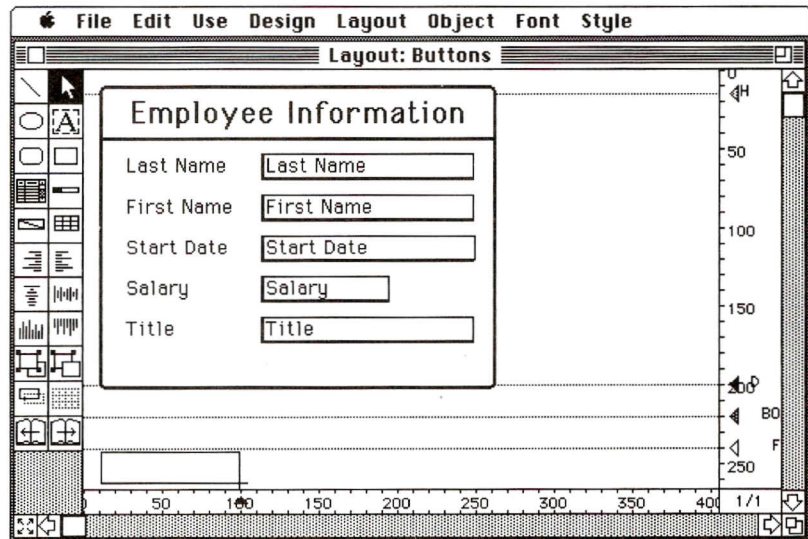


Figure 2-2
Drawing a custom button on the layout

When you release the mouse button, 4th DIMENSION displays the Object Definition dialog box. The Object Definition dialog box is similar to the Field Definition dialog box you used in Chapter 1.

Object type
pop-up
menu
Object action
pop-up menu

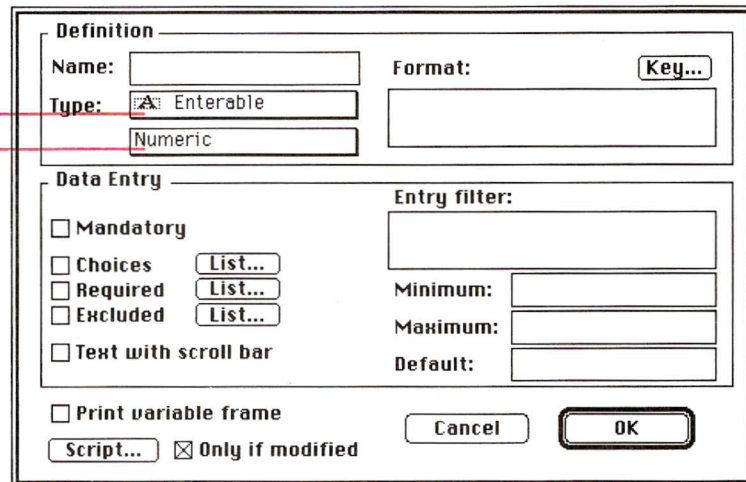


Figure 2-3
The Object Definition dialog box

An active object can perform many actions, from displaying data to working as a button or pop-up menu. You are going to use this active object as a button.

7. Name the button **bOK** and press Tab. The text area will be selected; label the button **OK**.

The Format area has a new title, Button text. OK is the text you want displayed on the button when it appears on the screen. You could have typed any text that would convey the meaning you want—Enter, Accept Record, and so on.

8. Press and hold the Type menu to display the pop-up menu of types of objects.

There are 15 types of layout objects you can choose from. For complete information about these choices, see the *4th DIMENSION Design Reference*.



Figure 2-4
Choosing from the Object Type pop-up menu

9. To create a button, drag the pointer to highlight the third choice, Button, and then release the mouse button.

Button text
Object name
Object type
Object action

Figure 2-5
Entering button text

10. Press and hold the Action menu to display the pop-up menu of actions.

Just as Button is one type of object, these choices are different actions you can assign to the button. You can choose from the list of 13 actions. You will choose 4 actions for buttons in this tutorial. For complete information about these actions, see the *4th DIMENSION Design Reference*.

11. Highlight Accept, and then release the mouse button.

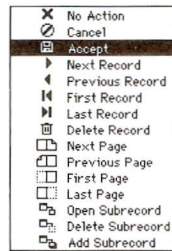


Figure 2-6
Choosing an action for the button

4th DIMENSION displays Accept as the action. The button you are defining will cause a record to be accepted when it is clicked.

12. Click OK.

4th DIMENSION displays the layout again, this time with your button on it. Note that the rectangle you drew has changed to a shape with rounded corners, the regular Macintosh shape for this type of button.

You have added the first of your buttons to the layout. In the next section you will create additional buttons the same size as this one.

Duplicating and Editing Buttons

For your screen design, you want all your new buttons to be the same size. The easiest way to accomplish this is to duplicate the button you just created and then edit the definition of each of the copies.

Remember, you are adding OK, Cancel, Next Record, and Previous Record buttons to your layout. You've already added OK, so you need three more buttons.



1. If necessary, click the OK button you just created to select it. Then click the Duplicate icon.

4th DIMENSION creates a copy of the OK button. The copy has all the instructions you used for the first OK button. When 4th DIMENSION duplicates a layout element, all the instructions for the element are copied as well (for example, a field's display format is copied).

2. Drag the new button up next to and to the right of the first button.

When you position this button and keep it selected, you prepare to use 4th DIMENSION's smart duplicate feature. 4th DIMENSION remembers where you positioned the button in relation to the first button. The next copy is similarly placed automatically.

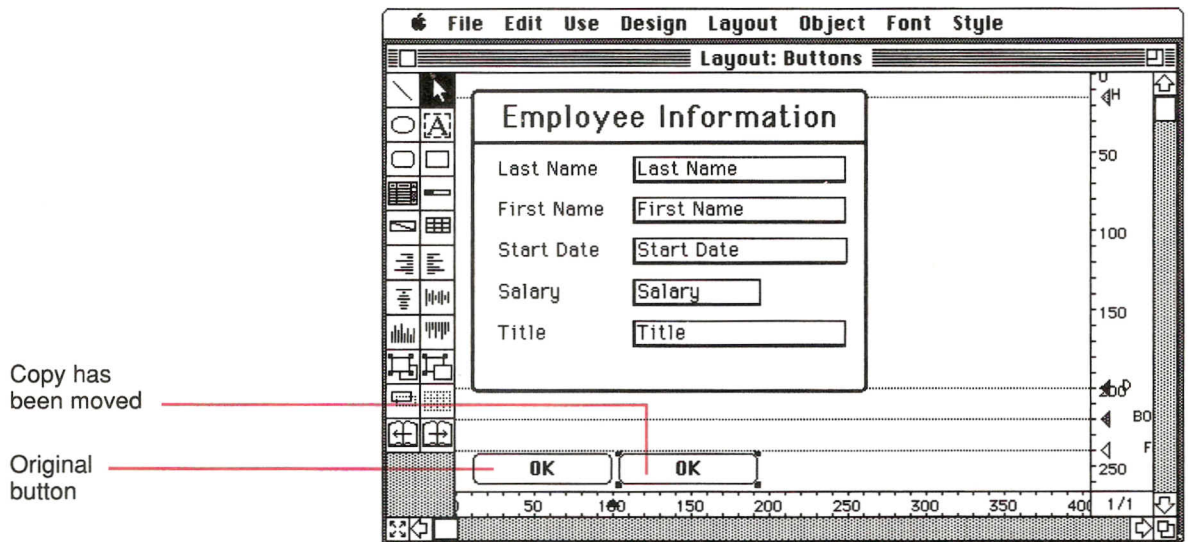


Figure 2-7
New button created with Duplicate, selected for the next step

3. Click the Duplicate icon two more times.

4th DIMENSION creates two more buttons, each placed to the right of the previous copy. If for some reason the duplication does not place the new button to the right of its original, you may have inadvertently selected something else before duplicating. Delete any copies you have made and start over again at step 1.



4. To align the four buttons exactly, Shift-click all four to select them as a group, and then click the Align Top icon.

4th DIMENSION aligns the buttons in relation to each other.

If you make a mistake, don't forget that you can go back a step by choosing Undo from the Edit menu.

5. Click anywhere other than the four selected buttons.

The four buttons are deselected.

6. Now double-click the second button.

Double-clicking the button displays the Object Definition dialog box for that button. You are going to make this button the Cancel button. The instructions in the dialog box are the ones you entered for the OK button. To make this button the Cancel button, all you need to do is choose Cancel for the action and change the display text.

7. Name the button **bCancel** and label it **Cancel**.

8. Choose Cancel from the Action pop-up menu.

9. Click OK.

4th DIMENSION again displays the layout. The second button is changed to a Cancel button.

10. Make the third button a Next Record button by double-clicking it, changing the button name to **bNext**, the button Action to Next Record, and the button text to **Next**.

11. Make the fourth button a Previous Record button by double-clicking it, changing the button name to **bPrevious**, the button action to Previous Record, and the button text to **Previous**.

Your layout is finished; it now includes the set of custom buttons you have created.

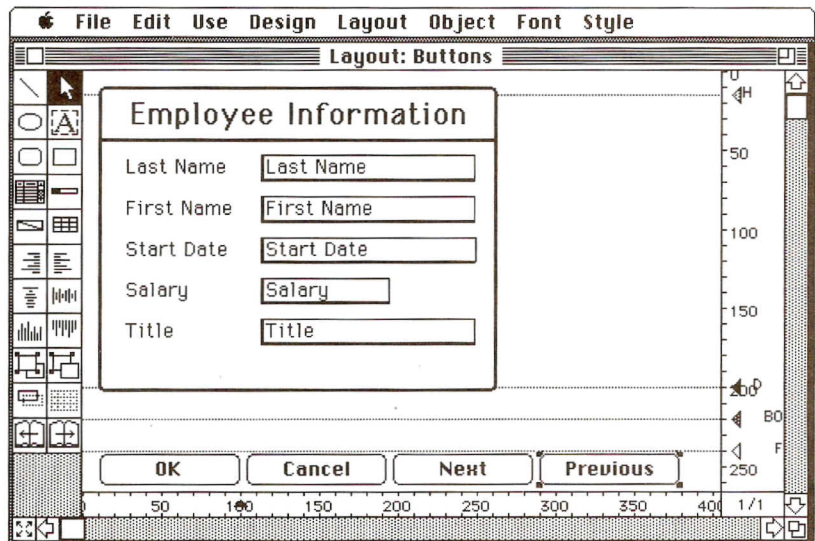


Figure 2-8
Custom buttons added to the layout

Seeing the Custom Buttons in Action

As you learned in the previous chapter, you can go to the User environment to check on work you have done in the Design environment.

Since 4th DIMENSION removes the standard control panel when you create your own buttons, you want to see how the new buttons affect the screen design of your layout.

Marlys Wilson has been promoted in the Art Department; her new title is Supervisor; her new salary is \$36,500. You are going to use your new layout to modify her employee record.

1. Choose User from the Use menu.
4th DIMENSION displays the records in the List layout.
2. Select the record for Marlys Wilson, and choose Modify Record from the Enter menu.

4th DIMENSION displays your previous input layout. Because you have created another input layout, you need to tell 4th DIMENSION to use the new layout instead.

3. Choose the Choose File/Layout command from the File menu.
4th DIMENSION displays the Choose File/Layout dialog box. This dialog box lets you establish the input and output layouts for each file.
4. Double-click the [Employees] filename to display the layouts for that file.

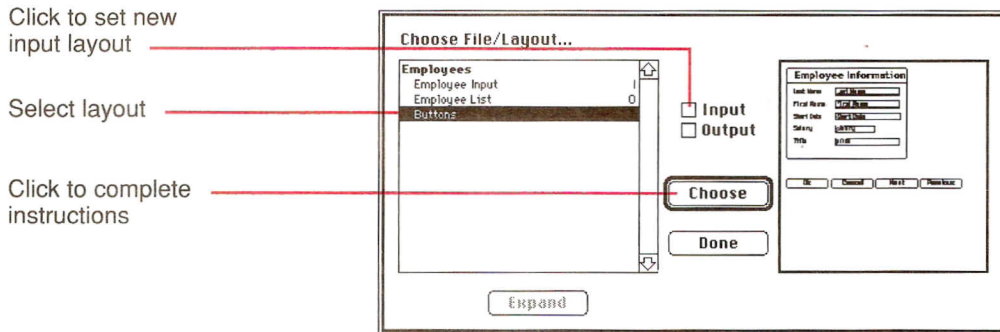


Figure 2-9
The Choose File/Layout dialog box

- Layout* 5. Select Buttons from the list (do not double click on it), click the Input check box, then click Choose.

4th DIMENSION displays the Buttons layout, ready for you to enter information.

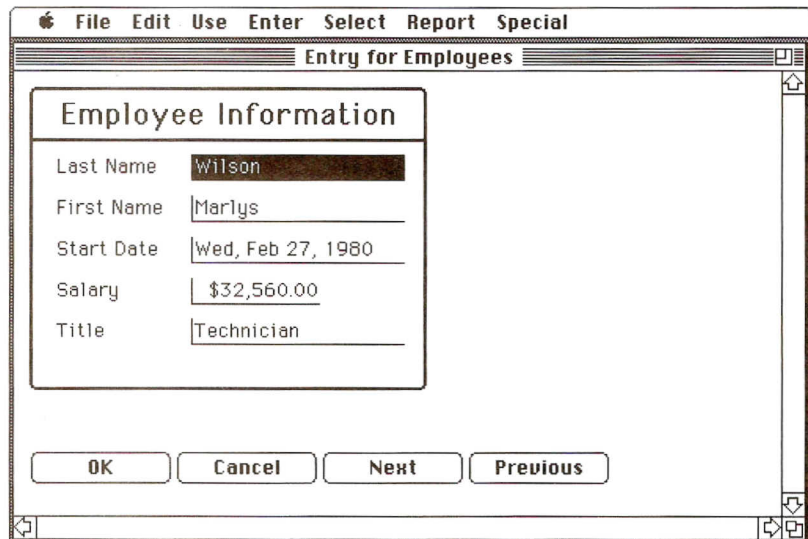


Figure 2-10
Seeing your custom layout in the User environment

4th DIMENSION has removed the standard control panel from the left side of the screen. Now your custom buttons are arranged across the bottom of the screen.

6. Enter the new information for Marlys Wilson:

Salary: **36500**

Title: **Supervisor**

7. Click Next.

4th DIMENSION displays the next record in the database.

8. Click Previous.

4th DIMENSION displays the record you just modified. You can use Previous and Next to move from record to record as often as you want.

9. Finally, click OK.

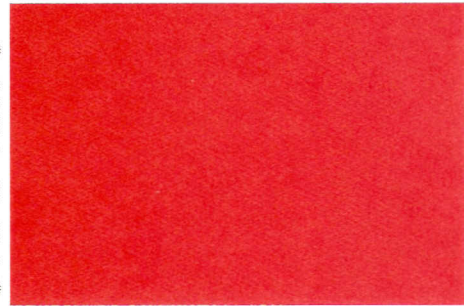
4th DIMENSION returns to the output layout for this database.

The Next Step

You have added Macintosh buttons to your layout for accepting and storing the information on the current record or canceling the entry or edit operation. The other buttons you added allow you to move from record to record (Previous and Next).

In the next chapter you will do more work with the Layout editor. You will add a new page to a layout, and then change the data entry order.

CHAPTER 3

***MULTI-PAGE LAYOUTS AND
DATA ENTRY ORDER***

MULTI-PAGE LAYOUTS AND DATA ENTRY ORDER

Database: Personnel 3

Estimated time to complete: 20 minutes

4th DIMENSION allows you to control virtually everything about your layouts. If you have too many fields to conveniently display on one screen, you can add additional pages. During data entry, when you use the Tab key to move from field to field, 4th DIMENSION automatically selects the next field according to the data entry order. You can change the data entry order to fit your needs. In this chapter you will learn how to

- add a page to your layout, making it a multi-page form
- change the data entry order

Single-Page and Multi-Page Layouts

4th DIMENSION's layouts provide a huge "page" on which to place fields and graphic elements, and display fields from included files and subfiles. A single-page layout can be as much as 144 inches wide and 142 inches high (almost 12 square feet). You use the scroll bars to move around the layout in the Layout editor.

Employees			
Last Name	Tattinger		
First Name	Nicol		
Start Date	5/8/85	Doctor	Dr.
Salary	35500	Emergency Phone	453
Department	Art		
Spouse	Michele		
Address	1978 Intercoastal Dr.		
City	Birmingham		
State	AK		

Figure 3-1
A layout can be much bigger than the screen

You may want to divide this large layout into two or more separate pages. 4th DIMENSION calls such a layout a *multi-page layout*. When you use a multi-page layout, you can

- reduce the amount of scrolling necessary to work with a layout.
- create a more attractive layout, in some cases.
- group related fields together on a particular page for quickly updating related information. For example, you could place all the fields that need regular modification on the first page of a layout.
- design each page of the layout to fit the size of the display monitor used by your system.
- imitate your company's current multi-page forms.

Many standard forms, such as employment applications, contracts for real estate, and insurance forms, contain several pages, with blanks on each page to fill out. Just like turning to the proper page in a multi-page paper form, when you use a multi-page layout you can display the exact page that contains the information you want to view or change.

Adding a Page

Suppose you have been working with another layout for the personnel database, one that keeps track of emergency information for each employee. The layout you are now using takes up more than the entire screen. You decide to add a page to the layout so that you can more conveniently display the information on two screens. Two pages allow you to create a more attractive display for the information, and reduce the amount of scrolling you have to do during data entry.

You plan to place official information on the first page (name, salary, department, and so on), and personal information on the second page (address, spouse's name, doctor's name, and telephone).

The several steps presented here show you how to add a page, choose the parts of the layout you want to display on the new page, and how to transfer them to the new page.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 3 database.

Personnel 3 starts in the Design environment.

Layout

2. Display the Emerg Records layout.
3. If needed, click the zoom box to expand the window.

Expanding the window reveals all the icons.

Next Page
icon

Previous
Page icon

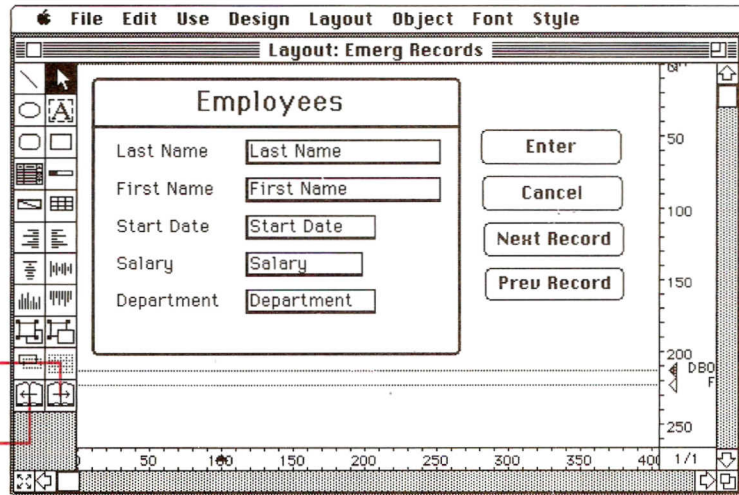


Figure 3-2
The Emerg Records Layout



4. Add a page to the layout by clicking the Next Page icon.

Since there is no next page, 4th DIMENSION asks if you want to create it.

5. Click OK.

4th DIMENSION creates a blank page. The page number of the page is in the bottom right hand corner.

Now you can select the fields you want to place on the second page.

Adding Fields to the Layout

4th DIMENSION provides a way to go back to the New Layout dialog box so that you can add fields to an already existing layout. To add the personal fields to the new second page:

1. Choose Add to Layout from the Layout menu.

The pointer changes to a right-angle marker.

2. Click near the upper left corner of the screen.

This spot marks the upper-left corner of the layout that will appear. 4th DIMENSION displays the New Layout dialog box.

fields

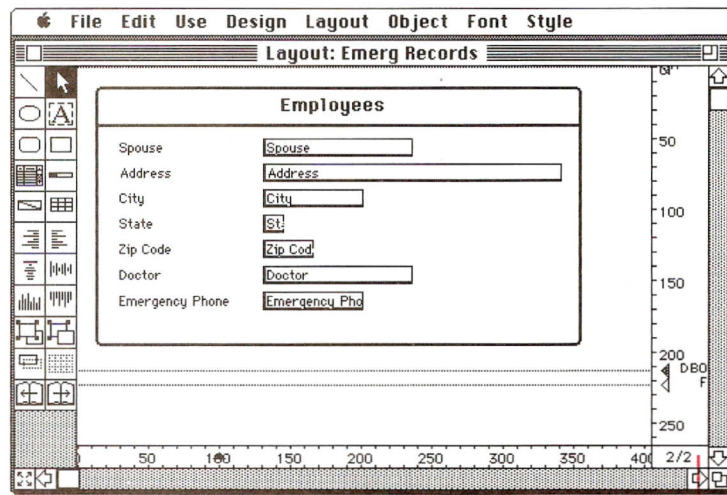
- 1 2 3 4 5 6 7
3. Select Spouse, Address, City, State, Zip Code, Phone, Doctor, and Emergency Phone.

To select a field, you can either select the field, then click the Select button, or you can simply double-click the field.

Font

- 8
4. Select the 9-point font size, and then click OK.

4th DIMENSION adds the fields you selected to the second page of your layout.



Layout page
number

Figure 3-3
The second page of the layout

Adding Next Page and Previous Page Buttons

You have created a second page and placed the elements you want on it. Now you need to add buttons to allow you to move between the two pages.

1. Go back to the first page of your layout by clicking the Previous Page icon.
2. Add a Next Page button to the first page of your layout.

Use the Create Active Object icon. Name the button **bNext**, select Next page from the Action pop-up menu and enter **Next Page** for the button text.



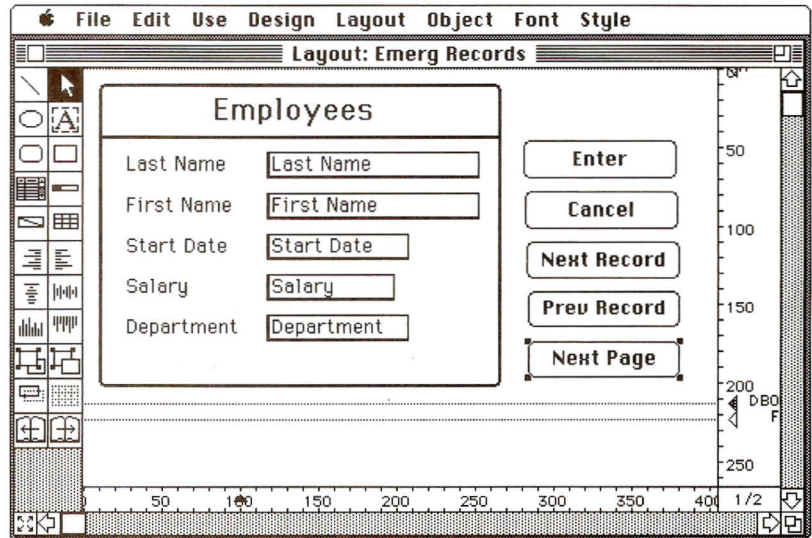


Figure 3-4

A Next Page button on the first page of the layout

3. Copy the button.

To copy an object you first select it, then choose Copy from the Edit menu.

4. Go to the second page and paste the copied button there.

To paste an object you have just copied, choose Paste from the Edit menu, then drag the object into position. When the object is in place, click anywhere outside the object to deselect it.

5. Change the name of the copied button to bPrevious, the action to Previous Page, and the button text to Previous Page.

Your new layout is complete.

Seeing the Multi-Page Layout in Action

Now that you have created a multi-page layout, you can see how it works.

1. Go to the User environment and change the Input layout to Emerg Records in order to see your multi-page layout. Changing the layout is described in Chapter 2.
2. Add a new record. Use the Next Page and Previous Page buttons to move between the two pages of your single layout. Switch to the Design environment when you are finished.

Layout

Data Entry Order

You may have noticed that 4th DIMENSION automatically selects the fields on your layout as you use the Tab key to move from one field to the next. 4th DIMENSION maintains a data entry order that determines the order in which the fields are selected. You can change this order.

The original data entry order 4th DIMENSION uses is based strictly on the position of the fields on a layout. The order proceeds from left to right and from top to bottom. If one field is above another, it is selected first; if one field is to the left of another, it is selected first. Precedence is given to a field if it is even one pixel above another. (A pixel is one dot on the screen.)

This field is chosen first because it is above the other field

Employees	
Doctor	
Emergency Phone	

This field is chosen first because it is to the left of the other field

Employees	
Doctor	Emergency Phone

Figure 3-5

The data entry order is first determined by location

You can change the data entry order to

- select fields in logical order, which may be different from the current data entry order.
- select fields in the order the information is presented for data entry. For example, a form that a customer fills out may show the information in a different order from the fields on the screen.
- place fields that are rarely updated last so they can be skipped if necessary.

Changing the Data Entry Order

In this section, you will use a layout that displays the information conveniently but has an awkward data entry order. You will change the data entry order to make data entry easier.

Layout

1. Choose Layout from the Design menu, then open the Side By Side layout.

4th DIMENSION displays the layout in another Layout editor window.

2. If needed, click the zoom box to expand the window.

The screenshot shows a software window titled "Layout: Side By Side" with a menu bar (File, Edit, Use, Design, Layout, Object, Font, Style) and a toolbar on the left. The main area displays a form titled "Employee Information:". The form is organized into two columns. The left column contains the following fields: Last Name, First Name, Address, City, State (labeled 'St'), Zip, Phone, and Emergency Phone. The right column contains: Start Date, Department, Salary, Spouse, and Doctor. The fields are arranged in a way that is visually clear but not necessarily in the order a user would enter the data.

Figure 3-6
The Side By Side layout

As you can see, this layout provides an attractive visual display of fields, exactly like the paper form used by your employees for information. Unfortunately, the data entry order makes it difficult to enter the information.

3. Choose Entry Order from the Layout menu.

4th DIMENSION displays the data entry order, and the pointer changes to a small arrow. The data entry order is indicated by arrows that point from field to field. As you can see, this order goes across the screen before going down the screen. Ideally, you want to enter information into the fields on the left first, then into the fields on the right.

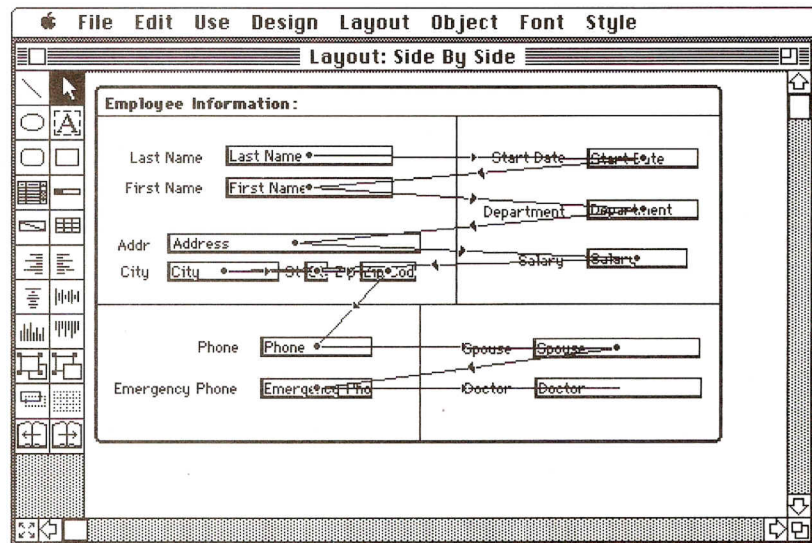


Figure 3-7
The data entry order

The selection order arrows extend from the middle of one field to the middle of the next. You change the order by drawing new selection order arrows from one field to another.

Here is the order you want to end up with:

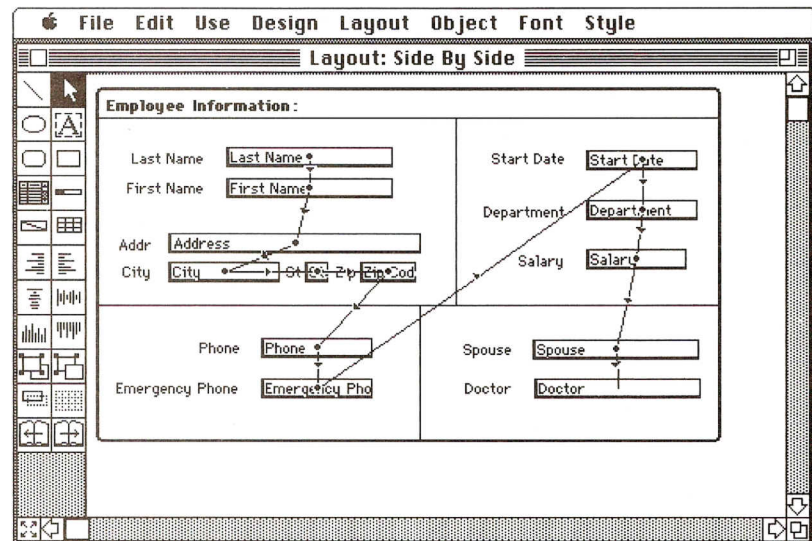


Figure 3-8
The desired data entry order

4. Move the pointer to the Last Name field on the left side, then press and hold down the mouse button as you drag the pointer to the First Name field.

When you release the mouse button, 4th DIMENSION redraws the selection order arrows for all affected fields.

You could continue in this fashion, drawing the new data entry order from field to field. But 4th DIMENSION provides a way to quickly change whole groups of fields.

5. Drag a marquee around the group of fields on the left.

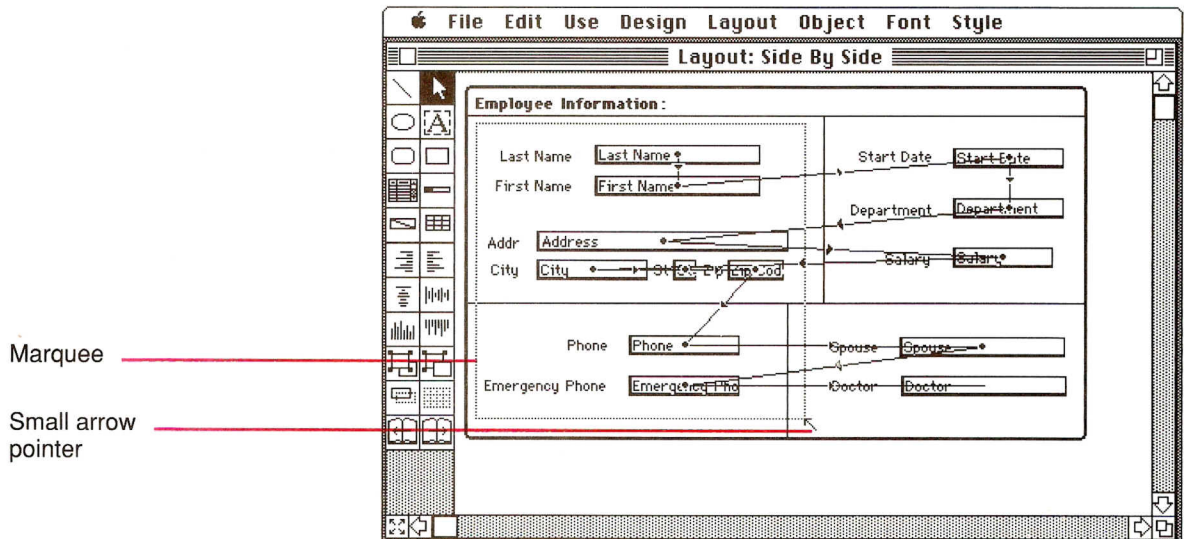


Figure 3-9
Dragging a marquee around a group of fields

When you release the mouse button, 4th DIMENSION automatically redraws the data entry order. The order goes down the left group first, then up to the right group.

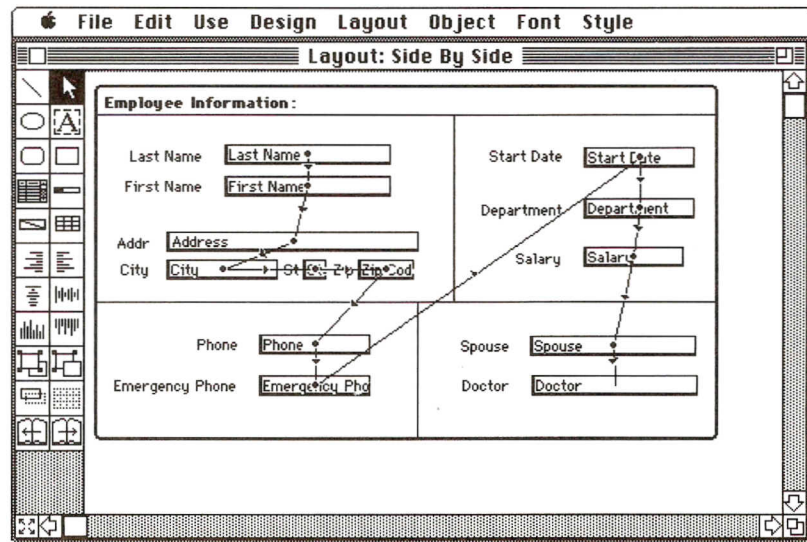


Figure 3-10
The new data entry order

6. * Return to layout editing by clicking on the pointer tool.
7. Try out your new custom data entry order in the User environment.

Remember that you have to change the current input layout to Side By Side to use your new data entry order.

The Next Step

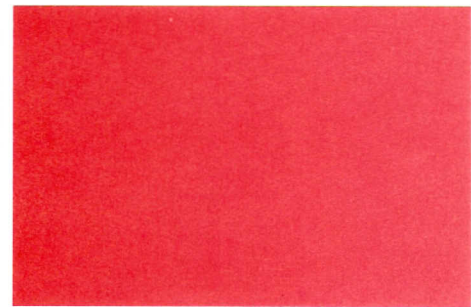
The Layout editor is a flexible design tool. You can create layouts that assist the data entry process, that display the information effectively, and that look attractive.

Practice with the Layout editor to learn more about what you can do with lines, shapes, and fill patterns. You can find complete information about the tools available in the Layout editor in the *4th DIMENSION Design Reference*.

In the next chapter you will add a field to the database, and to a layout, and use the Lists editor to create a list from which you can select an entry for a field.

ADDING FIELDS AND USING LISTS

CHAPTER 4



ADDING FIELDS AND USING LISTS

Database: Personnel 4

Estimated time to complete: 20 minutes

You can add new fields at any time to a 4th DIMENSION file. You already know how to create a field from *Quick Start*. Adding a field is essentially the same process, except that you must remember to place it on any existing layouts in order to enter and view data.

You add fields to a database when you discover that you need to store an additional piece of information on each record. You add fields to layouts whenever you create a custom layout.

4th DIMENSION allows you to create lists for field entries. You can display the list during data entry and choose the entry from the list. Choosing from a list simplifies data entry, and it ensures that the entry itself is exactly right—no misspelled words, no extra spaces.

You can have many lists in a single database. You can use lists for several fields and enterable objects. You can make a list mandatory, so that only an entry that appears on the list can be entered. Or you can make a list excluded, so that no entry that appears on the list can be entered.

In this chapter you will learn how to

- create a list
- add a field to the database
- place a field on a layout
- attach a list to a field
- use the list for data entry

Creating a List

Your company offers several health plans for its employees. You have decided to keep track of which health plan each employee has selected. In this section, you will make a list of the plan names. This list will provide data entry choices for the new field you plan to add to the database.

1. If you have not already done so, start 4th DIMENSION and open the Personnel 4 database.

Personnel 4 opens in the Design environment.

2. Choose Lists from the Design menu.

4th DIMENSION displays the Lists editor.

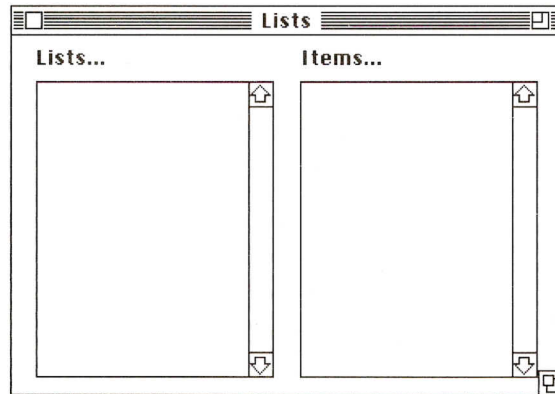


Figure 4-1
The Lists editor

The names of the lists you create appear in the Lists panel, and the choices on each list appear in the Items panel.

3. Choose New from the Lists menu.

4th DIMENSION displays a dotted-line box in the Lists panel.

Lists

4. Type Health Plans.

Health Plans is the name of this choice list. You will use this name whenever you want to activate this list.

Having created the list, you now will add the items on it.

Item

5. Choose New from the Items menu.

4th DIMENSION displays a dotted-line box in the Items panel.

Item 1

6. Type **White Cross**.

White Cross is one of the health plans an employee can join.

7. Choose New from the Items menu.

4th DIMENSION adds the first item to the Items column and displays a second dotted-line box.

Item 2

8. Type **King HMO**, and then press Return.

4th DIMENSION adds the second item to the Items column and displays another dotted-line box. Pressing Return is a shortcut for choosing New from the Items menu.

Item 3, 4, 5

9. Complete the list by entering the following choices:

Green Shield

National

None

Sort

10. Choose Sort from the Items menu to arrange the choices in alphabetical order.

4th DIMENSION sorts the titles.

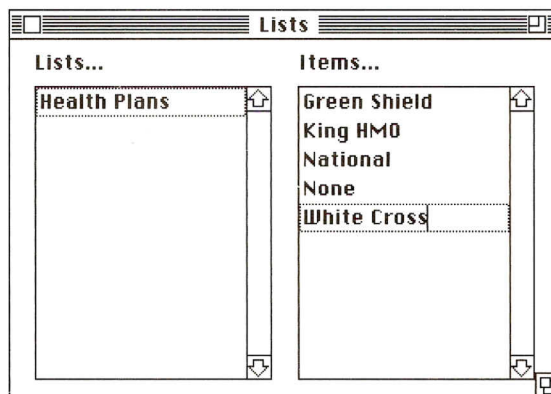


Figure 4-2

The completed list with sorted choices

When you create a list, 4th DIMENSION assumes you want to be able to modify the list during data entry. Because your company might add a new health plan in the future, you decide to allow the list to be modified.

Lists	Items
New	
Delete	
✓User Modifiable	

11. Pull down the Lists menu to ensure that User Modifiable has a check mark.

The check mark indicates that the list is modifiable. If the check mark does not appear next to User Modifiable, choose User Modifiable to place the check mark.

12. Click the Close box to close the Lists editor.

That's all there is to creating a choice list. In the following sections, you will see how to attach this list to a field and how to use it during data entry.

Adding a New Field

You have created a list that offers health plan choices. In this section you will add a field and attach the list to it so that the list appears during data entry.

1. If needed, select Structure from the Design menu.
2. Double-click beneath the last field of the [Employees] file.

Double-clicking is a shortcut for choosing New Field from the Structure menu. 4th DIMENSION displays the Field dialog box, ready for you to add a new field to the file.

If you accidentally click one of the existing fields in the file, 4th DIMENSION displays the Field dialog box for that field. In such a case, just click Cancel and try again.

3. Create a field called Health Plan and use the default field type, Alpha 20.

As you did in *Quick Start*, type the field name.

4. Click the Choices check box in the Lists section.

When you select Choices, the List button becomes active.

5. Click the List button.

4th DIMENSION displays the Lists dialog box. This dialog box displays all the lists that have been created for this database. Since you have created only the Health Plans list, it is the only one displayed.

field

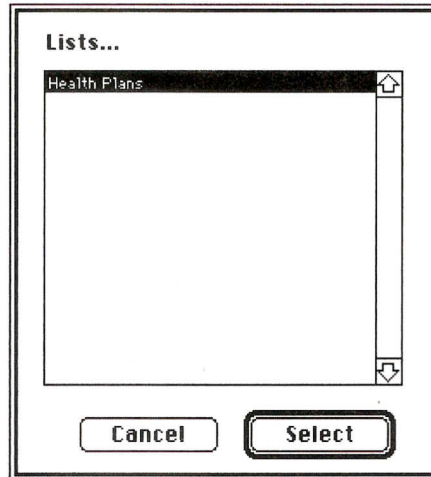


Figure 4-3
The Lists dialog box

6. With the Health Plans list highlighted, click Select.

4th DIMENSION returns the Field Definition dialog box to the screen. Whenever you select this field during data entry, the Health Plans list will appear so that you can select that employee's plan.

7. Click OK.

4th DIMENSION displays the Structure window. You have successfully added the Health Plan field to the file. The new field, however, does not yet appear on any layout. You need to add it to an existing layout.

Placing the New Field on a Layout

Now that your new field exists, the next step is to add this field to a layout. To do this you use the Layout editor.

Double-click
here to display
the Layout dialog

1. Double-click the filename title bar.

A screenshot of a software window titled "Employees". Below the title bar is a list of fields with their data types: Last Name (A), First Name (A), Start Date (D), Salary (R), Title (A), and Health Plan (A).

Employees	
Last Name	A
First Name	A
Start Date	D
Salary	R
Title	A
Health Plan	A

Figure 4-4
The [Employees] file with an added field

Double-clicking the filename title bar in the Structure window tells 4th DIMENSION that you want to see a layout for that file. When 4th DIMENSION displays the Layout dialog box, the [Employees] file is already expanded to show the layouts for that file.

Layout

2. Double-click the Employee Input layout.

4th DIMENSION displays the Employee Input layout. You are going to add the new field to this layout.

3. Select the frame of this layout and make it bigger by dragging the lower right corner toward the bottom of the screen.

Add field

- Click the Add Field icon on the palette, then draw a rectangle in the space you have added to the frame of the layout

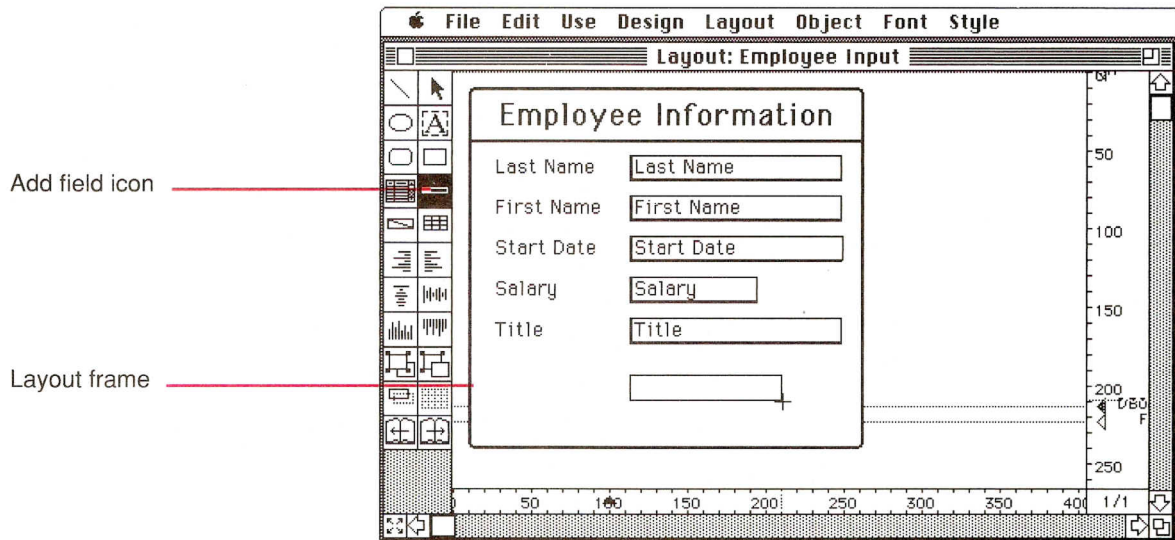


Figure 4-5
Drawing an area for adding a field

As soon as you finish drawing the field area, 4th DIMENSION displays the Field Definition dialog box. You use this dialog box not only to set the field display format (as you have done before), but also to choose the field you want in the field area you have just drawn and to set any data validation instructions for that field.

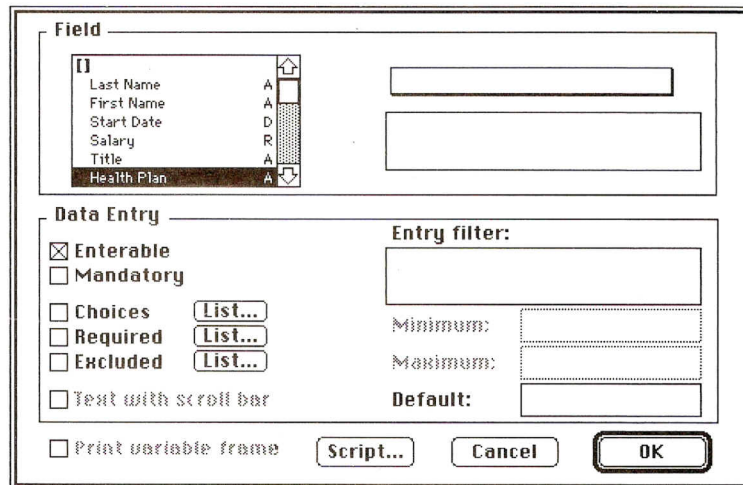


Figure 4-6
The Field Definition dialog box

5. Select Health Plan from the list of fields.
6. Click OK. Select 12 point from the Style menu.
4th DIMENSION displays the layout with the added field.
7. Use the Text Area tool to create a field label: **Health Plan**.
Make it 12 point.
8. Align the text to the field with the Align Top tool.

Remember to select both the new text area and the Health Plan field before you click the Align Top tool.

9. Select only the Health Plan field and then press Command-1 to create a box around it.

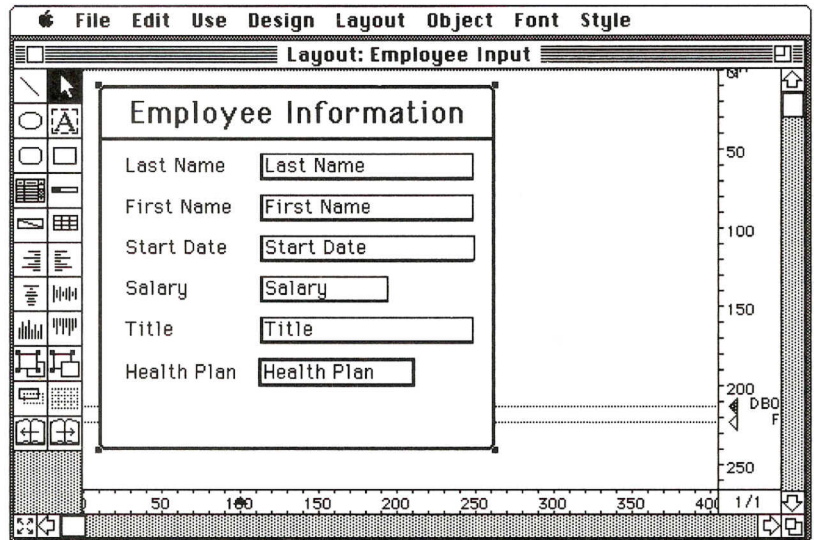


Figure 4-7
The layout with a new field added

This tutorial has taken you through adding a field to a layout to emphasize this point: new fields are not automatically added to layouts. Here is the rule to remember:

You must add a new field not only to the structure of the database, but also to any existing layouts you want to use it on.

Of course, any new layouts you create can automatically include the new field, along with the other fields in the file.

Seeing the Choice List in Action

As you found in the previous chapters, you can go quickly to the User environment to check on work you have done in the Design environment.

You want to see how the new choice list affects how you enter information into your layout.

1. Choose User from the Use menu.
4th DIMENSION displays the records in the List layout.
2. Select a record and choose Modify Record from the Enter menu.
4th DIMENSION displays your modified input layout.
3. Select the Health Plan field.
4th DIMENSION displays the choice list.

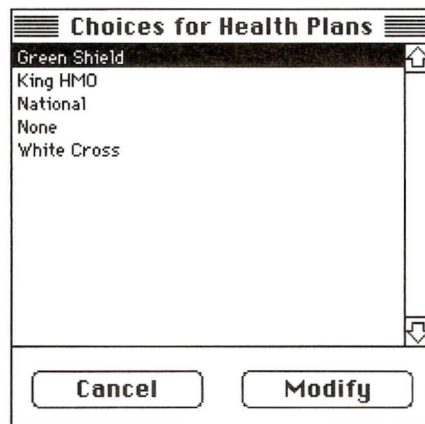


Figure 4-8
The choice list displayed during data entry

4. Click National.

4th DIMENSION enters National in the field and puts away the choice list. The Health Plan field remains selected.

Feel free to experiment with the choice list. You can select a different field, then select the Health Plan field to display the choice list again. You can select a different entry from the list to replace whatever has been previously entered. You can click Modify to return to the Lists editor to add or delete items from the list.

5. When you have finished using the list, click Enter or Cancel.

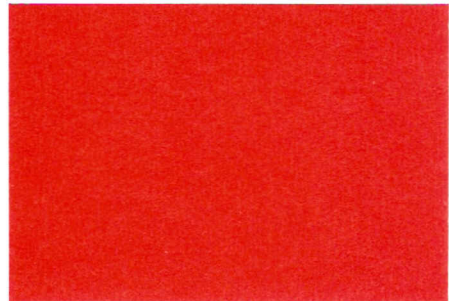
4th DIMENSION returns to the output layout for this database.

The Next Step

Choice lists provide a convenient and fast way to enter data into a field accurately. You create a choice list in the List editor. In this chapter you attached the choice list to a field as a field attribute. In the next chapter you will see additional ways to use choice lists for data validation.

VALIDATING DATA

CHAPTER 5



VALIDATING DATA

Database: Personnel 5

Estimated time to complete: 15 minutes

How important is correct information? An incorrect mailing address can be either annoying or disastrous, depending on the information that is delayed or not delivered. An incorrect total in your checking account statement can be annoying; indeed, if it goes undiscovered, it can be ruinous.

There are many ways incorrect information can find its way into a database. Information can become out of date. It can be entered wrong either accidentally or on purpose. It can be calculated with an incorrect formula. And the list of what can go wrong goes on.

The purpose of data validation is to check the information before the record is accepted into the database.

4th DIMENSION provides many ways to validate data. You can create lists of values that either must be used or may not be used for a field. Using field attributes, you can ensure that each record contains a unique entry in a field. You can establish a range of acceptable numeric values, rejecting any entry that does not fall between the upper and lower limits. Or you can use 4th DIMENSION's extensive language to write scripts that perform almost any type of data validation.

In this chapter you will learn how to

- use field attributes for data validation
- create an entry filter to reduce typing errors in a field
- create upper and lower limits for a numeric field
- use a list to set required entries for a field

Using Field Attributes for Data Validation

Field attributes provide several very useful ways to validate the information that you enter into your database. For example, applying the Mandatory attribute to any field makes it impossible to enter a record without an entry in that field.

The Personnel 5 database has a new field for the employee's social security number. You will specify attributes that help to validate the entries in that field.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 5 database.

Personnel 5 opens in the Design environment.

2. Double-click the SSNumber field in the [Employees] file.

Double-clicking is a shortcut for choosing Change Field from the Structure menu. 4th DIMENSION displays the SSNumber Field dialog box, ready for you to make any changes to the field instructions.

If you accidentally click another field in the file, 4th DIMENSION displays the Field dialog box for that field. In such a case, just click Cancel and start over.

Notice that the SSNumber field is an Alpha 9 field. All social security numbers have nine digits. You will use the special 4th DIMENSION formatting features to allow space for the two hyphens.

3. Select the Mandatory attribute.

Mandatory prevents a record from being accepted without a social security number.

Field for file Employees

Name: **SSNumber**

Types	Attributes
☒ Alpha 9	☒ Mandatory
☐ Text	☐ Display only
☐ Real	☐ Can't modify
☐ Integer	☐ Indexed
☐ Long Integer	☐ Unique
☐ Date	☐ Choices List...
☐ Time	
☐ Boolean	
☐ Picture	
☐ Subfile	

OK & Next

Cancel OK

Figure 5-1
Making SSNumber Mandatory

Now you will add other attributes to further protect the integrity of the social security numbers in your records.

4. Select Indexed, then select Unique.

When you select Indexed, the Unique attribute becomes available. Unique prevents any duplicate entries in the SSNumber field.

5. Click OK.

4th DIMENSION displays the Structure window. You have successfully changed the attributes of a field. The attributes affect the SSNumber field on every layout on which it appears.

You could go to the User environment to see the results of adding these attributes. But the next sections contain additional data validation techniques. You may want to wait until the end of this session to see the results in the User environment.

Setting an Entry Filter

An entry filter checks the information entered against a pattern. If it matches the pattern, it is accepted; if it doesn't match the pattern, it is rejected. An entry filter can standardize what appears in a Telephone Number field, or, in the case of social security numbers, can ensure that the correct number of digits is placed between hyphens.

Generally, when you specify an entry filter, you should also specify a display format. The entry filter affects data entry only; it has no effect on the way a field value is displayed and printed. If you use hyphens in your data entry filter, for example, they will be printed only if you also create a display format for the field.

1. Double-click the title bar of the [Employees] file.
2. When the Layout dialog box appears, double-click the Validate layout.

4th DIMENSION displays the Validate layout. You are going to use this layout for data validation controls.

3. Double-click the SSNumber field.

4th DIMENSION displays the Field Definition dialog box for the SSNumber field.

4. Select the Entry Filter box.

An Entry Filter can be used to set any sort of pattern for entering data. 4th DIMENSION then applies the pattern whenever a value is entered into this field on this layout.

exclamation mark

! D153

You create patterns from symbols on your keyboard. Here is a short table of the symbols and their meanings.

Symbol	Meaning
&	Signal that filter begins
#	Placeholder symbol
9	Any number
a	Any letter
A	Any capital letter
~	Forces capital letter

For complete information, see the *4th DIMENSION Design Reference*.

To require a particular punctuation mark, simply use it in the filter. All social security numbers follow a format of three numbers, hyphen, two numbers, hyphen, four numbers (123-45-6789). The next step shows an example of how to specify this pattern.

- To create the pattern for the SSNumber field, type the following:

Entry Filter

&9###-##-####

The Entry Filter pattern specifies the entry format for the SSNumber field. Each entry is forced into this format; only numbers are accepted. The entry filter has no effect on the way a value is displayed. In order to display the social security number with hyphens, you need to add a display format.

- Specify a display format for the field by entering the following in the Format box (see Figure 5-2):

###-##-####

This display format ensures that the social security number will be displayed and printed with hyphens. Without the display format, only the numbers would be displayed.

Display Format

Format box

The screenshot shows the 'Field Definition' dialog box. In the 'Field' section, a list of fields is shown with 'SSNumber' selected. To the right of the list is a 'Format box' containing the text '###-##-####'. Below this is the 'Data Entry' section with checkboxes for 'Enterable' (checked), 'Mandatory', 'Choices', 'Required', 'Excluded', and 'Text with scroll bar'. To the right of these is the 'Entry filter' section with a text box containing '09###-##-####' and three empty boxes for 'Minimum', 'Maximum', and 'Default'. At the bottom left is a checkbox for 'Print variable frame'. At the bottom right are three buttons: 'Script...', 'Cancel', and 'OK'.

Figure 5-2
Entry filter and display format for social security numbers

7. Click OK.

4th DIMENSION displays the layout again.

This data validation technique helps prevent data entry errors from affecting this important field.

Adding a Validation Range

Salaries in your company range from \$15,500 to \$105,000. These are the lower and upper limits of acceptable salary figures. To set these limits to validate entries in the Salary field, you use the same layout.

1. Double-click the Salary field.

4th DIMENSION displays the Field Definition dialog box for the Salary field.

You have already used this dialog box to set the display format. Now you will use it to enter upper and lower limits for the salary field.

Min

2. Select the Minimum box and type **15500**.

The lower limit for Salary is set at \$15,500.

Max

3. Select the Maximum box and type **105000**.

The upper limit for Salary is set at \$105,000.

The dialog box is titled "Field Definition" and is used for configuring the "Salary" field. It is divided into two main sections: "Field" and "Data Entry".

Field Section:

- A list of fields is shown on the left: Last Name, First Name, Start Date, **Salary** (selected), Title, and SSNumber. Each field has a corresponding data type icon (A, D, R, A, A).
- On the right, the display format is set to "###,##0".

Data Entry Section:

- ☒ **Enterable**
- ☐ **Mandatory**
- ☐ **Choices** (with a "List..." button)
- ☐ **Required** (with a "List..." button)
- ☐ **Excluded** (with a "List..." button)
- ☐ **Text with scroll bar**
- Entry filter:** (empty text box)
- Minimum:** 15500
- Maximum:** 105000
- Default:** (empty text box)

Bottom Section:

- ☐ **Print variable frame**
- Script...** button
- Cancel** button
- OK** button

Figure 5-3

The Field Definition dialog box for the Salary field

4. Click OK.

That's all there is to it. Now whenever a value outside these limits is entered into the Salary field, 4th DIMENSION will refuse the entry and display an alert. You will see what the alert looks like on the screen later in this chapter.

Making a List Required

You created a list for the Health Plan field in the previous chapter. The Personnel 5 database also includes a list for the Title field. You want to ensure that only these titles and no others are used in the employee records.

A list is commonly used to provide a quick, accurate method for entering data. Unless you make the list itself required, another title can be typed in (a feature you would want in many cases). You can make the choices on the Titles list required on this layout, which means that 4th DIMENSION will accept only those entries and no others.

1. Double-click the Title field.

4th DIMENSION displays the Field Definition dialog box for the Title field. There are two field attributes you can set on each layout—Enterable and Mandatory. These are exactly the same as the Field Attributes, except that they affect a field only on this layout.

Below the layout field attributes are the lists features. You can attach a list to a field for only this layout, make a list required for a field on this layout, or exclude a list of values from a field on this layout.

2. Click the Choices check box in the Lists section.
3. Click the list button next to the Choices check box.
4. Select Titles from the list, then click Select.

By making Titles a Choices list, the user will be presented with a Choices window.

5. Click the Required check box in the Lists section.

Field

1	Last Name	A
	First Name	A
	Start Date	D
	Salary	R
	Title	A
	SSNumber	A

Data Entry

☒ Enterable
☐ Mandatory
☒ Choices **List...**
☒ Required **List...**
☐ Excluded **List...**
☐ Text with scroll bar

Entry filter:

Minimum:
Maximum:
Default:

☐ Print variable frame **Script...** **Cancel** **OK**

Figure 5-4
Making a choice list required

6. Click the List button next to the Required check box.

4th DIMENSION displays the Lists dialog box.

7. Select Titles from the list, then click Select.

Now 4th DIMENSION will accept only entries from the Titles list for this field on this layout.

8. Click OK.

Viewing the Results

Now that you have added these data validation features to your layout, you can see the results in the User environment.

1. Choose User from the Use menu.

4th DIMENSION displays the output layout. Before using these data validation features, you must tell 4th DIMENSION to use the Validate input layout.

Here is a new method for changing the input layout. It is usually much faster than using the Choose File/Layout dialog box.

2. Press Command-Space.

A smaller window, the “List of files” window, is displayed in front of the Employee records window. The “List of files” window is always open, waiting behind the window you are using. If you make the window smaller, you can see the “List of files” window, and you can activate it by clicking on it.

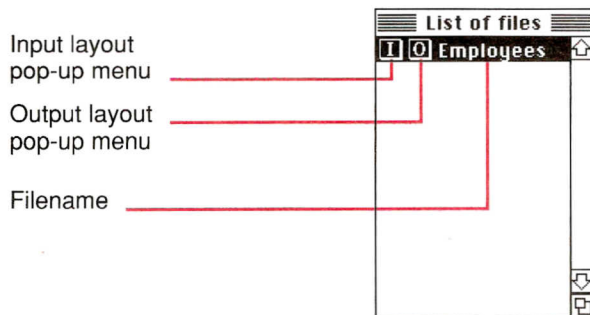


Figure 5-5
The “List of files” window

The layout icons are pop-up menus showing the layouts you have created for the file. You use the Input Layout icon to set a new input layout for that file, and you use the Output Layout icon to set a new output layout for that file.

3. Press the Input Layout icon for the Employees file and choose Validate from the pop-up menu.

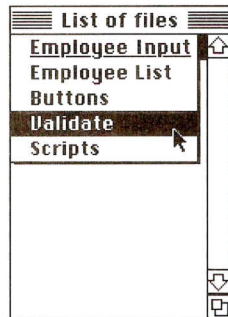


Figure 5-6
Choosing a new input layout from the "List of files" window

4th DIMENSION changes the current input layout to the Validate layout.

4. Press Command-Space again to bring the output layout to the front.

Or, you could just click the larger window.

5. Choose New Record from the Enter menu.

4th DIMENSION displays the Validate input layout.

6. Try entering **106000** into the Salary field.

As soon as you press Tab or Enter, or click on another field, 4th DIMENSION displays an alert box warning that the Salary value is outside the valid range of entries for this field. This is exactly what you want to happen. Enter a valid salary.

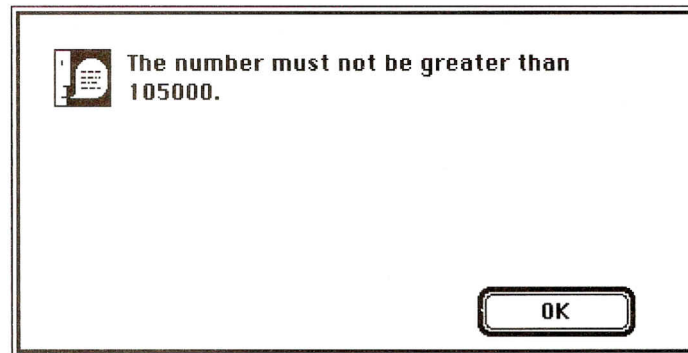


Figure 5-7
The alert message for an unacceptable value in a field

7. Try entering alphanumeric information in the social security number field.

4th DIMENSION rejects alphanumeric characters when you type them. Enter a valid number.

8. Select the Title field, click Cancel for the choice list, backspace over your entry and try to type a job title that doesn't appear on the Titles choice list.

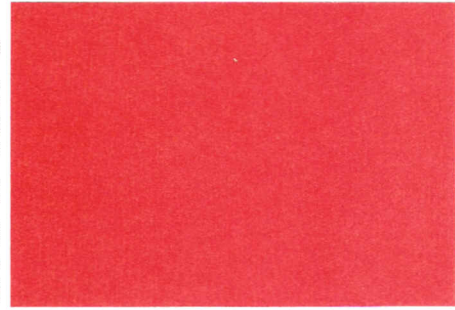
4th DIMENSION refuses the entry. Click in the Title field again to select one of the valid choices from the Choices list.

The Next Step

The data validation techniques you have used prevent gross errors from affecting the information in your database. You may want to try out additional techniques. Complete information about using the Data Entry panel of the Field Definition dialog box can be found in the *4th DIMENSION Design Reference*.

The next chapter gives you an introduction to using scripts and default values. A script uses 4th DIMENSION procedures to perform operations on a field. A default value is the initial entry in a field.

CHAPTER 6



USING SCRIPTS AND DEFAULT VALUES



USING SCRIPTS AND DEFAULT VALUES

Database: Personnel 6

Estimated time to complete: 10 minutes

A *script* is an instruction or series of instructions for 4th DIMENSION to execute. You can use a script to calculate a value for a field, ensure that text entries are capitalized, validate an entry, display a timely warning to the user, and so on.

A *default value* is an automatic initial entry in a field, a value that 4th DIMENSION places in the field on each new record. It remains that field's value until you change it by entering a different value. 4th DIMENSION provides a calculated default value for current date, current time, and current sequence number.

In this chapter you will learn how to

- create scripts to calculate values
- enter and use default values

About Scripts

A script is one type of 4th DIMENSION procedure. A script is usually short, from one line to only a few lines long. A script is always associated with an object on a layout (a field, a button, or some other active object). When 4th DIMENSION executes the script, it carries out the instructions provided by the script.

The Procedure Editor

When you write a script, you do so using one of 4th DIMENSION's two Procedure editors. You have the choice of using the Flowchart editor or the Listing editor.

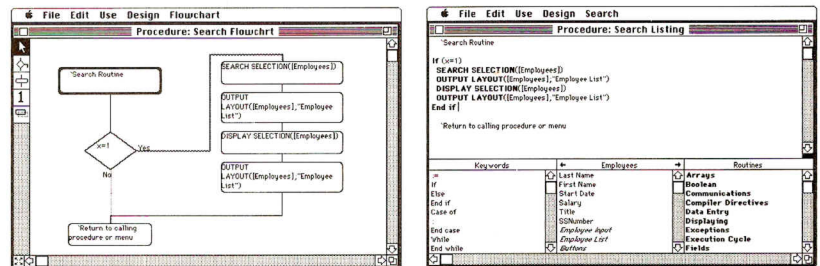


Figure 6-1
Procedures in the Flowchart and Listing editors

The Flowchart editor is a graphically oriented procedure editor, in which the instructions are presented as a series of steps and tests that are connected with flowlines. The Listing editor is a line editor in which the steps and tests are written as text.

If you have used flowcharts to diagram procedures, you may find the Flowchart editor more useful to you. However, most people are familiar with procedures written as a listing. The tutorials in this book use the Listing editor.

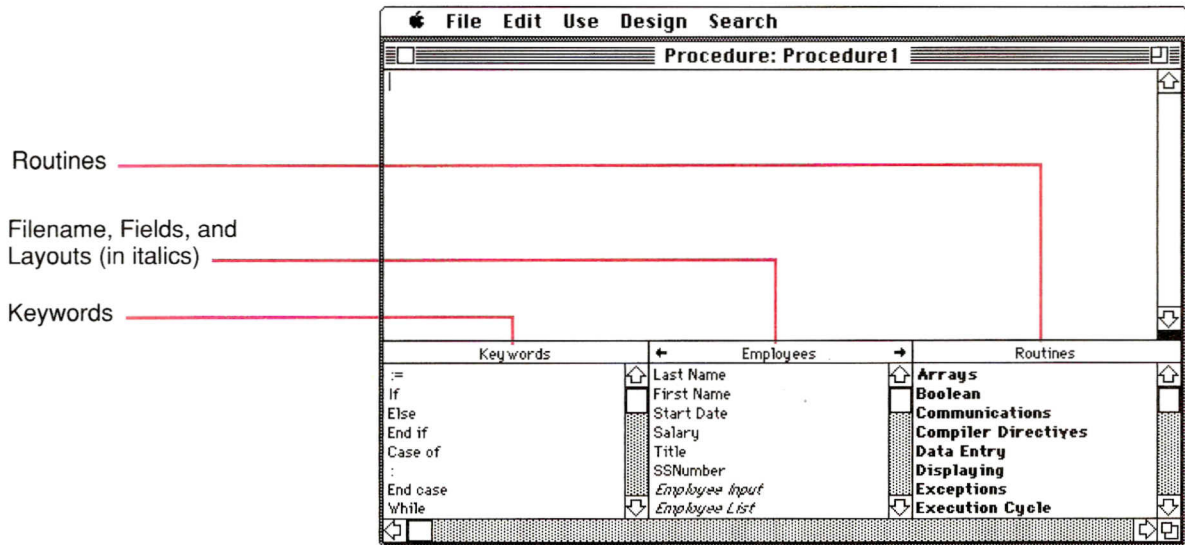


Figure 6-2
The Procedure editor (Listing editor)

The upper portion of the Procedure editor is where you enter and edit the commands, functions, and other elements that make up the script. You type the script into the text area. And you can select many of the script's elements from the selection panels in the lower portion of the window.

Keywords: Symbols and phrases you use to construct your procedure. The most commonly used symbol is `:=` which means *gets*. It is used to instruct 4th DIMENSION to place a value in a field (or in a variable). For example, the statement

`Monthly Salary := Salary/12`

reads "Monthly Salary gets Salary divided by 12." This statement instructs 4th DIMENSION to take the value in the Salary field, divide it by 12, and place it in the Monthly Salary field.

Files: Fields and layouts from the current file. You can select fields or layouts by clicking. You can display fields and layouts from any file in the database by clicking on the small arrows on either side of the panel title box.

Routines: Commands and functions provided by 4th DIMENSION. They are listed in alphabetical order.

A *command* carries out a task. For example, the `ALERT`

command displays text in an alert window. A *function* returns a value. For example the Round function rounds off a number and returns (sends back) the new value.

Writing a Script

You have decided to add the monthly salary to each record. You are going to use a script to calculate the value by dividing the yearly salary by 12. You are first going to create a new Monthly Salary field.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 6 database. It opens in the Design environment.
2. Create a new field called Monthly Salary, make it a Real field, and select the Display Only attribute.

The Monthly Salary field will contain a calculated value. You make this field Display Only to prevent any different value from being accidentally entered into it.

Creating a field is described in Chapter 4. The new field does not yet appear on any layout. You need to add it to an existing layout.

Layout

3. Open the Scripts layout.

You are going to add the new field to this layout.

4. Use the Add Field tool to place the Monthly Salary field on the layout below the SSNumber field. Make the field 12 point.

Placing a field on a layout is described in Chapter 4. 4th DIMENSION displays the Field dialog box.

5. Choose Monthly Salary from the list of fields.
6. Set the numeric display format by typing the following into the format box:

Display Format

\$###,###.⁰00

Typing this set of symbols is another method of setting the numeric display format, instead of choosing it from the pop-up menu.

7. Click OK.

8. Create a text area next to your new field and type:

Monthly Salary

You are now ready to create a script.

Enter the display format

Select Monthly Salary in the list of fields

Click the Script button

The dialog box is titled 'Field'. It has two main sections: 'Field' and 'Data Entry'. In the 'Field' section, a list of fields is shown with 'Monthly Salary' selected. To the right of the list is a 'Display Format' box containing '\$###,###0.00;-###,###0.00'. In the 'Data Entry' section, there are checkboxes for 'Enterable', 'Mandatory', 'Choices', 'Required', 'Excluded', and 'Text with scroll bar'. The 'Script...' checkbox is checked. To the right of these checkboxes are input fields for 'Entry filter:', 'Minimum:', 'Maximum:', and 'Default:'. At the bottom of the dialog are buttons for 'Script...', 'Cancel', and 'OK'.

Figure 6-3
Defining the Monthly Salary field

You are now going to add a script to the Salary field that computes a value for Monthly Salary.

1. Double-click the Salary field.

4th DIMENSION displays the Field Attribute dialog box for Salary.

2. Set the numeric display format by typing the following into the format box:

\$###,###⁰.00

3. Click the Script button.

It's on the bottom of the dialog box.

4th DIMENSION displays the "Procedure type" dialog box, which offers you a choice of using the Flowchart or Listing methods for writing the script.

4. Leave the Listing button selected, and click OK.

4th DIMENSION displays the Procedure editor, in a window titled *Script: Salary*.

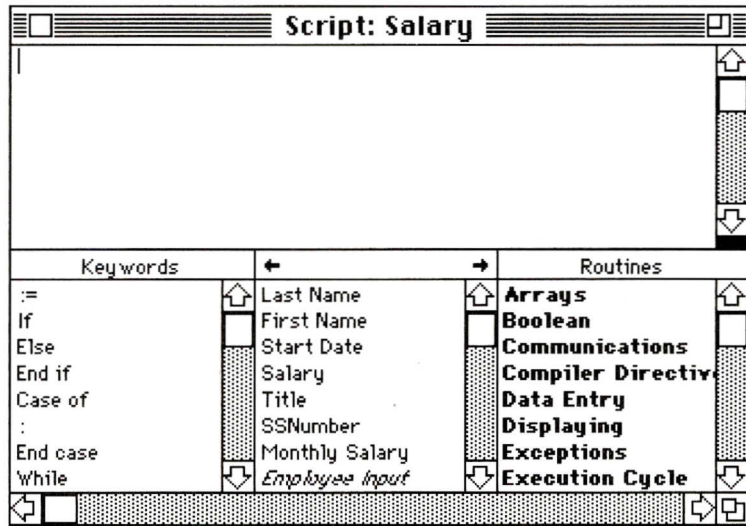


Figure 6-4
The Procedure editor for writing a script

The script you will enter is as follows:

Monthly Salary := Salary/12

This script reads “Monthly Salary gets Salary divided by 12.” You can often write a script simply by clicking on items in the three panels at the bottom of the window. In the next steps you will select the field names from the middle panel, and the gets symbol from the left panel. You will type the divide symbol and the number.

5. Click Monthly Salary in the middle panel.

4th Dimension enters the field name in the top part of the window.

6. Click the := symbol at the top of the Keywords list in the left panel.

4th DIMENSION enters the symbol next to the Monthly Salary field name.

7. Click Salary in the middle panel.

You are preparing to divide the Salary figure by 12.

8. Type: /12 and press enter.
The script is complete.
9. Click the close box to close the Procedure editor window.
4th DIMENSION displays the Scripts layout in its window.
In a later section you will view the results in the User environment.

Using a Default Value

You normally enter an employee's record on the first day that the employee starts work. The Start Date field, therefore, almost always contains the current date on the day the record is first created. You have decided to enter a default value to make data entry faster.

1. Double-click the Start Date field.
4th DIMENSION displays the Field Definition dialog box for the Start Date field.
2. Select the Default box.
It is just above the OK button.
3. Type #D.
This is a code for setting the current date as the default value for a field.
4. Click OK.
4th DIMENSION displays the layout again. Subsequently, when you create a new record, the current date will already be entered in the Start Date field. You can type over the default value if necessary.

Date

Seeing the Results in the User Environment

Now that you have added the field, script, and default value, you can see the results in the User environment.

1. Choose User from the Use menu.

You modified the Scripts input layout. Before you can see the results of your work, you need to switch input layouts.

2. Change the input layout by choosing Scripts from the List of Files window.

You display the List of Files window by pressing Command-Space. Choosing the input layout from the List of Files window is described in Chapter 5, “Validating Data.”

3. Choose New Record from the Enter menu.

4th DIMENSION displays the Scripts input layout. The current date is displayed in the Start Date field.

4. Enter a new salary in the Salary field, say 74000.

4th DIMENSION calculates the new monthly salary figure and displays it in the Monthly Salary field.

The screenshot shows the 'Entry for Employees' window in the 4th DIMENSION software. The window has a menu bar with 'File', 'Edit', 'Use', 'Enter', 'Select', 'Report', and 'Special'. Below the menu bar is a toolbar with buttons for 'Enter', 'Delete', and 'Cancel'. The main area is titled 'Employees' and contains a form with the following fields:

Field	Value
Last Name	
First Name	
Start Date	6/1/89
Salary	\$74,000.00
Title	
SSNumber	
Monthly Salary	\$6,166.66

Handwritten notes '1st time' and '1/6/89' are visible next to the Start Date field.

Figure 6-5
Record showing added field, calculated information, and default value

The Monthly Salary field now contains information that can be used in another place. If your payroll were set up to obtain the monthly salary figure from this field, you can see that any changes to an employee's salary figure would be immediately reflected on the payroll.

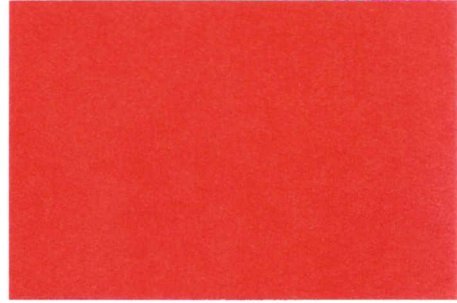
The Next Step

Scripts and default values can reduce data entry chores and increase accuracy.

In Chapters 7 and 13, you will see more examples of using scripts. You will use them to capitalize the entries in a field, and to calculate totals and subtotals for a report.

In the next chapter you will use the Procedure editor to create a global procedure, which you can then use in scripts for several fields.

CHAPTER 7

***USING PROCEDURES***

USING PROCEDURES

Database: Personnel 7

Estimated time to complete: 20 minutes

Now that you have created a script in Chapter 6, you may begin to see how useful 4th DIMENSION procedures can be. A script is a procedure that is associated with a field or other object in a layout. 4th DIMENSION allows you to write procedures that can be used from within scripts. A global procedure can be written once and used in many scripts and other procedures.

In this chapter you will write a procedure that capitalizes the first letter of a field entry. Then you will use this procedure in scripts that you attach to two different fields.

You will learn how to

- get to the Procedure editor
- write a global procedure
- use the global procedure in a script

4th DIMENSION Procedures

4th DIMENSION uses several kinds of procedures:

Global procedures: A global procedure can be used in other procedures or activated by a menu command.

Layout procedures: A layout procedure is associated with a particular layout. A layout procedure is executed before the layout is displayed, whenever a field or other object is selected or modified, and again after the record is accepted.

Scripts: A script is a procedure that is associated with an object on a layout. It can be executed as often as a layout procedure, or only when the object is used.

File procedures: A file procedure is associated with a file. A file procedure is executed before any layout for that file is used for data entry.

In this chapter you will create a global procedure. You have already created and used scripts (in Chapter 6 “Using Scripts and Default Values”). You will use a Layout procedure in a

later chapter. File procedures are useful in rare instances and are not covered in this book. For complete information about all these types of 4th DIMENSION procedures, see the *4th DIMENSION Design Reference* and the *4th DIMENSION Language Reference*.

Getting to the Procedure Editor

Whenever you write a procedure, you use 4th DIMENSION's Procedure editor. For a script, you get to the Procedure editor from within the Layout editor. For the other types of procedures, however, you use the Procedure menu command.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 7 database.

Personnel 7 opens in the Design environment.

2. Choose Procedure from the Design menu.

4th DIMENSION displays the Procedure dialog box.

Procedure list
area

Layout display
area

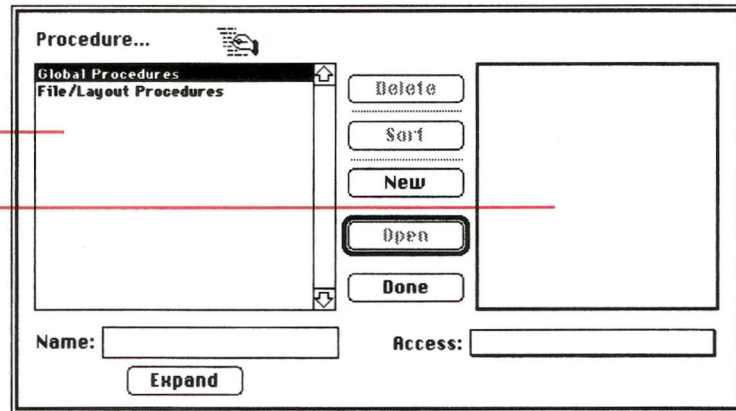


Figure 7-1
The Procedure dialog box

The Procedure dialog box shows all the global, file, and layout procedures associated with this database. At this point, before any procedures have been created, there are no procedures to list. Later you will be able to expand and collapse the lists to see the procedures that you have created. (You use the Expand and Collapse buttons, as in the Layout dialog box to expand and collapse layout names.) When you highlight a layout procedure, 4th DIMENSION displays the layout it is associated with in the Layout display area.

You must choose in this dialog box whether your procedure is to be a global, file, or layout procedure. Because you are writing a procedure that will be called by other procedures, it is a global procedure.

The Global Procedures choice is already selected, so you don't need to change it. If you have deselected the Global Procedures choice, be sure to select it before going on.

3. Click **New**.

4th DIMENSION displays the "Procedure type" dialog box.

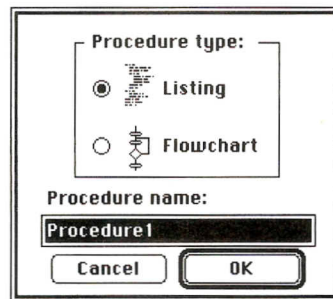


Figure 7-2
The "Procedure type" dialog box

Here you name your global procedure and choose whether to use the Listing or the Flowchart method for writing your procedure.

If you are accustomed to using flowcharts to map out or diagram procedures, you may find the Flowchart method appropriate. However, most people are familiar with a listing format, in which the procedures are written out line by line.

The choice between the two methods is available only for a new procedure (such as this one). Subsequently, you can edit the procedure only in the form in which you first write it. Since most people prefer the Listing method, it is preselected. For the purposes of this tutorial, don't change the selection.

4. Type **Uplow** in the Procedure name box.

Uplow is a descriptive name for the procedure you will write. It makes the first letter uppercase and the remainder of the letters lowercase.

5. Click OK.

4th DIMENSION displays the Procedure editor, in a window titled Procedure: UpLow. You use the Procedure editor to write and edit procedures.

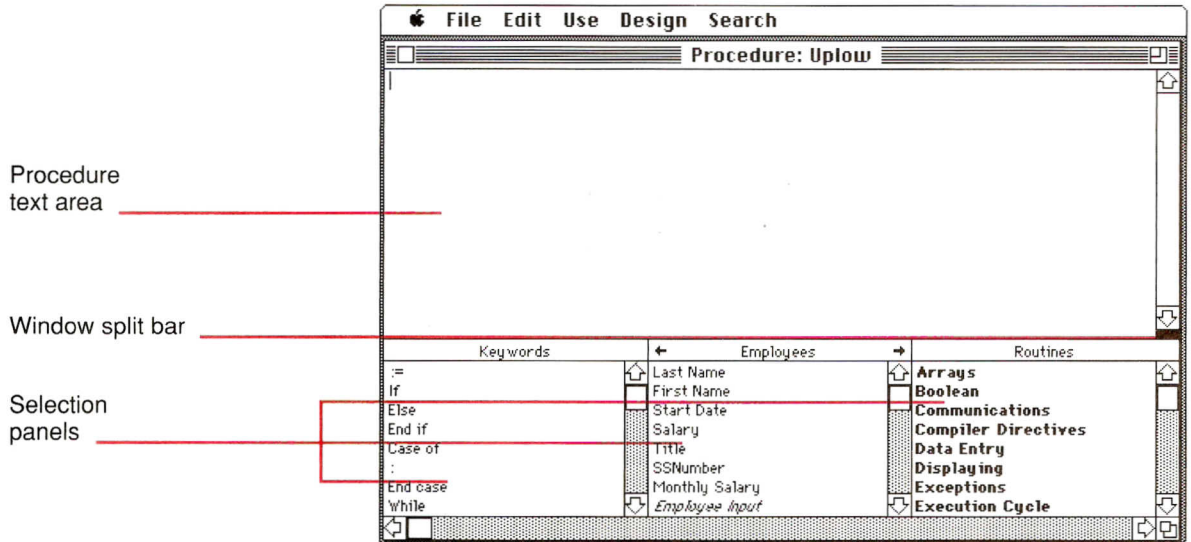


Figure 7-3
The Procedure editor

The upper portion of the Procedure editor is where you enter and edit the commands, functions, and other elements that make up the procedure. You can select most of the procedure's elements from the selection panels in the lower portion of the window:

Keywords: Symbols and phrases you use to construct your procedure.

Files: Fields and layouts from the current file. You can select fields and layouts by clicking. You can display fields and layouts from other files in the database by clicking on the small arrows on either side of the panel title box.

Routines: Commands and functions provided by 4th DIMENSION. They are listed in alphabetical order or by groups. You click the word Routines at the top of the panel to select either an alphabetic or a grouped listing of the routines.

Creating a Capitalization Procedure

You are now going to write the procedure to capitalize field entries. This procedure is useful for preventing typing errors from being stored in your database. When you use this procedure in scripts, you can be sure that the names are capitalized properly.

The procedure you will enter is as follows:

\$0:=Lowercase(\$1)

\$0≤1≥:=Uppercase(\$0≤1≥)

This procedure reads “Return a new value that is assigned the lower case value for all characters in the field, then return a new value which is assigned the uppercase value of this field’s first letter.”

You have already seen how 4th DIMENSION allows you to enter commands and other elements of a procedure by selecting them from the three panels on the bottom half of the Procedure editor (in Chapter 6 “Using Scripts and Default Values”). You can select the filenames, field names, and layout names that appear in the center panel, the keywords that appear in the left panel, and the routines that appear in the right panel.

The following steps do not specify whether to select or type the elements of the procedure. Try both ways. You will soon be able to decide which method works best for you.

1. Click the zoom box to expand the Procedure editor window.
2. First type the following comment to identify the purpose of the procedure:

Uppow capitalizes the first letter of field entry.

Then press Return.

The leading accent mark indicates that this is a comment, not part of the instructions. The accent mark appears in a different place on different keyboards. Don’t confuse this accent mark with the apostrophe or backslash.

When you press Return, the comment is entered and automatically indented. The insertion point moves to the next line.

2nd June 98
≤...≥
Language 326

Comment

Key board

Top Left Key



The following procedure uses the Uppercase and Lowercase functions to create a procedure that, in turn, acts as a function. A *function* is a procedural statement that returns a value. The procedure you will write takes the value presented to it, changes all the letters to lowercase, then changes the first letter to uppercase and returns the changed value. Later you will see how to pass a value to the function, and how to use the value it returns.

This procedure uses special variables that hold and return information temporarily (technically called "local variables"). They appear as \$0 and \$1 in the instructions that follow. The variable \$1 holds the first value passed to the instruction. The variable \$0 holds whatever value the function returns. Using these local variables allows the global procedure to be used in a script for any field.

3. You begin on the second line with the first local variable and the gets symbol. Type

\$0:=

This can be read as the "value returned gets." The value returned will be the lowercase version of the contents of the field. The remainder of the first procedure line will create the lowercase version.

4. Now you write the instruction to create lowercase letters for the entire entry. Type

Lowercase(\$1)

Then press Return.

This part of the procedure tells 4th DIMENSION to make lowercase the first value passed to the procedure (\$1).

You begin by making all the characters lowercase, so that when you subsequently make the first character uppercase, the entry is correct.

5. Now you write the instructions to create an uppercase letter in the first position. Type

$\$0 \leq 1 \geq :=$

Type $\leq$ and $\geq$ by holding down the Option key and typing < and >, respectively.

This can be read as “the character in the first position of the value returned gets.”

6. Now you write the instructions to change the first character to uppercase. Type

Uppercase($\$0 \leq 1 \geq$)

This part of the procedure tells 4th DIMENSION to make uppercase the letter in the first position (and only the first position). The entries in the parentheses instruct 4th DIMENSION to change the first character in the value returned by the first line of the procedure.

7. Press Return to end the line.

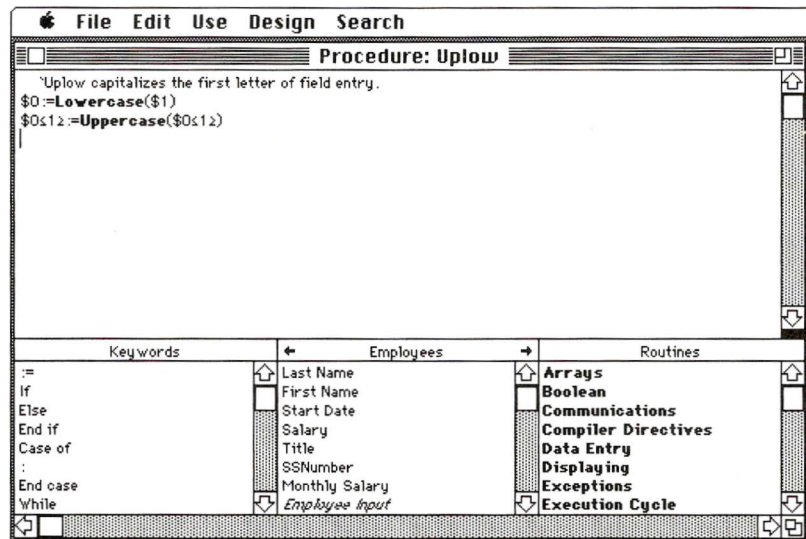


Figure 7-4
The completed procedure

That's it. Now you can use this procedure as part of another procedure.

Using the Global Procedure in Scripts

Now that you have a procedure that capitalizes the first letter of a word, you can use it in scripts to see how it works.

Layout

1. Choose Layout from the Design menu, then open the Scripts layout.
2. Hold down the Option key and click the Last Name field.

This is a shortcut to get to the Script editor. It is equivalent to double-clicking the Last Name field, then clicking the Script button in the Field Attributes dialog box.

3. Create the following script for this field:

Last Name:=Uplow(Last Name)

Placing the field name in parentheses after the name of the procedure instructs 4th DIMENSION to use the contents of the field as the value passed to the function. In this case the \$1 variable in the *Uplow* function is a placeholder for the Last Name field. The final \$0 value returned by the function is placed in the Last Name field. Uplow is shown in italic after pressing return because it is a procedure.

4. Create a similar script for the First Name field:

First Name:=Uplow(First Name)

In this case, \$1 in *Uplow* is a placeholder for the First Name field. Using the local variables (\$0 and \$1), you can write a global procedure without naming the specific fields that will be used with it.

Now you can test your scripts.

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5. Go to the User environment and enter a new record.

Be sure to use random uppercase and lowercase letters for the field entries for Last Name and First Name. You will see how the procedure corrects the entries as soon as you select another field.

Employees	
Last Name	<u>JoHnSOri</u>
First Name	

Employees	
Last Name	<u>Johnson</u>
First Name	

Figure 7-5
Mistyped and corrected field entries

The Next Step

The global procedure you have written works fine for capitalizing a field entry. You can use it in any script on any layout.

Global procedures such as this one can be used in any other procedure. In a later section you will write a global procedure that you attach to a menu command for a runtime 4th DIMENSION application.

USING RELATIONAL DATABASES AND SUBFILES

CHAPTER 8

RELATING FILES

RELATING FILES

Database: Personnel 8

Estimated time to complete: 25 minutes

In this chapter you will create a second file to store department information. You want to include the department name and manager's name on your employee input layout, but you don't want to duplicate the information on each employee record. If a department gets a new manager, you would have to change the entry on every employee record for that department.

You can add a second file to your database to store department information. You can combine information from the two files, *relating* them so that you can display information from the [Departments] file in a layout for the [Employees] file. You may also want to print a list of employees that includes their managers, or sort the employee records by department.

If you keep the department name in a related file, you need to enter it and store it on disk only once. You can then display the department name on each employee record. If you need to change the information, you need change it in only one place, in the [Departments] file. The change is then automatically reflected in the other files that use it.

In this chapter you will learn how to

- create a second file
- relate one file to another
- create a layout that displays information from a related file

Here is an explanation of how relating works. You use fields and layouts to store information about each department in the [Departments] file. After you enter the data, the information looks like this:

Departments: 8 of 8				
Code	Name	Manger	Budget	Total
ACC	Accounting	Mrs. Adams	750000	650989
ADM	Administration	Mr. Knowles	285000	276050
ART	Art	Mr. Cezanne	459000	345009
DES	Design	Mr. Wanamaker	890450	890450
PROD	Production	Ms. Taylor	3568000	2900700
TRAN	Transportation	Ms. Wayfarer	450800	425000
MAN	Manufacturing	Mr. Hoffman	1560000	1677088
SAL	Sales	Mr. Hopkins	4980000	3990000

Figure 8-1
[Departments] file information

Each department has one record. Each record has the department name, the department code, the manager's name, the department budget, and the total of department salaries.

You use the Department Code field to relate the [Employees] file to the [Departments] file. Because the department code identifies a unique record in the [Departments] file, 4th DIMENSION can locate and use the information in that one record automatically.

Whenever a record in the [Employees] file is displayed (or otherwise made the current record), 4th DIMENSION uses the department code in the employee record, searches the [Departments] file for the corresponding record and then loads the record. The information in the department record can be used in many ways. For example, it can be displayed on the layout for the employee's record or printed together with other employee information.

This diagram shows an example of many employee records drawing information from one department record:

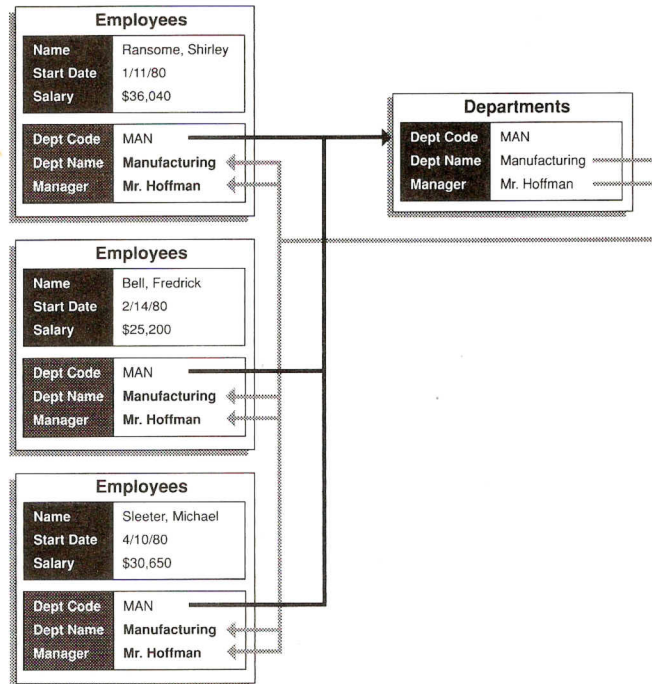


Figure 8-2
Many records draw information from one record

This is called a many-to-one relation. Many employee records have the same department code, but that code is entered in only one department record. You may be familiar with calling these files the One file and the Many file.

One department code identifies one record in the [Departments] file and many records in the [Employees] file. For a full discussion of the concept of the One file and the Many file, see the *4th DIMENSION Design Reference*.

Creating a New File

In this section you will create a second file to contain information about departments.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 8 database.

4th DIMENSION displays the Structure window with the [Employees] file in it. A new Department Code field has been added to the [Employees] file. This is the field you will use to relate the [Employees] file to the [Departments] file.

2. Choose New File from the Structure menu.

The pointer changes to a square file icon (the same shape that 4th DIMENSION uses to display a file). It remains file-shaped until the next step.

3. Position the pointer where you want the new file to be located (anywhere in the window) and click.

File2 is created at that location. (You can move a file to any location by dragging its filename.)



Note: If you change your mind about creating a file after you have chosen New File from the Structure menu, move the file-shaped pointer into the menu bar and click. This cancels the command, and the pointer again becomes an arrow.

4. Rename this file Departments by choosing Rename File from the Structure menu, filling in the filename in the dialog box, and then clicking OK.

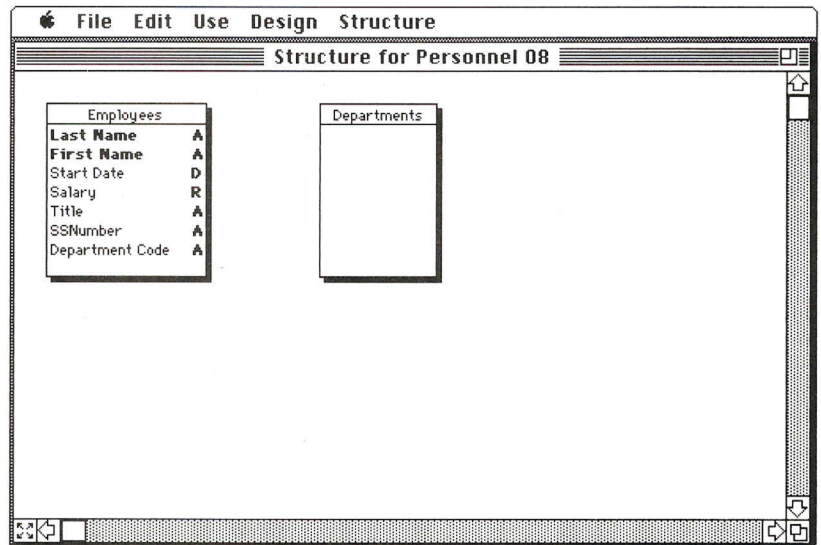


Figure 8-3
The new [Departments] file

You now have two files. You can create up to 99 files for a single database.

5. Create the following fields for the [Departments] file:

Field name	Type	Attribute
Code	Alpha 5	Indexed
Name	Alpha 15	
Manager	Alpha 15	
Budget	Real	
Total Salaries	Real	Display Only

6. Create an input layout named **Dept Input** that includes all the fields in the above table.

Use layout template #5 (the one in the middle) to see what it looks like, and to differentiate the [Departments] layout from the [Employees] layout.

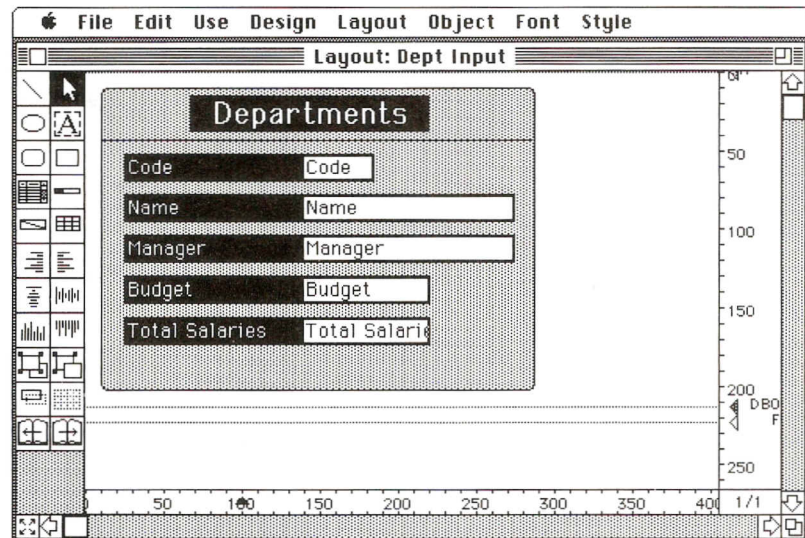
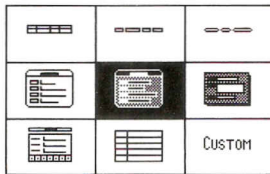
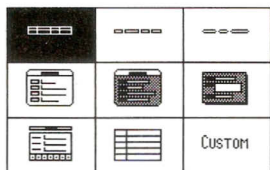


Figure 8-4
Your [Departments] layout



7. Create an output layout named **Dept Display** that includes all the fields in the above table. Use layout template #1 (the one in the upper-left corner).

You are now ready to relate the two files.

Relating Two Files

First you will relate the [Employees] file to the [Departments] file. Then you will create a new layout for the [Employees] file that includes information from the [Departments] file.

You establish a relation between two files by drawing a line that connects the common fields, that is, the fields that have information in common. In this case, the fields are the Department Code field in the [Employees] file and the Code field in the [Departments] file. The two fields do not have to have the same name, but they must have the same field type. In addition, the fields should be indexed.

1. Position the pointer on the Department Code field name in the [Employees] file.

Because the [Employees] file is the Many file, you start with it. The rule is this:

Whenever you draw a line to relate two files in 4th DIMENSION, you start with the Many file.

The Many file, remember, contains many instances of the common information, in this case, many instances of the department code. The Code field in the One file contains only a single instance of each code.

The Department Code field will be related to the Code field in the [Departments] file. These fields will contain the information that allows 4th DIMENSION to find corresponding records.

2. Press the mouse button, and drag the pointer to the Code field name in the [Departments] file.

A line follows the pointer (see Figure 8-5).

*Tell child who its
parent is.*

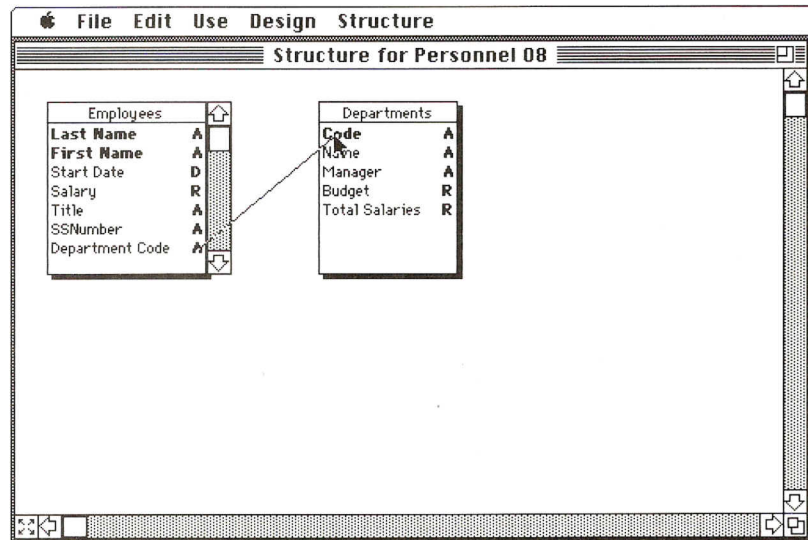


Figure 8-5
Drawing the line that relates two files

3. With the pointer positioned on the Code field in the [Departments] file, release the mouse button.

4th DIMENSION displays the Relation type dialog box.

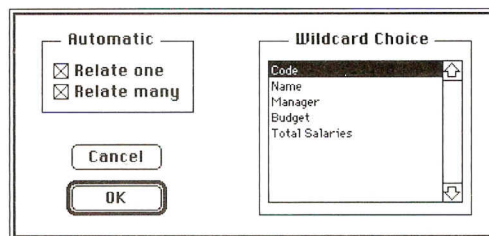


Figure 8-6
The Relation type dialog box

4th DIMENSION relations are automatic, that is, they do not require any programming. The line you have just drawn establishes the relation between the two files. 4th DIMENSION can locate the single record in the One file that corresponds to any record in the Many file (the relation is many records related to one record). And 4th DIMENSION can also locate the several records in the Many file that correspond to any record in the One file (the relation is one record related to many records).

You can deselect automatic relation for either Relate to One or Relate to Many in the Relation Type dialog box. Both check boxes are preselected, and these standard settings are the ones you want to use.

Wildcard

4. Click Name in the Wildcard choices list.

For complete information about Wildcard choices, see the *4th DIMENSION Design Reference*. D 54/58

5. Click OK.

4th DIMENSION displays the structure window again with an arrow pointing from the [Employees] file to the [Departments] file. The arrow shows that the two files are related. The arrow points from the Department Code field in the [Employees] file (where you started) to the Code field in the [Departments] file (where you ended).

If you made an error in drawing the line, you can quickly correct it. Simply repeat the steps.

Layouts With Fields From the Related File

You have related the [Employees] file to the [Departments] file. Whenever you enter a department code on a layout for the [Employees] file (or otherwise make that record current), 4th DIMENSION loads the corresponding record from the [Departments] file. You can then use information from that [Departments] record.

Your next step is to create a layout to display information from both files. This will be a new input layout for the [Employees] file.

1. To open the Layout dialog box, double-click the title of the [Employees] file.

4th DIMENSION displays the Layout dialog box, showing the layouts for the [Employees] file already expanded. Because you double-clicked the [Employees] file, only the layouts for that file are shown.

2. Click New to display the New Layout dialog box.

Notice that the field that you used to relate the two files (Department Code) is now in bold type, and the file it is

related to ([Departments]) is shown in brackets next to it. The [Departments] file is also shown at the end of the list of fields. This second listing allows you to create an included layout; you will work with the second listing of a file in the next chapter.

3. Double-click the Department Code field name.

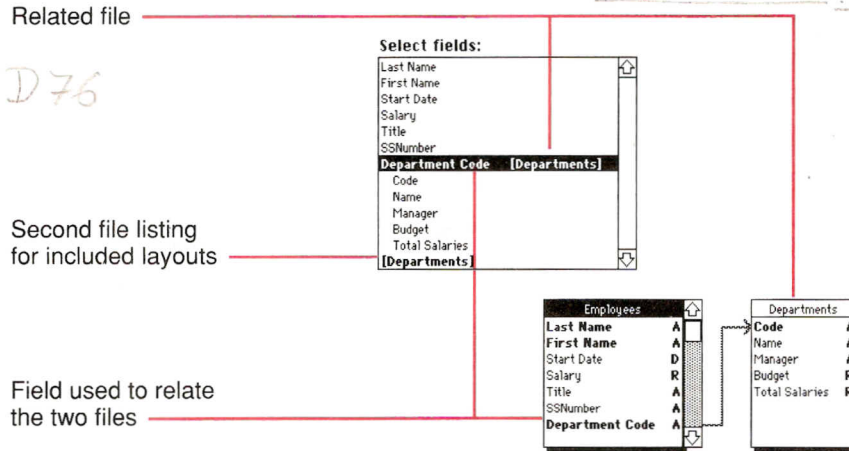


Figure 8-7

The new field list reflects the relation

4th DIMENSION expands the list to show the fields from the [Departments] file. You can include any of these fields in the layout you are now creating.

When you are creating a layout that includes fields from a related file, you must select all the fields you want to display. The fields will appear in your layout in the order you select them.

To select a field for your layout you click first the field name, then the Select button.

4. Select these fields from the [Employees] file in the following order:

- 1 Last Name
- 2 First Name
- 3 Start Date
- 4 Salary
- 5 Title

- 6 5. Select the Department Code field in the [Employees] file by clicking Select.
- 7 6. Now select the following fields from the [Departments] file:
Name
Manager
- 8 7. Type **Related** as the layout name, and choose the 9-point font size.

Layout font size

Expanded list of
fields in the
[Departments] file

New layout for Employees

Font size: ☒ 9 point
☐ 12 point

Select fields:

Last Name	1
First Name	2
Start Date	3
Salary	4
Title	5
SSNumber	6
Department Code [Departments]	6
Code	7
Name	7
Manager	8
Budget	
Total Salaries	
[Departments]	

☒ Enterable related fields

Layout Name:

Expand Select Cancel OK

Figure 8-8
New Layout dialog box for the Related layout

8. Click OK.
- 4th DIMENSION displays the new layout you have created. The two field labels for the fields you selected from the [Departments] file are displayed on this layout in bold type (the field labels from the [Employees] file are shown in plain type).

Fields from the
[Employees] file

Fields from the
[Departments] file

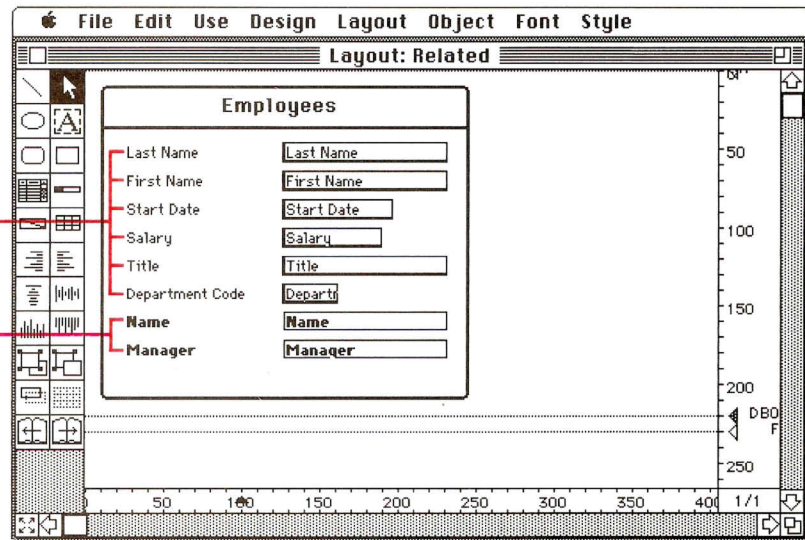


Figure 8-9
The [Employees] Related layout

You can now go to the User environment to enter records.

Importing Department Records

Now that you have related the two files and have created a layout that includes fields from both files, you can see the result as you enter additional records.

You must first add records for the [Departments] file. A text file of department records is included in the Personnel 08f folder.

1. Choose User from the Use menu.

4th DIMENSION displays the list of employee records you have been using.

2. Make [Departments] the current file.

Before you can import data, you must make the file that will contain the data the current file.

To change the current file, press Command-Space bar to display the "List of files" window, then select the file you want to make current on the "List of files" window. Then press Command-Space bar again.

Dept Display

3. Choose Import Data from the file menu.

You are going to import data from a text file for the [Departments] records.

IMPORT

4th DIMENSION displays the Import data dialog box.

“Text file – Departments” is the file that contains the department data and should already be selected.

4. Click Append >>> five (5) times so that the field import order matches the order of the fields in the [Departments] file.

You do not need to make any changes in the order of fields, because the text file’s fields are in the same order as the fields in your [Departments] file. For further instructions see *Quick Start* Chapter 3, “Entering, Importing, and Modifying Records.”

Your screen should match Figure 8-10.

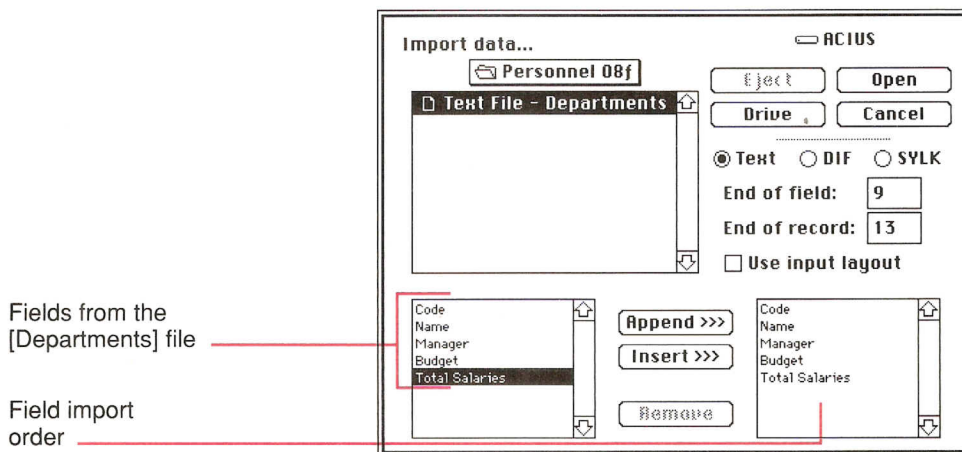


Figure 8-10
Import data dialog box

5. Click Open.

4th DIMENSION imports the records and places them in the [Departments] file. 4th DIMENSION displays the records.

1st Time
→

Departments: 8 of 8				
Code	Name	Manger	Budget	Total
ACC	Accounting	Mrs. Adams	750000	650989
ADM	Administration	Mr. Knowles	285000	276050
ART	Art	Mr. Cezanne	459000	345009
DES	Design	Mr. Wanamaker	890450	890450
PROD	Production	Ms. Taylor	3568000	2900700
TRAN	Transportation	Ms. Wayfarer	450800	425000
MAN	Manufacturing	Mr. Hoffman	1560000	1677088
SAL	Sales	Mr. Hopkins	4980000	3990000

Figure 8-11
Imported [Departments] data

Seeing the Relation in Action

In this section you'll see that, when you enter the department code on an employee record, 4th DIMENSION immediately displays the information from the [Departments] file.

To see how the automatic relation works, you will need to use the Related layout you just created.

110

Layout

1. Press Command-Space bar to display the "List of files" window.
2. Click the Input Layout icon for the [Employees] file and choose Related from the pop-up menu.

4th DIMENSION changes the current input layout to the Related layout you just created.

3. Press Command-Space bar again to bring the Records window to the front.

4th DIMENSION puts away the "List of files" window.

4. Choose New Record from the Enter menu.

5. Enter some practice information:

Last Name	Ormolu
First Name	Fritz
Start Date	4/1/89
Salary	38050
Title	Fabricator

4
MM/DD/YY 1 APR 89

6. Select the Department Code field.

7. Enter **DES** and press Tab.

4th DIMENSION instantly enters the department name (Design) and the manager's name (Mr. Wanamaker) in their fields. This information came from the [Departments] file. Thus you see the first benefit of the relation you have established: automatic, instantaneous, accurate lookups.

8. Click Enter.

4th DIMENSION accepts the record and displays a blank record for further data entry.

Access to the Related File

You will occasionally need to have access to a related file. You may need to create a record for a new department, for example. 4th DIMENSION makes this easy to do. When you enter a new department code, 4th DIMENSION gives you access to the input layout of the related file so that you can create the new record.

Suppose your company hires an engineer as the first employee of a new engineering department. You enter this record before the department record is created.

In this section you will enter a new department code, and then create the corresponding department record.

1. Enter some practice information:

Last Name **Conqueror**
 First Name **Bill**
 Start Date **10/1/88**
 Salary **45000**
 Title **Engineer**

10/1/88
10/1/88
1st Oct 88

2. Enter **ENG** in the Department Code field.

After you Tab out of the field, select another field, or press Enter, 4th DIMENSION looks in the [Departments] file for this code. When it finds no record, it decides that you have either made a mistake or else you want to create a new record. 4th DIMENSION displays the "This record does not exist" message and offers to let you create one.

3. Click Create It.



Figure 8-12
 Creating a new record in the related file

4th DIMENSION displays the input layout for the [Departments] file, ready for you to enter information about the Engineering department. The new department code is already entered in the correct field. To create a new record in the [Departments] file, you need only fill out the rest of the form.

4. Enter the Engineering department information:

Name: **Engineering**

Manager: **Mr. Sturges**

Budget: **175000**

You can ignore the Total Salaries field for the moment. This field has a Display Only attribute that prevents any value from being entered. Later you can instruct 4th DIMENSION to calculate a value for this field.

5. Click Enter.

4th DIMENSION accepts the record, returns to the Employee file's input layout, and displays the department and manager information in the related fields. The information has been drawn from the record you have just created in the [Departments] file.

Employees	
Last Name	Conqueror
First Name	Bill
Start Date	10/1/88
Salary	45000
Title	Engineer
Department Code	ENG
Name	Engineering
Manager	Mr. Sturges

Figure 8-13

Displaying information from the related file

6. Click Enter to return to the list of records.

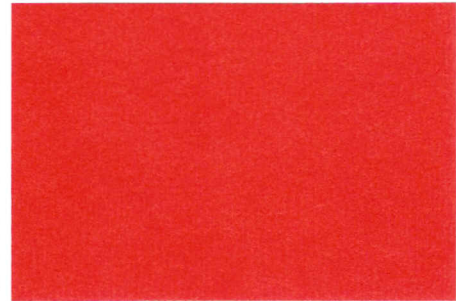
The Next Step

You have seen how related files allow you to share information between files. Your records of employees now include their department name and manager's name. And you will see in the next chapter that the department layouts can include information about each department employee.

Since the files can share this information, data that might have been repeated many times is stored only once. The advantages of this structure are reduced data entry time, less chance of error, ease of updating the information, and use of less space on disk.

You can create reports that use information from the related file. You can also search and sort records based on information in the related file. For example, you can sort the records in the [Employees] file by department or by manager, even though the department name and manager's name are in the [Departments] file. You will see these operations in later chapters of this book.

CHAPTER 9



RELATING ONE TO MANY

RELATING ONE TO MANY

Database: Personnel 9

Estimated time to complete: 10 minutes

In this chapter you will use the relation you established in Chapter 8 to display records from the [Employees] file in a layout for the [Departments] file. This is called a *One to Many relation*.

Relating One to Many means that whenever a record in the [Departments] file is made current, 4th DIMENSION loads all the [Employees] file records that have the same department code. This capability allows you to use information from many employee records from within each of the unique records in the [Departments] file.

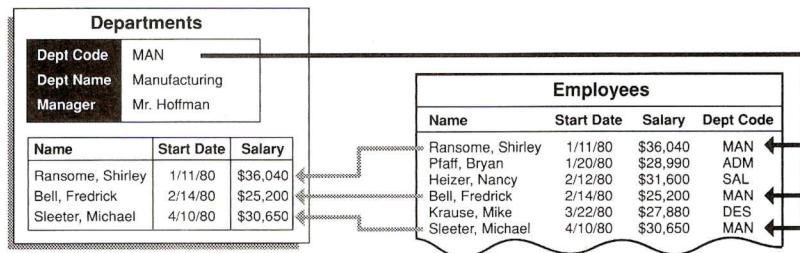


Figure 9-1

Many records contribute information to one record

In this chapter you will learn how to

- create a layout that includes records from the Many file
- modify an employee record from the [Departments] file

Creating an Included Layout

You want to create a layout that displays all employees that belong to a department on that department's record. You need to create a layout for the [Departments] file that includes space for [Employees] records. 4th DIMENSION provides an automatic method for including records from another file. The way it works is similar to the way you created the Related layout to display information from the [Departments] file.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 9 database.

Personnel 9 opens in the Design environment.

2. Double-click the title of the [Departments] file to open the Layout dialog box, and then click New.

4th DIMENSION displays the New Layout for Departments dialog box.

This dialog box shows the field names from the [Departments] file. The [Employees] filename is shown in bold and in brackets at the bottom of the list of fields. You will select two [Departments] fields and several [Employees] fields to display on the same layout.

3. Select ¹Name and ²Manager from the [Departments] file.
4. Click on the ³[Employees] filename and click Select.
5. Double-click the [Employees] filename.

4th DIMENSION lists the fields in the [Employees] file.

6. Select ¹Last Name, ²First Name, ³Start Date, and ⁴Salary in that order from the [Employees] file.

Be sure to select them in that order, so that they appear in that order on the layout. If you make a mistake, you can deselect any field name by selecting it again.

The numbers for the fields from the [Employees] file start over again from number 1. This is because the fields are numbered within the included layout area.

7. Select the fifth layout pattern (the one in the middle), and make the font size 9, and type **Included** as the layout name.

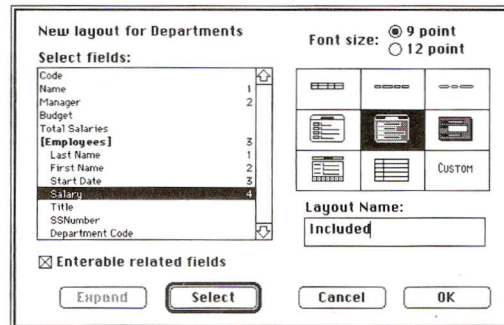


Figure 9-2
New Layout dialog box for the Included layout

8. Click OK.
- 4th DIMENSION displays the new layout.
9. Click the zoom box to expand the window.

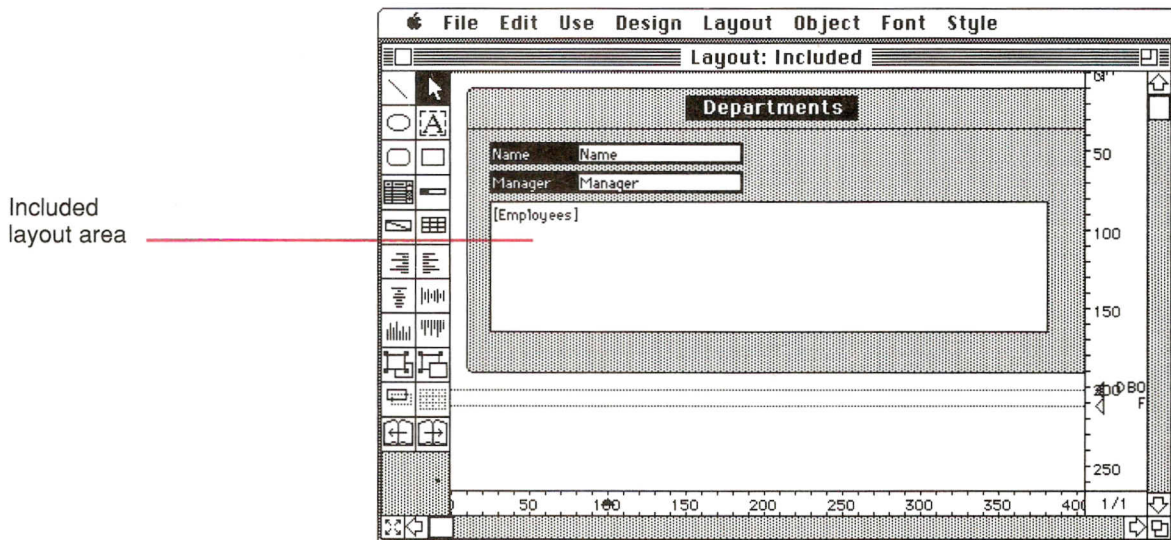


Figure 9-3
The [Departments] file layout with an included layout area

4th DIMENSION has automatically placed an *included layout* area on the new layout. An included layout area displays records from another file. On this layout, the included layout area will show the employee records in a multi-line scrollable list format. At present, no fields are visible. You will see them in the User environment.

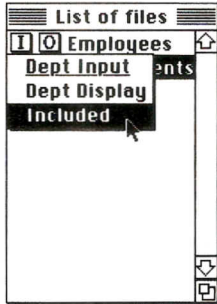
Viewing and Entering Records

Now you can go to the User environment to view department records that contain employee information. Each time a particular record is made current, 4th DIMENSION searches for all the employee records that match the department code and selects them. 4th DIMENSION then displays the information in the fields that you have selected.

1. Choose User from the Use menu.

4th DIMENSION displays the employee records. You need to change the file and layout.

2. Press Command-Space bar to display the “List of files” window.



3. Press the Input Layout icon for the [Departments] file and choose Included from the pop-up menu.

4th DIMENSION changes the current file to [Departments] and the input layout to the Included layout.

4. Press Command-Space bar again to send the “List of files” window to the back.

4th DIMENSION displays the department records in the [Departments] file output layout.

5. Select the Administration Department record and choose Modify Record from the Enter menu.

4th DIMENSION displays the new input layout, including a scrollable list of Administration Department employees.

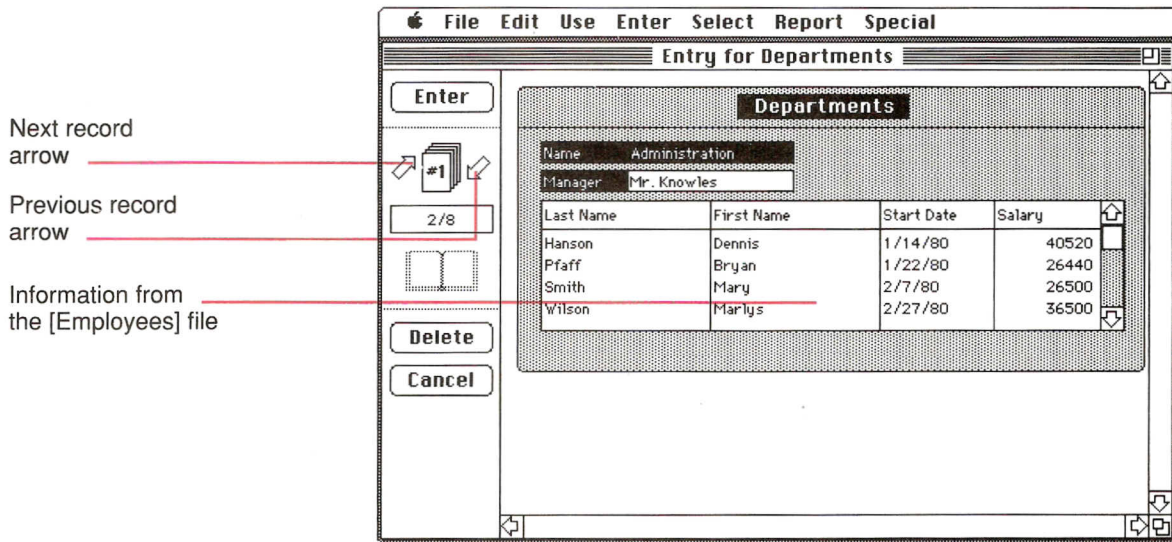


Figure 9-4
Employee information displayed in a department record

You can modify the employee records from this layout. Suppose one employee, Mary Smith, has received a raise of \$3,000 per year. You can change the salary figure here.

6. Click the Salary field in Mary Smith's record to select it, type 29500, and then click anywhere else on the record.

4th DIMENSION accepts the modified salary value. The record in the [Employees] file is now updated; the updating occurs when you move out of the employee record.

7. Click the next record arrow in the control panel to move to the next department record.

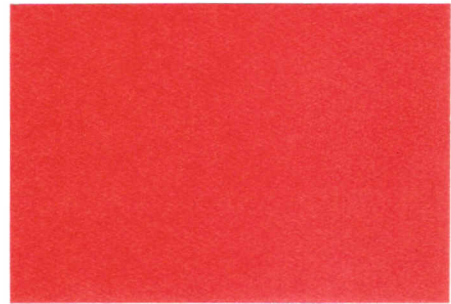
4th DIMENSION displays the next record in the [Departments] file. Employees in this department are listed in the included file area. You can continue to examine the different department records, scrolling to view all the employees in each department.

The Next Step

Automatic Relate One to Many is available whenever you use related files. One to Many makes it possible to gain access to many related records from the One file. Remember that each of the records in the [Employees] file has a department code that corresponds to one of the codes in the [Departments] file. Each department record is related to many records in the [Employees] file.

Using an included layout you can use the information in the [Employees] file in conjunction with a record in the [Departments] file. You can not only display this information, you can also print it, use it to search and sort, and perform calculations with it (total salaries per department, for example).

CHAPTER 10



USING A SUBFILE

USING A SUBFILE

Database: Personnel 10

Estimated time to complete: 25 minutes

In this chapter you will use 4th DIMENSION to store information about each employee's performance reviews. You have no way of knowing in advance how many reviews a particular employee has had. New employees have had no reviews; others who have been with the company a long time have had many reviews. You need to keep track of varying amounts of information for each record.

A 4th DIMENSION *subfile* handles just this problem. A subfile is a subordinate file that can contain any number of records associated with a single record in the parent file. It lets you keep track of a variable amount of information for each record, from no entries to as many as necessary. In effect, each employee record will have an entire data file in which to store that person's performance review information.

The file to which a subfile is attached is called the *parent file*. Since a subfile is associated with each record in the parent file, the records in the parent file are called *parent records*. The fields in a subfile are called *subfields*, and records in a subfile are called *subrecords*. A parent file can have many subfiles.

In this chapter you will learn how to

- create a subfile
- create a layout that displays information from the subfile
- enter information into the subfile

Why Use a Subfile?

You use a subfile when you need to keep track of a varying number of additional entries for each record. A subfile is an excellent place to store information limited to one record. You might keep track of your employee's children, publications, or social service awards in a subfile.

The subrecords—records in a subfile—are stored with the parent record. The subrecords are placed in memory when the parent record is made the current record. The number of subrecords a subfile can contain is limited to the number that will fit in memory.

The information in a subfile is available only when its parent record is current. Therefore, it is difficult to summarize information from subfiles belonging to different records. You would not use a subfile when you need to collect the information from all the subrecords of all subfiles. For example, an invoice file might seem to be a good candidate for using a subfile, because each set of purchased items could be associated with a specific customer record. But because you usually need access to such purchase records, you would undoubtedly use a normal file and an automatic relation to store the sales information. You would relate the sales file to the customer file to prepare invoices.

Creating a Subfile

You create a subfile in two steps: first, you add a field with a subfile field type to the parent file ([Employees]), and then you add fields to the subfile in the normal way. Once the subfile exists, you can create a new layout for the [Employees] file that includes the subfile.

Notice that creating a subfile is quite different from creating a relation between two files that already exist. You cannot make a file that already exists into a subfile.

In the following steps you will create the subfile.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 10 database.

Personnel 10 opens in the Design environment.

2. Double-click in the space below the field names in the [Employees] file.
4th DIMENSION displays the Field dialog box.
3. Type **Review Info** for the field name.
This is the name 4th DIMENSION will use for the subfile as well as the field.
4. Select the Subfile field type.
5. Click OK.

4th DIMENSION creates the subfile below the [Employees] file and connects it to the Review Info field with a gray line.

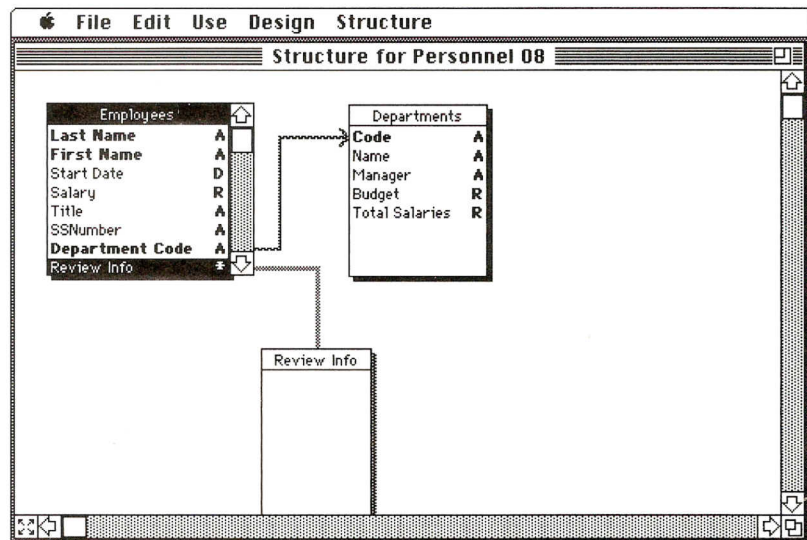


Figure 10-1
Subfile added to [Employees] file

The gray line connects the top of the subfile to the parent file. (This is unlike the arrow that connects two related fields.)

Next, you create fields in the subfile—subfields—to contain the information. These steps are the same as those for a regular file.

1. Double-click within the subfile.

4th DIMENSION displays the “Field for Review Info” dialog box.

2. Create the following subfields:

Subfield	Type
Review Date	Date
Rating	Real
Comments	Text

Click OK after creating the Comments subfield.

These subfields are linked automatically to each parent record.

The Review Date subfield will contain the date the performance review is approved. The Rating subfield is for the numerical rating your company uses for performance reviews. The Comments subfield will contain the text of the performance review itself. You have made it a Text subfield so that it can hold a substantial amount of text (up to 32,000 characters).

Layout

3. Using the same layout pattern (#5) you used for the previous input layouts, create an input layout for the Review Info subfile named **Input**. Use all three subfields. (See Figure 10-2).
4. After creating the layout, double-click the Comments field.
4th DIMENSION displays the Field Definition dialog box.
5. Click the “Text with scroll bar” check box.
6. Click OK.

This layout will be referred to later on as a full-page layout, because it provides access to a record on a full page.

7. Drag the layout frame down to just past 250. Increase the size of the comments field to match Figure 10-2. The comments field has been expanded to accommodate paragraphs of text.

Expanded
Comments field

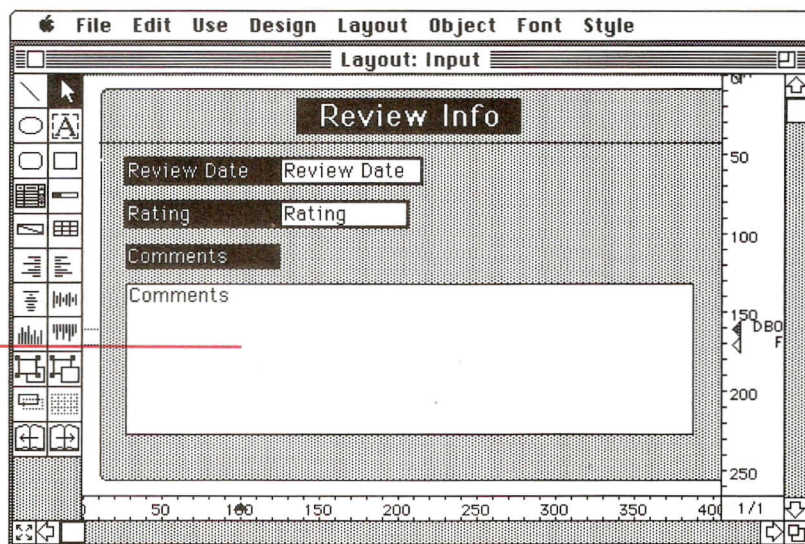


Figure 10-2
An input layout for a subfile

Now that you have created an input layout, you can proceed to create a layout for the [Employees] file that includes a layout for the subfields.

Layout

1. Create a new input layout for the [Employees] file. Name it **Subfile**. Select 9 point font size.

2. Select the First Name, Last Name, and Title fields from the [Employees] file.

3. Double-click the Review Info field and click Select.

4th DIMENSION lists the subfields in the Review Info subfile.

4. Select the Review Date, Rating, and Comments subfields. (See Figure 10-3).

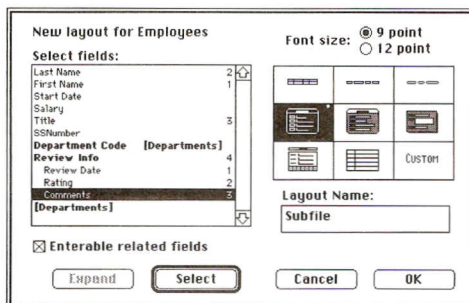


Figure 10-3
Fields and subfields selected for the new layout

You create an included layout area for a subfile in the same way you created an included layout area for a related file in Chapter 9. You select the subfile as one of the fields to be displayed, then select the fields you want from the subfile. Be sure your New Layout dialog box matches the one in Figure 10-3 before proceeding.

5. When you have finished, click OK.

4th DIMENSION creates a new layout, automatically including a multi-line layout area for the subfile fields.

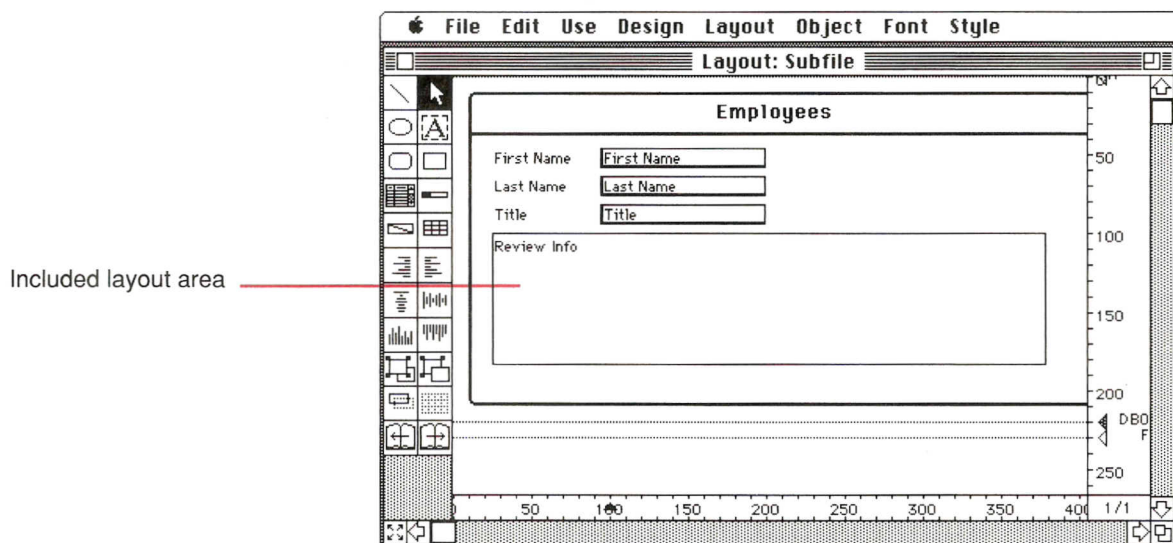


Figure 10-4
The input layout with a subfile display area

Whenever you enter information for an employee you will see the subfile displayed in the subfile display area.

You now need to associate the subfile input layout with the included layout area.

1. Double-click the included layout area.

4th DIMENSION displays the “Included layout” dialog box.

You use this dialog box to tell 4th DIMENSION which of the subfile layouts to use for input.

The Review Info subfile name is highlighted. The asterisk next to the subfile name shows that Review Info is associated with included layout area.

2. Click Expand to show the list of layouts you have created for Review Info.

Layout

3. Select Input, and then click the Full Page check box.

This step makes the input layout you designed the full-page layout that “waits behind” the subfile display area until you signal to enter more data. You will see this feature in action in the next section of this chapter. Ignore the buttons for the different frame displays; they are used only during printing.

4. Click the Double-clickable check box in the Data Entry area.

This step makes it possible to double-click the included layout. When the included layout is double-clicked, the full-page layout is displayed.

5. Click OK.

4th DIMENSION displays the layout you have been working on.

6. Close the Layout editor window.

Entering Information Into the Subfile

Now that you have created the subfile and an [Employees] file layout with a subfile display area, you can use the new layout to enter and display information. In the following steps you will add review information to a record that already exists.

1. Choose User from the Use menu.

4th DIMENSION lists the employee records in the output layout.

2. Make the new layout, Subfile, the current input layout.

You change the current layout by choosing it from the “List of files” window. To display the “List of files” window, press Command-Space.



Employees

3. Select the first record in the list of records.

4. Choose Modify Record from the Enter menu.

4th DIMENSION displays the record, including the added subfile display area.

Figure 10-5
The first record with a subfile display area

As you can see, the subfile display area uses a multi-line layout pattern.

5. Double-click anywhere within the subfile area.

4th DIMENSION displays the full-page layout for the Review Info file. This is what was meant by the Review Input layout “waiting behind” the subfile area.

6. Enter the following information for this employee:

Review date: **3/18/88**

MM/DD/YY 18/3/88

Rating: **4.5**

10th March

Comments: **Tom has had a very successful quarter, meeting all his stated goals. In particular, his report on the need for the new Engineering Department was effective in getting it established.**

During the coming quarter, his goal is to establish budget and scheduling parameters for the coming year. This means he will be working directly with Bud Schulberg.

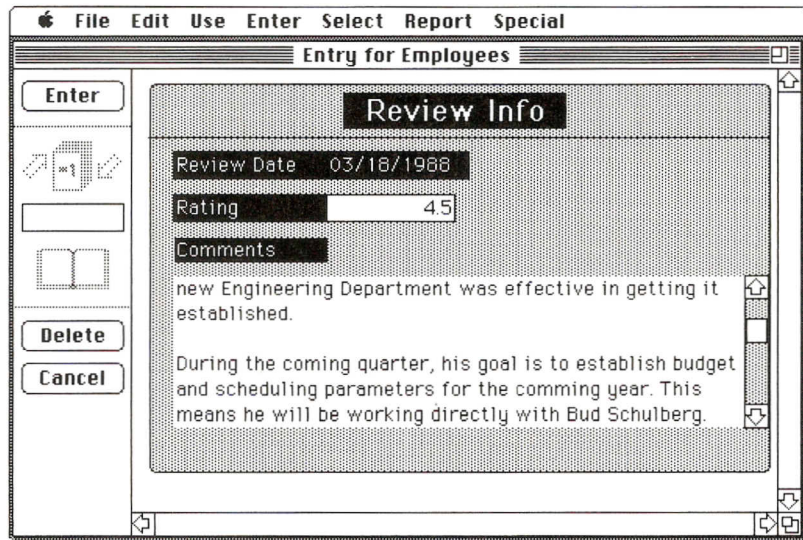


Figure 10-6
Entering comments into a text field

Notice that the text area for comments works like a text processor. The words wrap from line to line within the borders of the field area.

7. Click Enter.

4th DIMENSION displays a blank input layout for the subfile. Click Cancel to return to the parent record.

You see only a few lines of the text you have entered, though the text area contains all the words.

Figure 10-7 shows a window titled "Entry for Employees" with a menu bar (File, Edit, Use, Enter, Select, Report, Special) and a sidebar with buttons (Enter, #1, 1/60, Delete, Cancel). The main area displays a form for an employee named Tom Johnson, an Engineer. It includes a table for performance reviews with one entry dated 3/18/88, a rating of 4.5, and a comment: "Tom has had a very successful quarter, meetir".

Review Date	Rating	Comments
3/18/88	4.5	Tom has had a very successful quarter, meetir

Figure 10-7
Subfield entries displayed in parent record

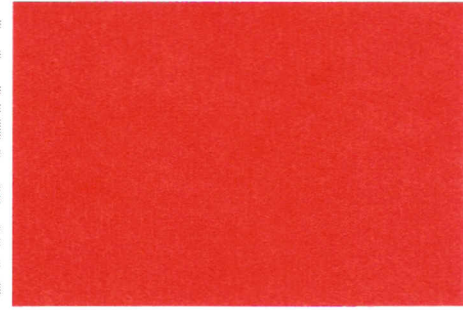
After you enter additional subrecords, you can move any of them into view with the scroll bar on the right of the subrecord display area.

8. Click Enter to return to the output layout.

The Next Step

You have seen how to add a subfile to each record in which you can store many pieces of information about an employee. The subfile can accommodate any number of subrecords, from none at all to the many performance reviews of a long-term employee.

USING THE SEARCH EDITOR



USING THE SEARCH EDITOR

USING THE SEARCH EDITOR

Database: Personnel 11

Estimated time to complete: 10 minutes

In this chapter you will learn how to use 4th DIMENSION's Search editor to search for a group of records based on a complex set of search conditions.

In Chapter 3 of *Quick Start* you used Search by Layout to search for a specific record. When your search conditions are more complex, you usually use the Search editor. You would use the Search editor, for example, if you wanted to find all the records between two dates.

In this chapter you will learn how to

- enter search conditions in the Search editor
- create complex search conditions
- search on a field in a related file

Using Search Conditions

You often need to isolate a specific group of records, to view them together, to update a field in each record in the group, or to perform a calculation or print a report based on that subset of all the records. The subset of the records isolated by searching is called the *selection*.

A search is based on *search conditions*, instructions to 4th DIMENSION that identify the basis on which the records are included or excluded from the selection. The selection is made up of records that meet the search conditions.

Suppose you want to see all the records for employees with salaries greater than \$30,000. The condition you would enter to isolate those records is "Salary greater than 30000." This simple example illustrates both the exact nature of a search condition and the ease with which you can write search conditions in 4th DIMENSION. Using this search condition, 4th DIMENSION tests the condition against the value in the Salary field on each record. If the condition is true (the salary is greater than 30000), the record is included in the selection; if the condition is false (the salary is 30000 or less), the record is excluded from the selection.

A search condition always has three elements in this order: *field name, operator, value*. The field name is from the current file or a related file. The operator is one of the comparisons (*equal to, greater than, less than*, and so forth). The value is the value to which each record is compared. In the Search editor, the search condition is displayed in the text area so that you can see it easily and edit it as necessary.

You can save search conditions or load conditions you have previously saved. If you need to perform the same search on a regular basis, 4th DIMENSION allows you to enter the search conditions once, save them, and then have them available whenever you need them.

If the field is an indexed field, 4th DIMENSION can perform the search very fast.

Using the Search Editor

Suppose you want to see all records of people earning more than \$30,000 per year. You can create a selection of just these records using the Search editor.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 11 database.

Personnel 11 opens in the User environment.

2. Choose Search Editor from the Select menu.

4th DIMENSION displays the Search editor. Here you enter the condition you want to use to search.

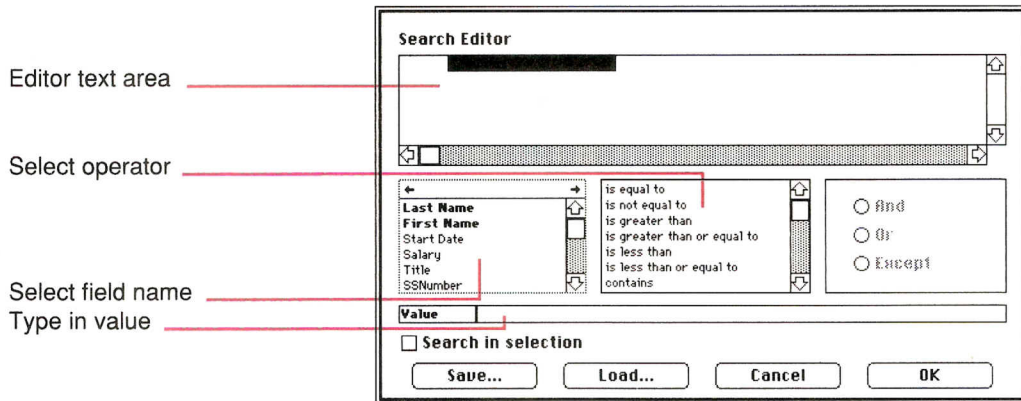


Figure 11-1
The Search editor

3. To enter the field name you want to use, click Salary in the panel on the lower left.
4th DIMENSION enters the field name in the editor text area.
4. To enter the operator you want to use, click "is greater than" (in the center panel).
5. Type 30000 (the amount is entered on the Value line at the bottom of the dialog box).
This completes your search condition.
6. Click OK.

4th DIMENSION performs the search based on the condition you have entered. The records of all employees earning more than \$30,000 are displayed on the screen.

38 records of 60

- 10 → and ← 20
- greater than 10
AND
less than 20
7. To see all the records again, choose Show All from the Select menu.

Using a Condition With *And*

You use the *And* conjunction to join two search conditions. The *And* conjunction restricts the search to fewer records than either condition alone. In order to meet the compound condition, a record must satisfy both conditions.

Suppose, to take a simple example, you want to view the record for Mary Smith. You can use *And* to create a compound search condition for this task. You want to see the record that has *Smith* in the Last Name field *And* that has *Mary* in the First Name field. The record must meet both conditions, not just one.

1. Choose Search Editor from the Select menu.

4th DIMENSION displays the Search editor. The previous search condition is still displayed in the editor text area.

2. Choose Clear from the Edit menu.

The previous search condition is erased.

3. To enter the field name you want to use, click Last Name.

4th DIMENSION enters the field name in the editor text area.

4. To enter the operator you want to use, click "is equal to."

5. Type Smith.

The first search condition is complete. So far your condition states that you want to see records that have a last name of Smith. You now need to enter the conjunction and the second condition.

- And
6. Click the And button.

This step prepares the editor to receive the second condition.

7. Click First Name, then click "is equal to," then type Mary.

Both conditions are complete.

Figure 11-2
Completed compound search conditions

8. Click OK.

4th DIMENSION performs the search based on the conditions you have entered. The record you want is displayed on the screen.

Using a Condition With Or

You use the *Or* conjunction to join two search conditions. The *Or* conjunction expands the search to more records than either condition alone. In order to meet the compound condition, a record can satisfy either condition.

Suppose, for example, you want to see the records for several employees who have recently received social service awards of various kinds. You can join them into one compound search condition with *Or*.

Your conditions will state that you want to see records that have a Last Name entry of Davis, or Wilson, or Tracy, or Arnold, or Martin. In ordinary English you might say, "I want to see the records for Davis, and Wilson, and Tracy, and Arnold, and Martin." However, you are writing logical conditions. Clearly no record contains Davis, Wilson, Tracy, Arnold, *And* Martin. Each record has just one of these last names. In this case, you need *Or* to expand the number of records that meet the condition.

1. Choose Search Editor from the Select menu.

4th DIMENSION displays the Search editor again.

2. Choose Clear from the Edit menu to remove your previous search conditions.

4th DIMENSION clears the Search editor.

3. Click Last Name, click "is equal to," and type Davis

4. Click the Or button.

5. Enter the next condition, and click Or again:

Last Name, is equal to, Wilson

6. Continue using the *Or* condition for the remaining last names:

Tracy
Arnold
Martin

You have entered a five-part search condition, joined with *Or*. A record can meet any of these conditions and be included in the selection. The principle at work here is that using *Or* expands the number of records in the selection.

Figure 11-3
Completed search conditions

7. Click OK.

4th DIMENSION performs the search and displays the selection of records on the screen. Notice that the search was of the entire file, not of just the selection created by the previous search. 4th DIMENSION assumes you want to search the entire database. If you ever want to search just the current selection, you would click the "Search in selection" check box before you click OK.

Searching on a Field in a Related File

The [Employees] file is related to the [Departments] file. As you saw in Chapter 8, this means that every employee record has one corresponding department record. The relation allows you to perform searches of the Employees records based on the entries on records in the [Departments] file.

In this section you will search first on the department code, and then on the department manager's name.

1. Choose Search Editor from the Select menu.

4th DIMENSION displays the Search editor again. Your previous search condition remains in the Search editor.

2. Choose Clear from the Edit menu.

4th DIMENSION clears the Search editor.

3. Click either of the cycle arrows at the top of the list of files until the [Departments] file is displayed.

Click cycle arrows to display files

Departments	
Code	↑
Name	
Manager	
Budget	
Total Salaries	↓

Figure 11-4
Displaying the [Departments] file

4. Enter this search condition:

Code, is equal to, TRAN

5. Click OK.

4th DIMENSION searches for the records in the [Employees] file that are related to the [Departments] record with *TRAN* in the Code field, then displays them.

You have searched on the department code to isolate all the records for members of the Transportation department.

Suppose, however, you want to see the employees that report to Mr. Wanamaker, but you don't know his department code. You can use another field from the related file, not just the related field.

6. Open the Search Editor, clear it, and enter this search condition:

Manager, is equal to, Mr. Wan@

You have used the “@” wildcard so you don’t have to spell out the whole name.

7. Click OK.

4th DIMENSION searches for the records in the [Employees] file that are related to the [Departments] record with *Mr. Wan* in the Manager field, then displays them. These are all the employees who report to Mr. Wanamaker.

The Next Step

The Search editor is designed for compound searches. As you can see from the Select menu, the Search editor is just one of four ways to search the database.

Select	
Show All	⌘G
Show Subset	⌘H
.....	
Search Editor...	⌘S
Search by Layout...	⌘L
Search and Modify...	
Search by Formula...	
.....	
Sort Selection...	⌘T
Sort File...	

Figure 11-5

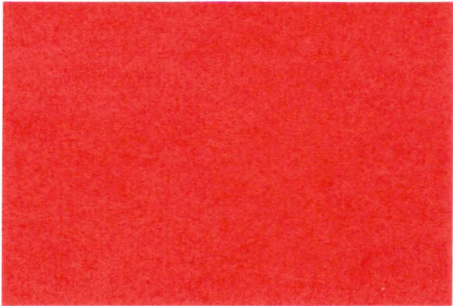
The Select menu shows four ways of searching

Q44
4th DIMENSION provides the Search by Layout and Search and Modify methods that you worked with in *Quick Start* to perform simple searches. The Search editor is designed to perform any kind of search, from simple searches to the kind of compound searches that are covered in this chapter, as well as even more complex combinations of *Or*, *And*, and *Except*.

It is possible to use Search by Layout for compound searches with special symbols. For complete information, see the *4th DIMENSION User Reference*.

4th DIMENSION also provides the Search by Formula method for searching the database. The Formula editor is designed to search with formulas created with 4th DIMENSION’s procedural language.

WORKING WITH REPORTS



QUICK REPORTS WITH BREAKS

QUICK REPORTS WITH BREAKS

Database: Personnel 12

Estimated time to complete: 15 minutes

You often need various printed versions of the records in your database. You may need to print a list of names and phone numbers or create mailing labels. You might be called upon to prepare quick reports that present the information in several ways. With 4th DIMENSION you have all the flexibility you need to perform these tasks.

In this chapter you will learn how to

- create a quick report that includes subtotals
- use fields from a related file in a report

Using the Quick Report Editor

Reports allow you to communicate the information contained in the records. 4th DIMENSION's Quick Report editor allows you to print all the information, some of it, or just summaries of it (total sales for October, for example). You can design and save reports that you use again and again. And you can quickly design a report you use only one time for a special purpose.

Quick Report is one of 4th DIMENSION's two major report methods. You can also design a report using the Layout editor. The Quick Report can handle many of your reporting needs, but not all of them. In Chapter 13, you will design a more complex report using the Layout editor.

Using the Quick Report editor, you can design and print tabular reports quickly. You can choose the fields you want to print, arrange them in any order, calculate totals and subtotals, and print additional text. Here is a typical report:

Columns headers

Information drawn from fields

Name	Last Name	Salary
Accounting	Baldwin	\$43,990
	Johnson	\$18,250
	Subtotal for Accounting:	\$62,240
Administration	Hanson	\$40,520
	Pfaff	\$26,440
	Smith	\$26,500
	Terry	\$16,190
	Wilson	\$36,500
	Subtotal for Administration:	\$146,150
Art	Forbes	\$18,840
	Martin	\$56,144
	Tompkins	\$19,770
	Venable	\$43,520
	Voltz	\$25,150
	Subtotal for Art:	\$163,424
	Grand Total:	\$371,814

Figure 12-1
Parts of a typical report

This report was created by the following *report design*. The report design is the set of instructions that tells 4th DIMENSION what to print.

Reports...

☒ Report with frame

Name	Last Name	Salary
H	Name	Last Name
D		\$###,###
B1	Subtotal for	Sum
I	Grand Total:	Sum

Sort

Name
Last Name
<<Add Sort>>

Cancel OK

☐ Sum ☐ Average ☐ Min
☐ Max ☐ Count
☐ Auto column width

Figure 12-2
The report design in the Quick Report editor

By comparing the report design with the final printed output, you can see that the Header row is shown at the top of the design and that it is printed at the top of the columns of field information. The Detail and Break rows appear in the middle of the design, and they affect the middle of the printed report. The Totals row is shown at the bottom of the design, and it is printed at the bottom.

Details and Breaks

When your report is printed, 4th DIMENSION looks through the records in the current selection one at a time. The sort order determines the order the records appear in the report and how records are divided into groups.

SORT The report design in this chapter sorts the records by Department. 4th DIMENSION looks at all the records for one department, then at all the records for the next department, and so on. This sort order allows 4th DIMENSION to calculate a subtotal for each department. If the records were sorted by job title, 4th DIMENSION could calculate a subtotal for each job title.

Whenever the value in the sort field changes, a *break* is generated. The word break comes from the idea of interrupting. When 4th DIMENSION comes to the end of the records for the art department, a break occurs (an interruption in the sequence of Department entries). Before 4th DIMENSION prints the first record in the next department, it performs whatever calculations you have instructed it to do.

Records can be sorted into many levels. If you sort the records by department and then by job title, you can create a break whenever the job title value changes as well as when the department value changes. You could therefore calculate additional subtotals for job title within department.

You must have at least as many sort levels as break levels. But you don't have to create a break level for every sort level. In the example in this chapter, there are two sort fields, Department Name and Last Name, but only one break level. The break level corresponds to the first sort field, Department Name. Therefore, records are broken up into groups using the Department Name, but not Last Name. The Last Name field is used to sort records so that within each department the employees appear in alphabetical order.

Creating a Quick Report

For this quick report, you will create a list of employees and their salaries, grouped by department. You plan to calculate the total salaries for all employees as well as subtotals for each department.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 12 database.

Personnel 12 opens in the User environment.

2. Choose Quick from the Report menu.

4th DIMENSION displays the Quick Report editor.

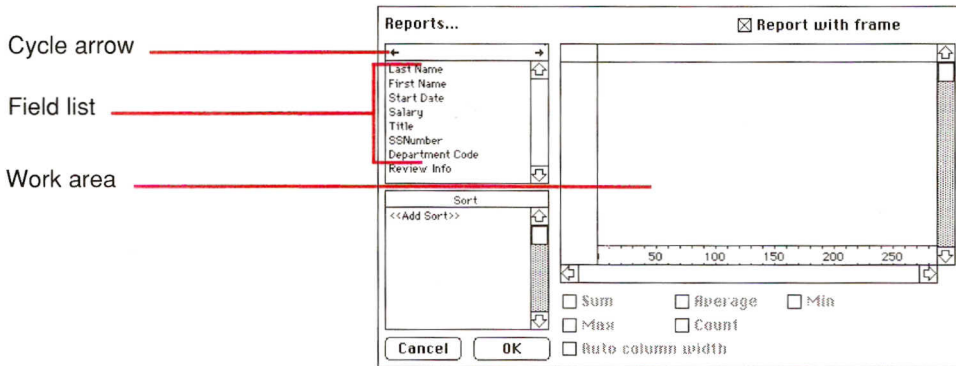


Figure 12-3
The Quick Report editor

In the next steps you will drag the fields from the field list into the work area. Since the first field you want (Name) is in another file, use the cycle arrows at the top of the list to display the [Departments] file.

3. Click the right cycle arrow until the [Departments] filename is displayed in the box.

The [Departments] file fields are displayed in the field list.

4. Drag the Name field from the field list into the work area.

When you release the mouse button, 4th DIMENSION creates a column for department names.

5. Click the left cycle arrow once to return to the [Employees] file fields.

6. Drag the Last Name field, then the Salary field from the field list into the work area.

4th DIMENSION creates two new columns for these fields.

You now need to establish the sort order, both to determine the order in which the records will be printed, and to allow you to create a break row. You will use Name and Last Name for your sort fields.

7. Drag the <<Add Sort>> phrase from the Sort list onto the Name column in the work area.

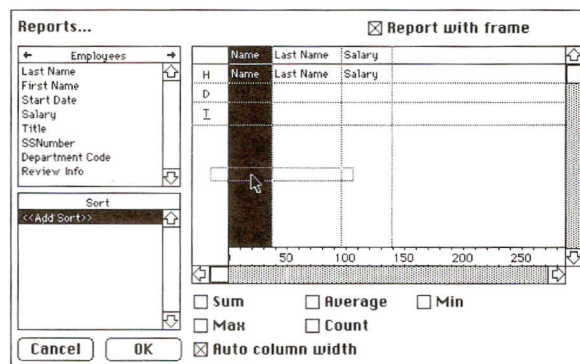


Figure 12-4

Dragging the <<Add Sort>> phrase to create a sort field

4th DIMENSION adds the Name field to the Sort list.

8. Drag the <<Add Sort>> phrase from the Sort list onto the Last Name column.

You have created a two-level sort. The primary sort field is the department name, and within each department the records are sorted by the employees' last names.

You want to have 4th DIMENSION calculate a total for salaries. You do this the same way you did it in *Quick Start*.

9. In the Salary column, select the cell intersected by the Total row, and then click Sum.

4th DIMENSION adds a Sum symbol to the selected cell, instructing the program to calculate the total of all the salaries when the report is printed. The total will be printed in the Salary column.

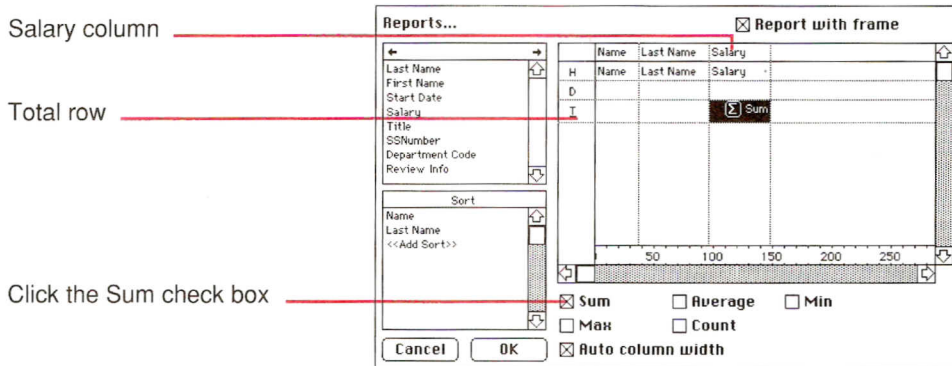


Figure 12-5
Instructing 4th DIMENSION to calculate a total

10. Select the cell to the left of the calculated cell you just created, click again to create an insertion point, then type **Grand Total**. Select left from the style menu.

You can now create a Break row, so that you can instruct 4th DIMENSION to calculate a subtotal.

11. Select the Total row by clicking on the "T" or by clicking in the Total row to the right of the fields.
12. Choose Insert Break from the Edit menu.

4th DIMENSION creates a Break row just above the Total row.

4th DIMENSION adds a Sum symbol to the Salary cell in the Break row. This action instructs the program to calculate the subtotal (all the salaries in the preceding department) when the report is printed. The same symbol is used for both summing operations (total and subtotal). The difference between the instructions depends on the row in which the Sum instruction is placed: Placed in a Total row, the Sum calculates over the entire report (sums salaries for every record in the selection);

placed in a Break row, the Sum calculates over only the records printed since the previous break (sums salaries for records in each department).

You can now add some additional text next to the subtotal. Placing the text in the Break row ensures that it will be printed each time the subtotal is calculated.

13. Select the cell to the left of the subtotal cell you just created, click again to create an insertion point, then replace the existing text with **Subtotal for: #**. Select Right from the Style menu.

"#" option key.

The pound sign, #, tells 4th DIMENSION to substitute the name of the department whose sum is being printed. For example, when 4th DIMENSION prints the subtotal for the engineering department, the label will read, "Subtotal for Department: Engineering."

hundred of thousands

14. Click on the Detail cell in the Salary column. Click again to create an insertion point. Type the format: **####,###.**

(\$#,###,###)

This tells 4th DIMENSION how to format the employees' salaries. This format will also be applied to the subtotals and the grand total.

millions

Here is your final report design:

column too narrow or Total

appears as

=====

when

\$#,###,###

used

\$#,###,###

OK

D137

Figure 12-6
Final report design

You are now ready to print your report.

15. Choose Print from the File menu.

(use large enough format)

16. Select “Preview on screen” and then click OK.

4th DIMENSION prints the report. You can click Zoom to examine it closely. Click Stop Printing and OK to exit.

Name	Last Name	Salary
Accounting	Baldwin	\$43,990
	Johnson	\$18,250
	Subtotal for Accounting	\$62,240
Administration	Hanson	\$40,520
	Pfaff	\$26,440
	Smith	\$26,500
	Terry	\$16,190
	Wilson	\$36,500
	Subtotal for Administration	\$146,150
Art	Forbes	\$18,840
	Martin	\$56,144
	Tompkins	\$19,770
	Venable	\$43,520
	Voltz	\$25,150
	Subtotal for Art	\$163,424
Design	Doyen	\$43,210

Figure 12-7
The report previewed on screen

You have created and printed a useful report in just a few minutes. If you wanted to print such a report each month or each quarter, you could save this report and use it over again. When the time came, you would simply load the report design and print it again. The printed output would reflect any changes you had made to the database in the meantime.

The Next Step

The Quick Report editor can also print text at the top and bottom of each page, provide automatic page numbers, and use any text font, size, and style. For complete information, see the *4th DIMENSION User Reference*.

CHAPTER 13

**CREATING A CUSTOM
REPORT LAYOUT**

CREATING A CUSTOM REPORT LAYOUT

Database: Personnel 13

Estimated time to complete: 45 minutes

One of the major functions of a database is to produce reports. In Chapter 12 you used the Quick Report editor to create a report. In this chapter you will use the Layout editor to create a custom report.

There are several advantages of using a layout for a report: you can use graphic elements on the layout, you can control the placement of report elements precisely, you can use scripts to perform calculations, and you can use headers at each break. The advantage of the quick report is that it is sometimes faster to create.

You will next create a report that shows the employees, their salaries, and the total salaries for each department. This report is similar to the quick report you produced in the previous chapter. By going through the steps in each chapter, you can compare the two methods.

In this chapter you will learn how to

- create a report layout including header, footer, detail, and break areas
- print the time, date, and page number
- create scripts that calculate subtotals and totals

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Ch 5, Page 205*

Report Layouts

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Here is an example of a report produced from a layout:

Header	Consumer Products Employees		
	Date: 6/8/89	Time: 5:43 PM	
Break header	Accounting		
Detail	Name	Title	Salary
	Baldwin, Steve	Supervisor	\$43,990
	Johnson, John	Clerk	\$18,250
Break subtotal	Total Salaries for Accounting		\$62,240
Break header	Transportation		
Detail	Name	Title	Salary
	Bentley, Alice	Engineer	\$28,000
	Gerbando, Smeldorf	Clerk	\$19,610
Break subtotal	Total Salaries for Transportation		\$47,610
Grand total	Total Salaries for Company		\$109,850
Footer	Salaries by Department		Page: 1

Figure 13-1
The final report

Here is the output layout for this report.

Header marker

Break header
marker

Detail marker

Break markers

Footer marker

The image shows a screenshot of a report layout editor window titled "Layout: EmployeeReport". The report content is as follows:

- Header:** "Consumer Products Employees". Fields: "Date: <vDate>" and "Time: <vTime>".
- Section Header:** "Name".
- Table:** A table with columns "Name", "Title", and "Salary". A data row contains "<vName>", "<vTitle>", and "<vSalary>".
- Summary Row 1:** "Total Salaries for <[Departments]Name>" followed by a field "<vSalarySub>".
- Summary Row 2:** "Total Salaries for Company" followed by a field "<vSalaryTot>".
- Page Footer:** "Salaries by Department" and "Page: <vR>".

On the left side, a vertical toolbar contains various icons for report design. Red lines and labels on the left identify specific markers:

- Header marker:** Points to the top of the report header.
- Break header marker:** Points to the section header "Name".
- Detail marker:** Points to the first data row of the table.
- Break markers:** Two red lines point to the summary rows, indicating breaks between the table and the totals.
- Footer marker:** Points to the footer area.

A horizontal ruler at the bottom shows positions from 50 to 400. The right edge of the window shows a vertical ruler from 50 to 250 and a status bar with "1/1".

Figure 13-2
The report layout

The areas of the report—the header, break header, detail, break area, and footer—are controlled by the *report control markers* on the layout. The report control markers are in the right ruler.

You are familiar with most of these terms already:

Header: The header is printed at the top of each page.

Break header: A break header contains material that is printed once at the beginning of a break, and not again until the next break. This type of header is useful to label information at each major division of a report.

Detail: The detail area usually contains data that comes directly from each record. Whatever appears in the detail area on the report layout is printed once for each record.

Break: A break area contains subtotals and other calculations performed during a break in the Sort field. You can specify what calculations you want performed and any additional text you want printed whenever a break occurs.

Footer: The footer is printed at the bottom of each page.

The layout rulers are marked in pixels, which are the smallest dots your screen can display. The rulers can be changed to inches or centimeters by choosing Ruler Units from the Layout menu.

The report control markers define areas on the layout. The elements you place in each of these areas—fields, text, and variables—are printed at the appropriate place in the report. You can use scripts to perform any necessary calculations.

Working With Report Control Markers

In *Quick Start* you created an output layout to display your records on the screen. This time, you will create an output layout designed for printing.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 13 database.

Personnel 13 opens in the User environment.

2. Choose Design from the Use menu.
- 

Layout

3. Create a new output layout for the [Employees] file named EmployeeReport.

Include these fields in this order: Last Name, Title, and Salary. Use the layout template in the upper-left corner of the pattern choices. Make sure your New Layout dialog box matches that in Figure 13-3.

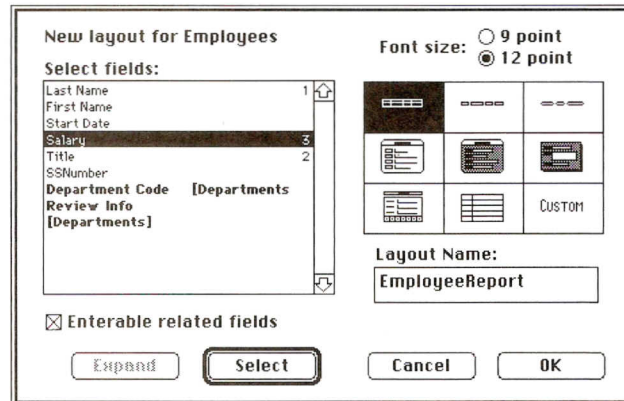


Figure 13-3
New Layout dialog box for the report layout

The layout is displayed in the Layout editor.

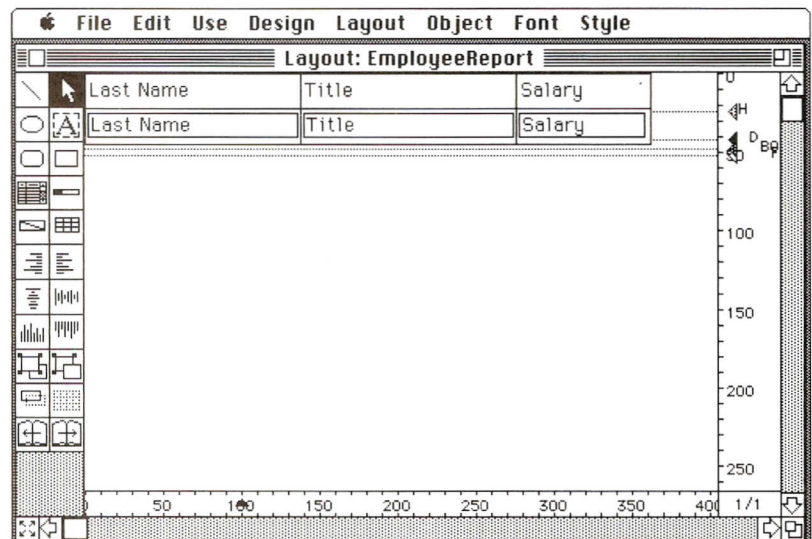


Figure 13-4
The three fields in the layout

4. Expand the window either by clicking the zoom box or dragging the size box.

5. To prepare to add elements to the report, drag the Footer marker down to 230 and the Break marker down to 150.

To move the marker, drag the letter or the triangle of each marker. A dotted line extends from each marker across the layout to show the location of each area.

The Footer marker, a triangle labeled *F*, shows the bottom of the Footer area. Anything you enter on the layout between the Footer marker and the Break marker will be printed at the bottom of each page of the report. You usually use footers for page numbers and running titles or comments.

The Break marker, a triangle labeled *B0*, shows the bottom of the Break area. The Break area is equivalent to the T row in the Quick Report editor. *B0* stands for the level zero break.

6. Hold down the Option key and click the Break marker.

The level one Break marker, labeled *B1*, appears on top of *B0*.

7. Drag the *B0* marker down to 180.

Anything you enter on the layout between the *B1* Break marker and the Detail marker will be printed each time the value in the sort field changes. (You will sort the records before printing to create the necessary Sort field break.)



Note: If you inadvertently create an extra Break marker (*B2*, *B3*, and so on), you can delete it by holding down the Command key as you click the unwanted marker.

8. Choose Select All from the Edit menu. Move all the elements on the layout by dragging them so that the bottom line of the frame is at about 120. Deselect the elements by clicking on the layout. Format the Salary field with a \$ format by double-clicking on the field and choosing the format from the Format pop-up menu. See Figure 13-5 for the proper positioning.

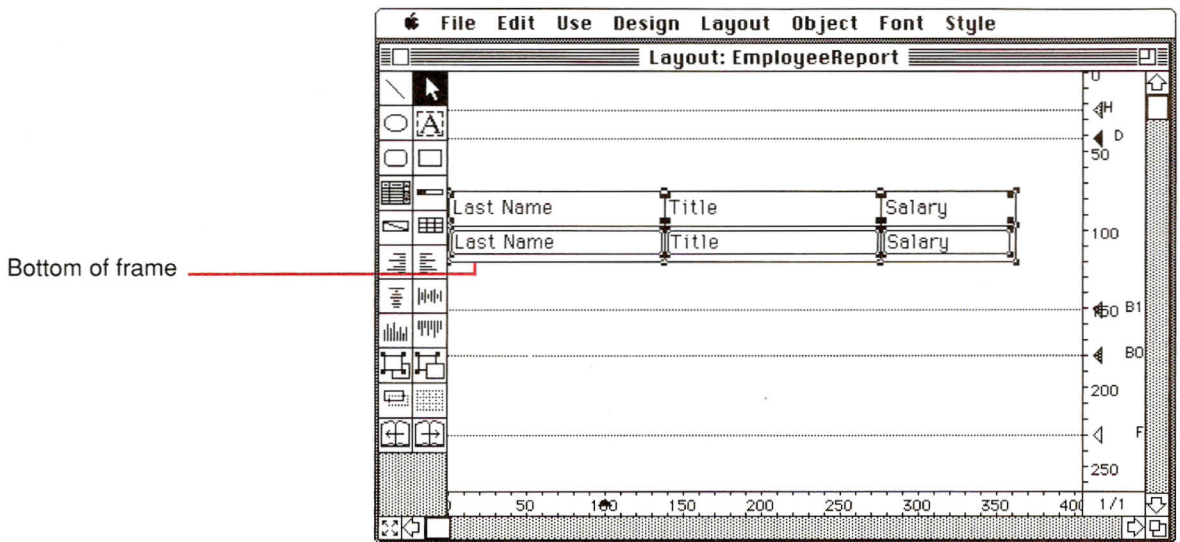


Figure 13-5
The bottom of the frame is at 120

9. Drag the Detail marker down to just above the bottom line of the layout (just above 120). See Figure 13-6.

The Detail marker, a triangle labeled *D*, shows the bottom of the detail area. Anything you enter on the layout just above the Detail marker will be printed once for each record in the selection you print. You use this area for data drawn directly from the records.

10. Drag the Header marker until it is at 40.

The Header marker, a triangle labeled *H*, shows the bottom of the header area. Anything you enter on the layout just above the Header marker will be printed at the top of each page of the report. You usually use headers for the title of the report and date or time stamps.

11. Hold down the Option key and click the Header marker.

The level one Break Header marker, labeled *H1*, appears.

12. Drag the H1 marker just below the middle line of the layout and above the fields (just above 100).

The Break Header marker, labeled H1, is at the bottom of the break header area. Anything you enter between the Break Header and Header markers will be printed once above each group of records. You will use this area to label each group of records and the columns of the report.

13. Raise the top line of the layout box up to 50. Delete the two vertical bars inside the layout box that separate the fields.

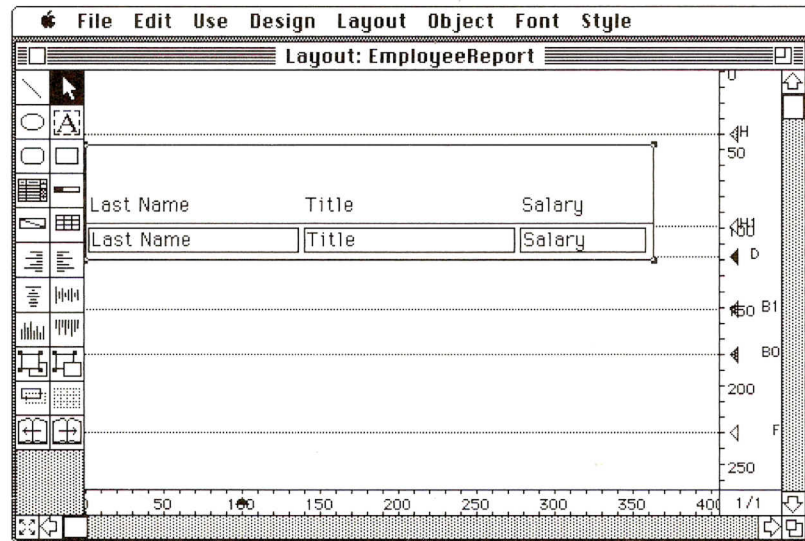


Figure 13-6
The layout after markers have been dragged

14. Click the Add Field tool and draw a rectangle in the upper-left corner of the layout box (see Figure 13-7). Select the Name field from the [Departments] file. To do this double-click on the [Departments] file name and scroll down the list of fields to Name. Make the field 12 point and bold.

You have now defined areas on your layout for elements to be printed in the Header, Break Header, Detail, Break, and Footer areas of your report. Anything entered in these areas prints at the appropriate time.

[Departments] Name
field

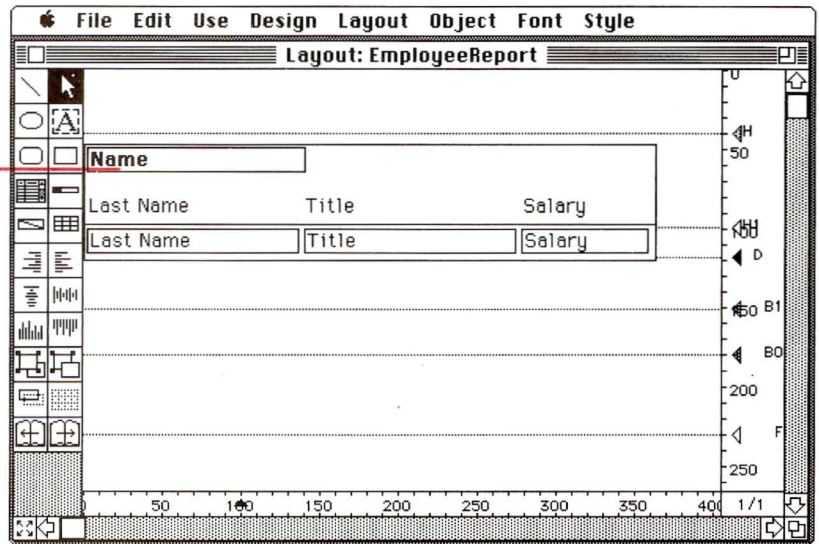


Figure 13-7
The [Departments] Name field is added

Working With Nonenterable Objects and Scripts

You worked with one type of active object, in Chapter 1, when you added buttons to your layout. Now you will use objects and scripts to perform tasks on this report layout.

1. Select the Last Name text area, and change it to Name.

You use the Text tool to select text within the text area.

2. Delete the Last Name field by selecting it and pressing the Delete key. Replace it with an active object.

Backspace

To add an active object, you click the Create Active Object icon, then you draw a rectangle where you want to place the object. You will name the object and add other instructions in the Object Definition dialog box.

You selected the Last Name field for inclusion only so that the layout would provide room for this object. You are going to write a script for the object to join each employee's first and last names.

3. In the Object Definition dialog box, type **vName** for the name, select a Nonenterable object type, deselect “Only if modified.”

Be certain to deselect “Only if modified.” “Only if modified” applies only to an input layout. If you leave it selected, the script will not be executed when the report is printed.

4. Click the Script button, and select the Listing type for the procedure. Enter the following one-line procedure, then click the Close box:

vName:=Last Name+", "+First Name

Make vName 12 point.

This script instructs 4th DIMENSION to print the value from the Last Name field, then a comma and a space, and then the value from the First Name field. This is better than using two fields on the layout because the comma and the first name come immediately after the last name. Two fields would leave extra spaces after most last names.

The vName variable is in the Detail area of the report. It will be processed and printed once for each record you print. The script you have written will cause the report to include the last and first names for each employee.

Everything in the Detail area prints once for every record. The Name field will print the department name and the Salary field will print the salary value, once for each record. Of course, the information on the record will determine the exact value printed for each record.

5. In the Header area above the column headings, create a large text area and enter a report title: **Consumer Products Employees**. Set the font and size of the title to Helvetica 18 and make it bold (see Figure 13-8).

6. Create a text area and type **Date:**
7. Create an active object, name it **vDate**, and make it a Nonenterable object. Deselect the “Only if modified” check box. Use the Short date format. Click the Script button and enter the following script:

vDate:=Current date

This code instructs 4th DIMENSION to print the current date in the object.

8. Create a text area and type **Time:**
9. Create an active object, name it **vTime**, and make it a Nonenterable object. Deselect the “Only if modified” check box. Use the H:MM AM/PM format. Click the Script button and enter the following script:

vTime:=Current time

This code instructs 4th DIMENSION to print the current time in the object.

Your layout should now look like Figure 13-8.

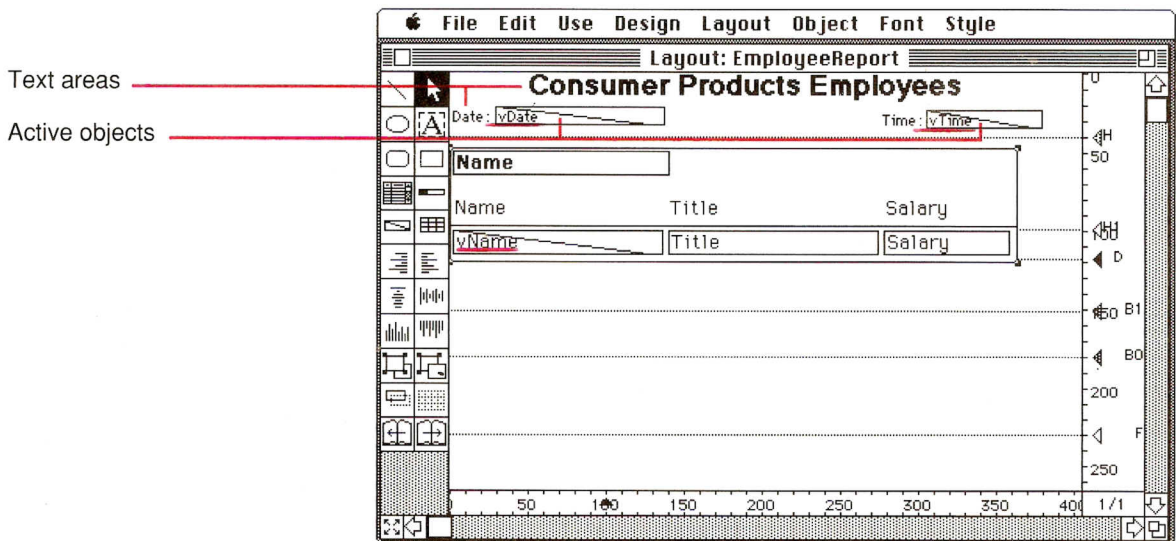


Figure 13-8
Elements added in the Header area

10. In the B1 Break area (between the Detail marker and the B1 Break marker), create an active object for the salary subtotal. Make the object the same size as the Salary field above it.

active

also format Salary

Name the object **vSalarySub**. See Figure 13-9 for placement. Make vSalarySub a nonenterable object, deselect “Only if modified,” and enter **\$#,###,###** as the numeric display format.

11. Click the Script button and enter the following script:

vSalarySub:=Subtotal(Salary)

The Subtotal routine instructs 4th DIMENSION to calculate the total for the current break. Because the object is located in the B1 Break area, the Subtotal routine will calculate a subtotal for each department. The portion of the script in parentheses is called the *argument* for the Subtotal routine. It instructs 4th DIMENSION to use the Salary field for the subtotals.

12. Create a text area to the left of the vSalarySub object.

An insertion point appears in the text area. Type the following label: **Total Salaries for**

Press the spacebar after typing the label.

While holding down the Shift and the Option keys, press and hold down the mouse button. *together*

A pop-up menu appears as shown in Figure 13-9.

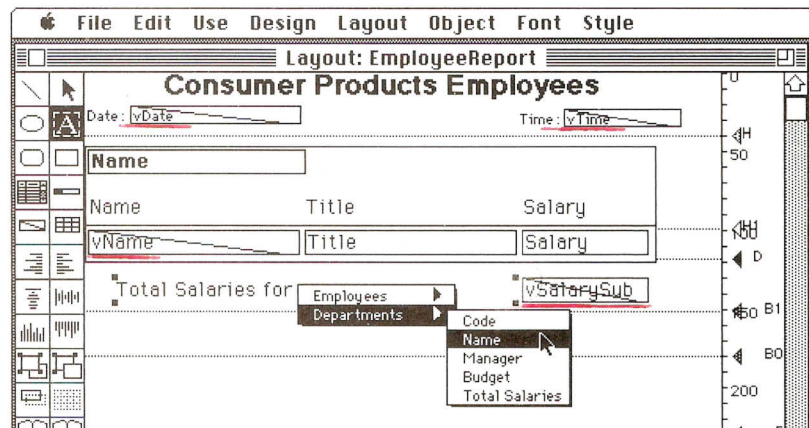


Figure 13-9

Field names pop-up menu

Choose the Name field in the [Departments] file from the pop-up menu.

4th DIMENSION appends the Name field to the text. The text area should now look like Figure 13-10.

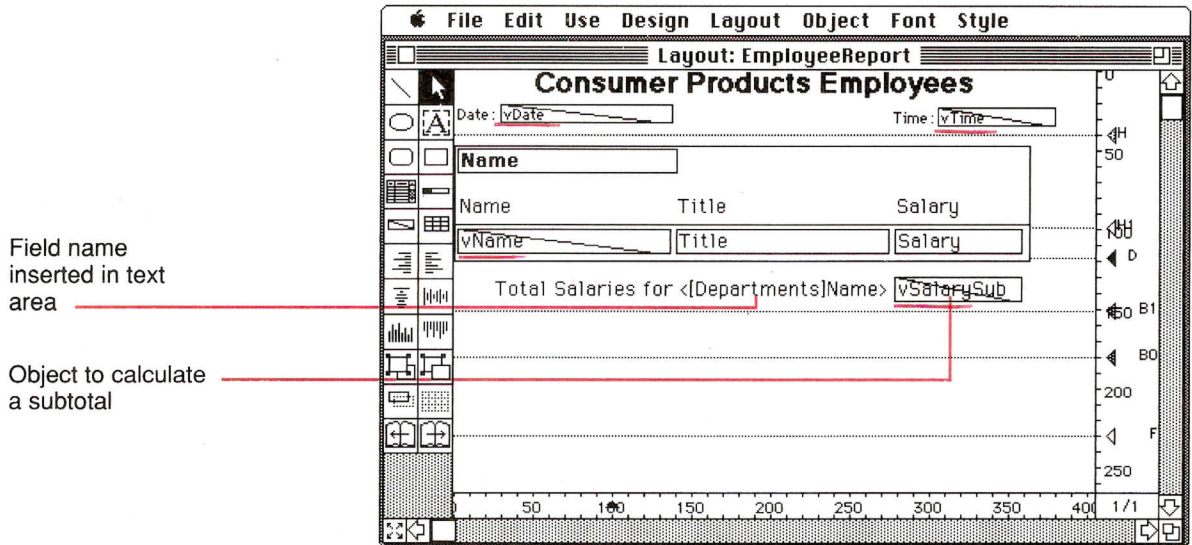


Figure 13-10
Elements added in the break area

When you print the report, 4th DIMENSION will insert the name of the department where the <[Departments]Name> phrase appears in the output layout.

Note: You can use this technique of embedding the values of fields in text areas in other kinds of reports. For example, you can create a mail-merge letter using one large text area. See Chapter 5 of the *4th DIMENSION Design Reference* for more information.

13. Choose 12 point and Right from the Style menu.

14. Now create an active object to calculate the total salaries, and add additional text to identify it. Place both elements in the B0 Break area. See Figure 13-11 for placement.

The active object, named `vSalaryTot`, can be created by duplicating `vSalarySub`, and then editing the name and the Script. The script to calculate the total is as follows:

`vSalaryTot:=Subtotal(Salary)`

The Subtotal routine instructs 4th DIMENSION to calculate the total for the current break. Because the object is located in the B0 Break area, the Subtotal routine will calculate the grand total for all records.

Object to calculate
grand total

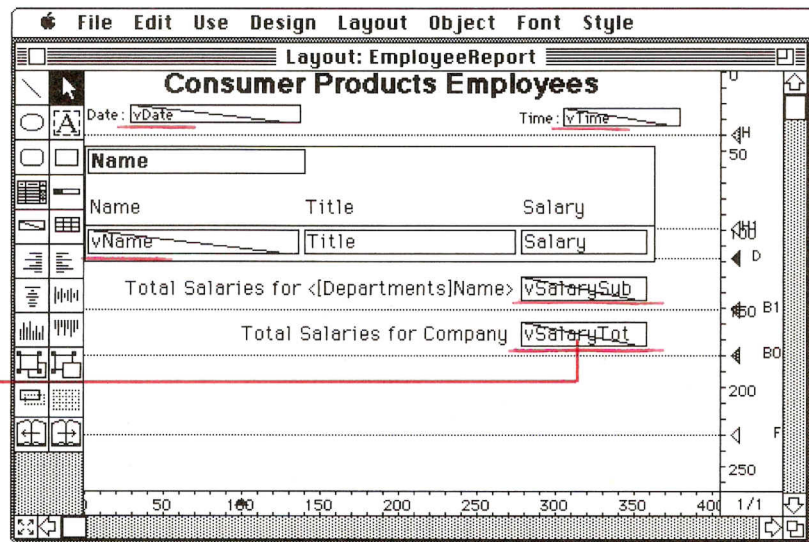


Figure 13-11

Placing text and an active object to calculate a total

15. In the left side of the Footer area (between the B0 Break marker and the Footer marker), create a text area and enter a running title:

Salaries by Department

This running title will print at the bottom of each page of the report.

16. On the right side, create a text area, and type: **Page:**
17. Create a Nonenterable active object to contain the page number. Name this object **vPage**; deselect “Only if modified.”
18. Click the Script button and enter the following script:

vPage:=Printing page

This script causes 4th DIMENSION to print the page number.

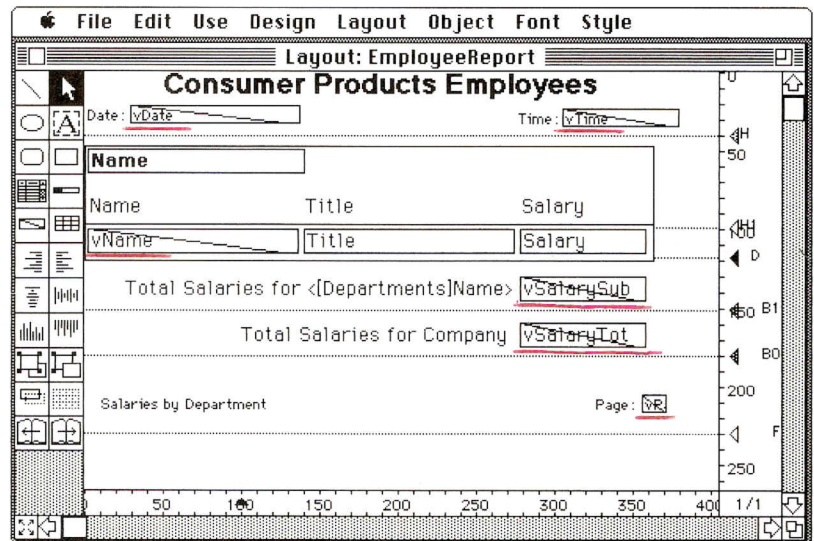


Figure 13-12
The completed report layout

Figure 13-12 shows the completed report layout. Make sure your layout looks similar to this layout before you continue.

Printing the Report

You have created the layout, objects, and scripts for your report, and now you can see the result.

1. Choose User from the Use menu.
2. Choose Sort from the Select menu and sort the records by [Departments] Name and [Employees] Last Name.

Use the cycle arrows to choose the [Departments] Name field.

You can sort the records in the [Employees] file by a field in the [Departments] file because the two files are related.

This sort order is required so that a break is generated after each department. 4th DIMENSION also requires at least one more sort level than break level. In this case, you are using two sort levels so that the names that appear within each department are in alphabetical order.

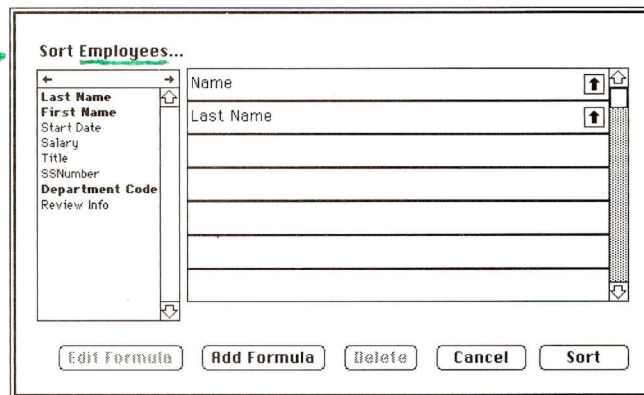


Figure 13-13
Sorting the records prior to printing

You are now ready to print your report.

3. Choose Print from the File menu.
4. Select EmployeeReport, the layout you just designed, from the list.
5. Click OK.

Two printer instruction dialog boxes appear, one after the other. If you have a printer connected to your computer, you can print your report. Click the "Preview on screen" ******* check box on the second dialog box to send your report to the screen instead.

6. Click OK.
7. Click the Zoom button to see the report close up.

Printing Employees		
Consumer Products Employees		
Date: 6/8/89		Time: 5:34 PM
Accounting		
Name	Title	Salary
Baldwin, Steve	Supervisor	\$43,990
Johnson, John	Clerk	\$18,250
Total Salaries for Accounting		\$62,240
Administration		
Name	Title	Salary
Hanson, Dennis	Manager	\$40,520
Praff, Bryan	Secretary	\$26,440
Smith, Mary	Engineer	\$26,500
Tercou, Don	Clerk	\$16,190

Figure 13-14
Seeing the report printing to the screen

You have created a working report. The scripts perform the necessary calculations for subtotals and totals. They display the proper department name for each subtotal as well as the date, time, and page number of the report. You can view the third page of the report to see that the text for the grand total is also correct.

The Next Step

You have created a report layout and printed a report with it. In Part V you will use this layout for a report in a runtime application.

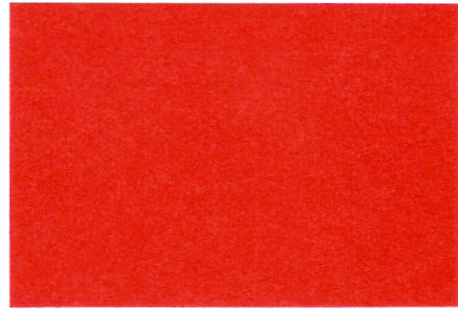
In Chapter 15 you will create a global procedure that automatically carries out the manual actions you performed in this chapter (sorting the records, choosing the layout to use for printing, and so on). You will then link the procedure to a menu item. You can use this menu item in the runtime application, and you can also execute the command to print this report from the User environment.

The option of
No "Printing to Screen"
Not available.

Yes "Preview on Screen" ***
a check on Report Layout
before sending Report
to Printer.

Design Reference
"Screen Display"
Page 197

CREATING CUSTOM MENUS



CREATING CUSTOM MENUS

CREATING CUSTOM MENUS

Database: Personnel 14

Estimated time to complete: 15 minutes

You can create your own Macintosh applications, called runtime applications, using 4th DIMENSION. You work with a *runtime application* in the Runtime environment, or as a stand-alone application using a special Runtime version of 4th DIMENSION.

A runtime application uses many elements you are already familiar with: fields, choice lists, objects, scripts, formats, procedures, layouts, and so forth. To create a runtime application, you combine these elements with custom menus.

In this chapter you will learn how to

- create custom menus
- add a unique graphic background to an application

Runtime Applications

A runtime application is an extension of a database. With a runtime application, you create the files, fields, and layouts you need. Then you package the database with customized menus and procedures that control the program. You use input layouts for the user to enter data, output layouts to display data, and reports for printing data.

Menu commands and procedures allow the user to perform operations you provide, such as searching, sorting, and graphing. Your procedures can use the same editors used in the User environment. You can use the 4th DIMENSION Sort editor, Search editor, Search by Layout, Quick Report, Graph editor, Label editor, and so on. Or you can have more functions than the User environment offers. You can add special search dialog boxes that perform exactly the search you want with just a click. Or you can call a particular sort from a menu for a sort you do frequently.

You can make a simple program. If you want a program that accepts information and stores it in records, you can create an application that does only that. If you want a program that accepts information and prints a daily report, you can have that.

Or you can make a multi-function program that includes the features you have already worked with: data validation, mailing labels, sorting, searching, and so on. You can create an application that includes several different reports; the ability to add, modify, and delete information; and output to desktop publishing programs.

If you have a multi-user setup (a server with several Macintosh computers hooked up to it), you can create a program that users in different departments each use with different access privileges. The manager of the accounting department might be able to display information from any file in the database, while an order entry clerk might be able to see and use only one layout in a single file.

And remember that you can create programs that take advantage of the whole range of Macintosh interface features—different windows, custom dialog boxes, and so on.

Creating Custom Menus

4th DIMENSION allows you to create custom menus to operate your runtime application.



Figure 14-1
A custom menubar with menus and menu items

A *menu bar* is one set of menus. You can have several menu bars for your application, each with different menus. Each menu bar can have as many menus as can fit across a screen. Each menu can have as many items (commands) on it as there is room for in a screen.

Each menu item calls a procedure to carry out the command. In this chapter you will create menus and menu items. In the next chapter you will create the procedures for two of the menu items you create in this chapter.

For this tutorial example, you will create the menus for a runtime application based on the database you have been working with in previous chapters. This application performs information tracking for your employees. It includes reports that you provide for your company each month and each quarter.

Suppose you decide that your personnel application needs the following menus and menu items:

File	Departments	Employees	Reports
Quit	Add Department	Add Employee	Monthly
	Modify Department	Modify Employee	Quarterly
	Remove Department	Remove Employee	

Getting to the Menu Editor

To create these menu titles and items you use 4th DIMENSION's Menu editor.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 14 database.

Personnel 14 opens in the Design environment.

2. Choose Menu from the Design menu.

4th DIMENSION displays the Menu Bars dialog box.

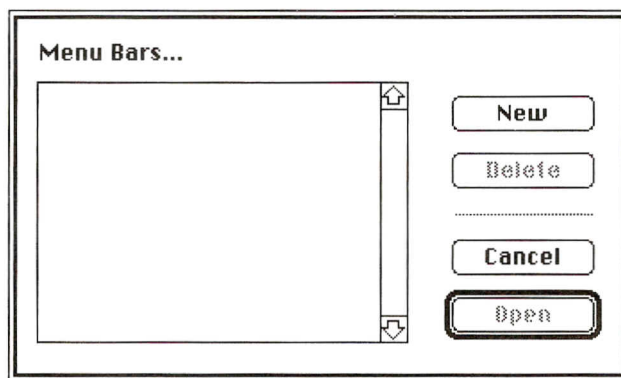


Figure 14-2
The Menu Bars dialog box

This dialog box will eventually list all the menu bars you create for this database. You can then select the one you want to modify. Because this is your first custom menu, the menu bar display area is blank.

3. Click New.

4th DIMENSION displays the Menu editor, titled Menu Bar #1. You cannot change this name.

On every menu bar, 4th DIMENSION automatically enters the File menu as the first menu. It contains one menu item, the Quit command.

4. Select the File menu title.

As you can see, the Menu editor displays the items in the selected menu. In this case, there is only one item, Quit, and there is no procedure. The absence of a procedure is the way to tell 4th DIMENSION to quit the application.

QUIT

It is always a good idea to leave the Quit command on the File menu because that is where Macintosh users expect it to appear.

5. Pull down the File menu on the far right side of the screen.



Figure 14-3
Viewing the File menu

The menu preview shows the order and style of the menu items on the selected menu. In this case, there is only one item, Quit. Later you will preview the menus you create.

Entering Menu Titles and Items

You create the menus you want by entering the menu titles in the Menus column in the order you want them to appear. Then you enter the items for each menu in the Items column. For each menu item (except Quit), you enter a procedure name in the Procedures column. If you don't enter a procedure name, 4th DIMENSION will quit the application when that menu item is chosen.

The menu titles you create appear across the top of the screen in your application. 4th DIMENSION automatically shows the Apple and Edit menus.

1. Choose Append Menu from the Menu menu.

A blank box containing the insertion point appears in the Menus column.

2. Type **Departments**.

This is the first of your custom menu titles. You will enter the items for this menu later.

3. Double-click in the Menus column just below the Departments menu title.

Double-clicking creates another menu title box, just as if you had chosen Append Menu again.

4. Type **Employees**.

5. Double-click below this menu title to create another blank menu title box.

6. Type **Reports** and this time press Return.

Pressing Return also creates a blank menu title box.

Now you have finished entering your custom menu titles. You can go on to enter the items for each title and the procedure name for each item.

7. Select the Employees menu title.

Use the scroll bar to move this menu title into view, if necessary, before selecting it.

8. Choose Append Item from the Menu menu.

A blank item box appears in the Items column and a blank procedure box appears in the Procedures column.

The screenshot shows a dialog box titled "Menu Bar #1". It has three main columns: "Menus", "Items", and "Procedures". The "Menus" column contains a list of menu titles: "File", "Departments", "Employees", and "Reports". The "Items" and "Procedures" columns are currently empty. Below the columns, there are several options: "Keyboard:" with a checkbox, "Line" with a checkbox, "Enabled" with a checked checkbox, "Bold" with a checkbox, "Italic" with a checkbox, "Underline" with a checkbox, "Outline" with a checkbox, and "Shadow" with a checkbox. At the bottom, there is a "Password:" field with the text "All Groups" entered. The dialog box has standard window controls (minimize, maximize, close) in the top right corner.

Figure 14-4
Appending an item

4th DIMENSION always adds both these boxes at the same time because each menu item must have a procedure entered in the Procedures column.

9. Type Add Employee in the item box and press Return.

The insertion point moves to the procedure box.

10. Type Add Empl and press Return.

Add Empl is the name you will give the procedure to add an employee record to the database.

Another item box and procedure box are added on the next line.

You get the idea. You type in the menu item as you want it to appear and then enter a procedure name for each one. You can use any procedure name you want.

11. Complete the menu bar. To prepare for the next tutorial, add the following menu items and procedures:

Title	Item	Procedure
Departments	Add Department	Add Dept
	Modify Department	Mod Dept
	Remove Department	Remove Dept
Employees	Add Employee	Add Empl
	Modify Employee	Mod Empl
	Remove Employee	Remove Empl
Reports	Monthly	Monthly Rep
	Quarterly	Quarter Rep

When you have finished, the menus look like this:

Menus	Items	Procedures
File	Add Department	Add Dept
Departments	Modify Department	Mod Dept
Employees	Remove Department	Remove Dept
Reports		

Menus	Items	Procedures
File	Add Employee	Add Empl
Departments	Modify Employee	Mod Empl
Employees	Remove Employee	Remove Empl
Reports		

Menus	Items	Procedures
File	Monthly	Monthly Rep
Departments	Quarterly	Quarter Rep
Employees		
Reports		

Figure 14-5
Completed menus

Changing the Style and Adding a Shortcut

On the lower half of the Menu editor window are commands to change the look and function of each menu item. The users of this application will most often choose Add Employees. You can provide a visual emphasis for the menu item and add a keystroke to activate the command as well.

1. Select the Add Employee menu item.
2. Click the Underline check box.

The menu will display Add Employee with an underline.



Note: Underlining is shown here for demonstration only. Apple's Human Interface Guidelines suggest that you should retain the basic Macintosh typeface in menus. You should reserve font and style changes in menus for those menu items that result in font and style changes in the application.

3. Select the Keyboard check box.

You want this menu command to be accessed by a keystroke as well as by choosing the item from the menu. You want the keystroke to be Command-N.

4. Select the Keyboard entry box and type N.

4th DIMENSION will automatically insert the command character.

5. Preview the menu display by pulling down the menu preview on the far right of the menu bar.



Figure 14-6
Previewing the modified menu

You have now made it possible to use the Command-N keystroke combination to start the process that adds an employee record to the database.

Note that there are two additional check boxes on the bottom of the Menu editor, *Enabled* and *Line*. Menu items are automatically enabled when you enter them in the Items panel. If you want to disable a menu item, click the Enabled check box to turn it off. It remains disabled until you click Enabled again. A disabled menu item appears gray in the menu.

You can enter a line between menu items by clicking the Line check box. This effectively separates menu items into groups of commands for the convenience of the user, as on the standard Macintosh Edit menu.

Previewing the Menus and Adding a Graphic

You use 4th DIMENSION's Menu editor to preview your menu bar and to paste a picture to use with it.

1. Choose Show Custom Menus from the Menu menu.
4th DIMENSION displays the menu bar you have just designed.
2. Pull down the Employees menu that you have just created.

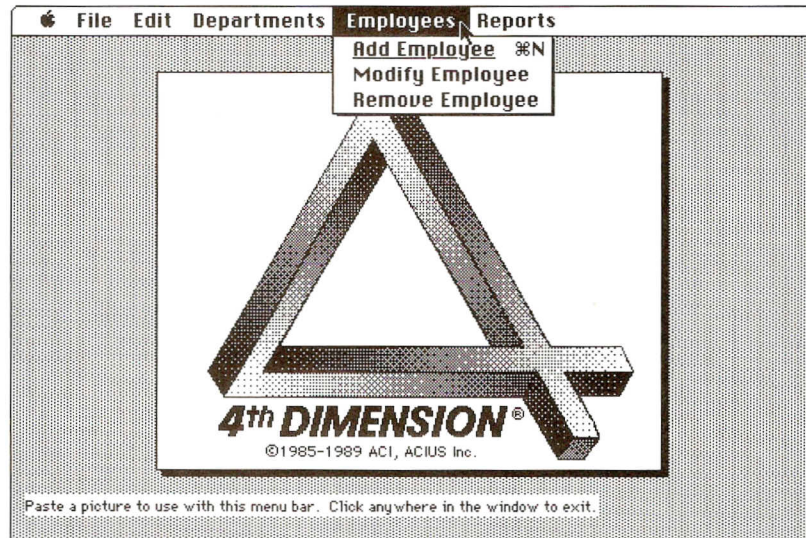


Figure 14-7
Previewing the custom menus

Choosing a menu command from this screen does not activate the command (and it wouldn't activate it even if you had already written the procedure). You must be in the Runtime environment to start a command from a custom menu.

If you have a picture in your Clipboard, you can paste it here. If you do so, each time this menu bar is shown, the picture will be displayed also.

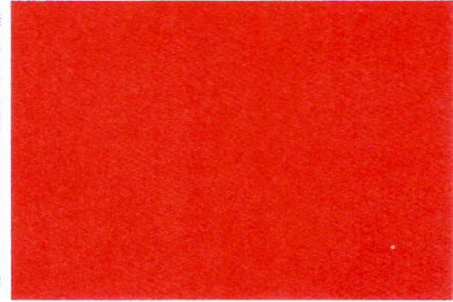
Use this feature of 4th DIMENSION to personalize your database applications with designs, patterns, and pictures that suit the company, person, or department that will be using the application.

3. Click anywhere in the screen below the menu bar to return to the Menu editor.
4. Click the close box to close the Menu editor and return to the Structure window.

The Next Step

In this chapter you have seen how to create and preview a customized set of menus and menu items for use in the Runtime environment. Go on to the next chapter to see how to create the global procedures that are called by these menu commands.

It does not matter in what order you create the custom menus and the procedures they use. You can write the procedures first or create the menus first. In the case of the Add Employee, Monthly, and the other menu items in this chapter, you created the menu items before the procedures. You now need to give the correct name to each procedure when you write it. You can keep the Menu editor window open on the screen when you name the procedures, so that you can see which name you have used.



USING PROCEDURES WITH MENUS

USING PROCEDURES WITH MENUS

Database: Personnel 15

Estimated time to complete: 25 minutes

If you want to use the Runtime environment or the Runtime version of 4th DIMENSION, you need to create custom menus to add and modify records, search, sort, print, and so on. You write procedures that perform these functions.

4th DIMENSION provides a powerful procedural language that allows you to control every aspect of your application.

In this chapter you will create procedures to

- add a record
- print a report
- search records
- sort records

This tutorial is based on the menu structure you created in Chapter 14. You will write three of the procedures you specified in Chapter 14. After you write these procedures, three of the menu items you created in Chapter 14 will work.

Programming in 4th DIMENSION

A *program* is a series of statements that tell a computer what to do. In 4th Dimension, a series of statements is called a *procedure*. 4th DIMENSION's language provides over 200 commands for writing procedures for runtime applications.

4th DIMENSION's language is a high-level language; that is, one command in the language performs a series of actions within the computer. The ADD RECORD command, for example, automatically performs all the steps necessary to display an input layout and accepts the record when you click OK.

4th DIMENSION's language has many techniques in common with other programming languages, such as

Tests: Conditions that are evaluated so that the program knows what to do next.

Loops: Statements that require the program to repeat an action until a test is evaluated as true.

\$0, \$1

Parameters: Pieces of information given to a procedure so that it knows what to do or what to act upon.

Functions: Statements that result in a value (a number, date, time, or series of characters) that can be used by the program. A function is said to return a value.

Commands: Statements that instruct the program to do something. For example, ADD RECORD is a command.

4th DIMENSION functions and commands are called *routines*. The routines available in 4th DIMENSION appear in a list so that you can place them in a procedure by clicking.

A complete discussion of programming with 4th DIMENSION is beyond the scope of this book. Further information can be found in the *4th DIMENSION Language Reference*.

Creating a Global Procedure

You are now going to write the procedure to add an employee record to the database. This is the procedure you named *Add Empl* in the previous chapter.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 15 database.
2. Open the Procedure editor, and create a new global procedure called Add Empl.

If you need to review the beginning steps for creating a procedure, see Chapter 7, “Using Procedures.”

4th DIMENSION displays the Procedure editor in a window titled *Procedure: Add Empl*. You use the Procedure editor to write and edit procedures.

Procedure text
area

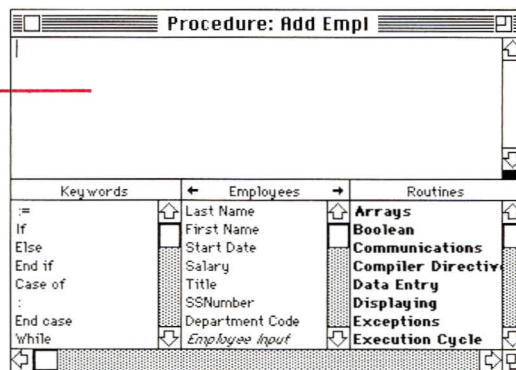


Figure 15-1
The Procedure editor

You can most easily learn how to write 4th DIMENSION procedures by carefully considering what the program needs to be able to work. Here are the most important points to keep in mind:

- A global procedure is executed from beginning to end, in strict order of the lines of the procedure. When the last statement has been executed, the procedure stops running.
- Since a database can have more than one file for records, you need to specify which file to add the record to.
- Since each file can have several layouts, you need to specify which layout to use.

To instruct 4th DIMENSION to add a new record, you will specify the [Employees] file and the Empl Input layout, and then you will use the ADD RECORD command.

You have already seen how 4th DIMENSION allows you to enter commands and other elements of a procedure by selecting them from the three panels on the bottom half of the Procedure editor (in Chapter 7, "Using Procedures"). You can select the filenames, field names, and layout names that appear in the center panel; the keywords that appear in the left panel; and the routines that appear in the right panel.

The following steps do not specify whether to select or type the elements of the procedure. You will quickly decide which method works best for you.

3. First type the following comment to identify the purpose of the procedure:

L28

'Adds a record to the Employees file

The leading accent mark indicates that this is a comment, not part of the instructions. The accent mark appears in different places on different keyboards. Don't confuse this accent mark with the apostrophe or backslash.

4. Press Return.

When you press Return, the comment is entered and automatically indented. The insertion point moves to the next line.

5. Define the file to use for this record by entering

L134

DEFAULT FILE([Employees])

The DEFAULT FILE command establishes a default file for the remainder of the procedure. The command is one of the routines listed in the Routines panel. Notice that when you add the filename after the command, you need to surround it with both parentheses and brackets. If you click the filename in the middle panel, 4th DIMENSION enters the brackets automatically.

If you should omit any necessary part of a command, 4th DIMENSION displays large dots on either side of the incorrect statement (see Figure 15-2). When you correct the statement and press Enter (or move the insertion point to a new line), the large dots are removed.

Large dots indicate incorrect statement. In this example, the parenthesis are missing

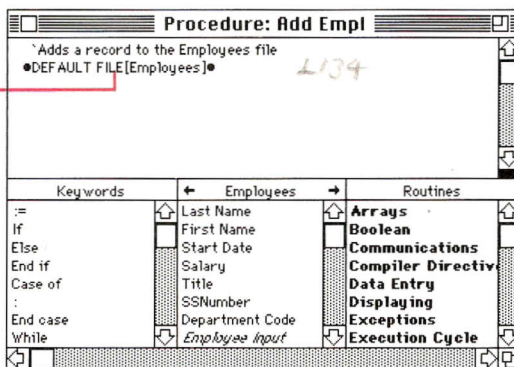


Figure 15-2
Large dots around an incorrect command

6. Define the input layout you want to use by entering

L137

INPUT LAYOUT("Employee Input")

Employee Input is the name you gave the input layout you designed in *Quick Start*. The layout names appear at the bottom of the list of fields in the file panel.

7. Now enter the command to add a record:

L141

ADD RECORD

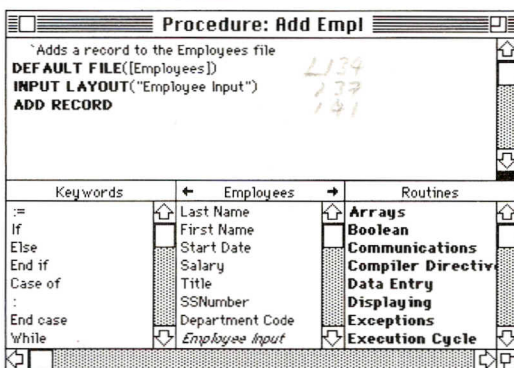


Figure 15-3
The completed *Add Empl* procedure

That's it. Now you can see how it works.

Seeing the Procedure in Action

Now that you have a procedure that can be called by a menu item, you can use the Runtime environment to see how it works.

1. Choose Runtime from the Use menu.

The menu bar you have created is displayed. If you pasted a graphic to this screen from the Menu editor, the screen displays it also.

2. Choose Add Employee from the Employees menu.

The input layout you specified in the procedure is displayed.

3. Type some practice information, and then click Enter.

The initial screen reappears. The record has been accepted just as if you had entered it in the User environment. Your procedure works fine.

However, there is still some work to do. Typically, you would be adding several records to the employee file at the same time. The way your application works now, it returns to the starting screen after you enter each record. You will see in the next section how to make the slight change that keeps the input screen active until you have finished.

4. Choose Quit from the File menu.

4th DIMENSION returns to the User environment. Quitting from the Runtime environment returns control to the User environment. The record you have entered is displayed.

5. Choose Design from the Use menu.

The windows you have been working with reappear, ready for you to make any necessary changes.

Modifying the Procedure

The *Add Empl* procedure you have written works fine for adding a record to the correct file. However, if you have three records to add, you have to choose the menu item three times. With a slight modification of the procedure, you can leave the input layout on the screen until you have finished entering as many records as you want.

This modification requires that you write a loop for the ADD RECORD command, making it active until you click Cancel. This loop is called the “Repeat...Until” loop. Essentially it requires 4th DIMENSION to repeat a series of commands until a test is satisfied. The following steps show you how to edit the procedure you have already written.

1. If necessary, click in the Procedure:Add Empl window to make it active.
2. Click just to the left of the ADD RECORD command to move the insertion point to that spot.

L120

3. Either type **Repeat** or select it from the list of Keywords on the lower left panel of the screen, and then press Return.

4th DIMENSION automatically indents the ADD RECORD command. The indentation means that the command has moved down one level and will be executed only under the control of the loop that will surround it.

4. Move the insertion point to the line below the ADD RECORD command.

You can either click the mouse button to move the insertion point or use the down arrow on your keyboard.

L120
L24

5. Enter **Until (OK=0)** and press Return.

This step completes the loop. The meaning of the loop you have inserted in the procedure is that 4th DIMENSION must repeat the ADD RECORD command when you click OK or press Enter while adding records. Not until you click Cancel will the ADD RECORD command stop repeating. Clicking Cancel sets the OK variable to 0 (zero).

The OK variable is a variable that 4th DIMENSION creates automatically. You use it in procedures to test whether a user has pressed the Cancel button.

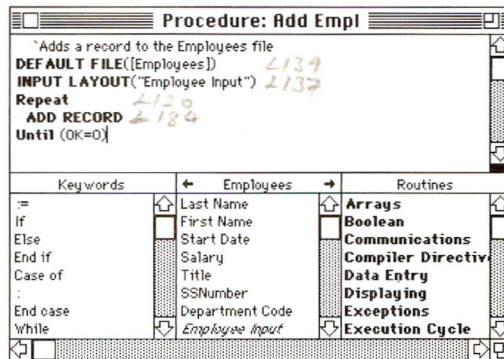


Figure 15-4
The revised *Add Empl* procedure

6. Now return to the Runtime environment to see the difference this loop makes to the task of entering records.

The input layout now remains displayed and ready to accept additional records until you click Cancel (OK=0).

Using the Search Editor in an Application

You have several more procedures to write before your application is finished. In this section you will see how to bring the Search editor from the User environment into your own application. You will use the Search editor as part of the *Mod Empl* procedure.

The steps described here show you how to create a procedure that

- displays the Search editor to create a selection of records
 - displays the selection as a list from which you can select the records to modify
1. Return to the Design environment and create a global procedure called *Mod Empl*.

The steps for creating a procedure are explained earlier in this chapter. *Mod Empl* is the procedure name you entered for the Modify Employee menu item in the previous chapter.

- Indicate the file and input layout to use by entering the following:

DEFAULT FILE ([Employees])

L134

INPUT LAYOUT("Employee Input")

L137

Now you want to instruct 4th DIMENSION to use its own Search editor.

- Enter the following:

SEARCH

L194

The SEARCH command, without any argument, displays the Search editor. 4th DIMENSION will use the search conditions you enter to create a selection of records.

- Instruct 4th DIMENSION to display the selection of records and prepare to modify those selected by entering the following:

MODIFY SELECTION

L143

This command allows you to modify the records in the selection. To display a record in the input layout, the user simply double-clicks on the record that needs to be modified.

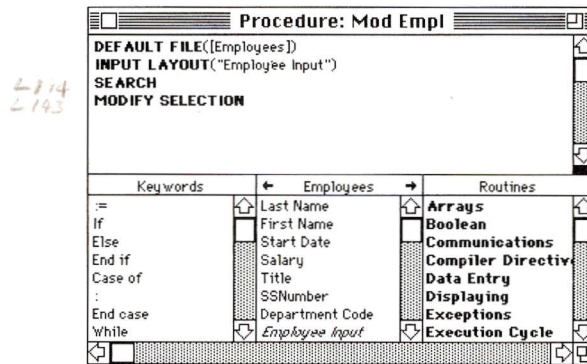


Figure 15-5
The completed *Mod Empl* procedure

5. Now return to the Runtime environment to see how this menu command works.

When you choose Modify Employee from the Employee menu, the Search editor is displayed. You use the Search editor just as you used it in the User environment. After you enter the conditions to isolate the records you want to modify and click OK, 4th DIMENSION displays the selection of records.

Creating the Report Procedure

In this section you will see how to write a procedure that sorts the records and then prints them for a monthly report. You will use the report layout you designed in Chapter 13.

1. Return to the Design environment and create a global procedure called Monthly Rep.

The steps for creating a procedure are explained earlier in this chapter. Monthly Rep is the procedure name you entered for the Monthly menu item in the Chapter 14.

2. Indicate the file and report layout to use by entering the following:

DEFAULT FILE ([Employees])

OUTPUT LAYOUT("EmployeeReport")

3. Enter **ALL RECORDS** to make the selection include all the records in the database.
4. Sort the records by entering the following:

**SORT SELECTION([Employees];[Departments]Name;>;
[Employees]Last Name;>)**

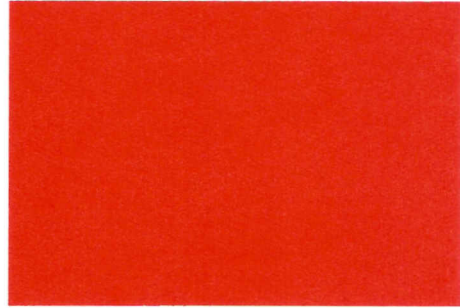
The SORT SELECTION command is very powerful in 4th DIMENSION. It can be used to sort a selection based on fields you specify in the command, to sort based on variables you enter in a custom dialog box, and in many other ways. Here, you have instructed 4th DIMENSION to sort the records in the [Employees] file according to the department name in the [Departments] file and then by Last Name. Note that you first specify the names of the file you want to sort, and then you specify the filename for each sort field. The greater-than sign (>) instructs 4th DIMENSION to perform an ascending sort.

The Next Step

You need to write a global procedure for each menu item you use in your runtime application. With 4th DIMENSION's procedural language, you can create programs of great power and flexibility that allow you to control the processing of your information.

This chapter has been merely an introduction to one of the most powerful features of 4th DIMENSION. For complete information about all the commands available, see the *4th DIMENSION Language Reference*.

USING THE PASSWORD ACCESS SYSTEM



USING THE PASSWORD ACCESS SYSTEM



USING THE PASSWORD ACCESS SYSTEM

Database: Personnel 16

Estimated time to complete: 10 minutes

When you create a database that will be used by more than one person, you may need to set up a password access system to limit access to data. An access system requires each person who uses an application to have a password, and controls what functions the person can perform.

For example, you may hire a temporary employee to enter some information into your database. You can easily provide that person access to enter or modify records, but reserve other functions for only those employees who need to use them.

In this chapter you will learn how to

- use 4th DIMENSION's Password Access editor
- set up an access system with passwords for your personnel application

Users and Groups

The access system provided by 4th DIMENSION is based on the concept of users and groups. Users are assigned to groups, and groups are given access rights to different parts of a database.

You create user names and passwords for as many users as you want. 4th DIMENSION begins with two users who are given special access powers:

Designer: The person who has access to everything in all environments—Design, User, and Runtime. The Designer can create and delete groups, assign and change group access privileges, and reassign users to different groups.

Administrator: The person responsible for overseeing the application on a daily basis. The administrator can add and delete users and assign them to groups.

Groups can contain any number of users (and, in fact, can contain other groups). The groups determine who has access to a particular file, procedure, layout, or menu. Records in each file can be loaded, saved, added, or deleted depending on which group is given access to each function.



Figure 16-1
Access privileges are part of the File Attributes

As you can see in the dialog box in Figure 16-1, all groups have the right to load records in this file, but only users who belong to the Personnel group can save or add records, and only users who belong to the Executive group can delete records. This system of differing access privileges allows the records to be seen by everyone with a password, but ensures that the records are changed only by the appropriate people.

You maintain the access system by adding new users to the proper groups, deleting users who no longer need to be in a particular group, and by creating new groups for special purposes.

Adding Users and Groups

You know that there are four likely users for your application—yourself, the head of the personnel department, his secretary, and possible temporary workers. You need to enter them as users and assign a password. Then you need to group them in appropriate groups and assign the groups to the correct menu choices.

1. If you have not done so already, start 4th DIMENSION and open the Personnel 16 database.

Personnel 16 starts in the Design environment.

2. Choose Passwords from the Design menu.

4th DIMENSION displays the Password Access editor.

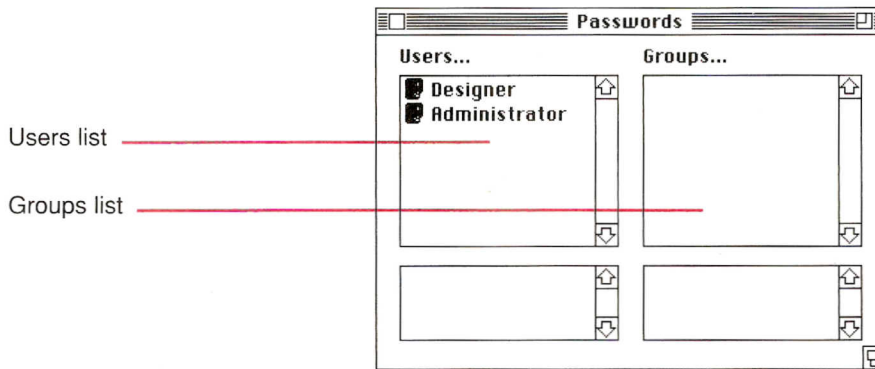


Figure 16-2
The Password Access editor

The Password Access editor shows two sets of boxes. The Users box displays the list of users. Currently it contains Designer and Administrator; later it will also display the users you create. The groups a selected user belongs to are displayed in the box below the Users box. The Groups box displays the list of groups you create, and the names of users that belong to a selected group are displayed in the box below the Groups box.

3. Choose New User from the Passwords menu. 4th DIMENSION displays the Edit User dialog box. You fill out one such dialog box for each user you add to the system.

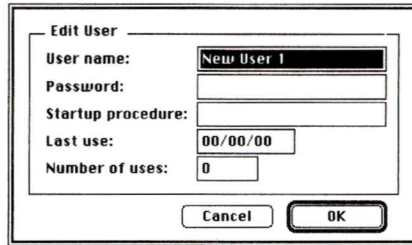


Figure 16-3
The Edit User dialog box

You can enter and edit user names, passwords, and a startup procedure in the Edit User dialog box. 4th DIMENSION keeps track of the date of last use and the number of uses of a particular password.

4. Enter David as the User name, and HawK as the Password.

As a double-check, you capitalize two letters of the password. 4th DIMENSION's access system is case-sensitive. David (the head of the personnel department) will have to capitalize both the first and last letters when he enters his password.

You don't plan to use a startup procedure for this user, so you leave the "Startup procedure" box blank. A startup procedure runs when a user starts 4th DIMENSION. Leaving this box blank allows David to use the User environment as well as the Runtime environment.

5. Click OK.

4th DIMENSION closes the Edit User dialog box and adds David to the list of users.

6. Add the following users and passwords to the list:

User name: Helen

User name: Temporary

Password: Gos6h

Password: Temp

Notice that the password for Helen, the personnel department secretary, has a number entered in the word.

This is another way to ensure password security. The password for the temporary worker is simple, easy to remember, and appropriate. If necessary, you can change it.

You don't need a user name for yourself, since you plan to use the Designer name.

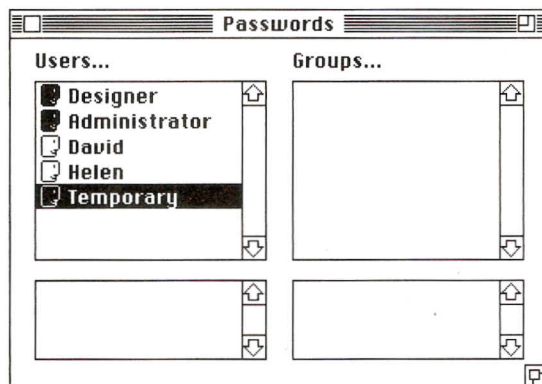


Figure 16-4
The completed list of users

7. Choose New Group from the Passwords menu.

You are now going to create the groups you want to use.

4th DIMENSION displays the Edit Group dialog box.



Figure 16-5
The Edit Group dialog box

4th DIMENSION allows you to name the group and to choose a group owner from among the users already created. The group owner can add and delete users from the group. Normally you leave the Administrator as the group owner.

8. Enter General as the group name, and leave the "Group owner" box alone.

This is the group that will contain all users.

9. Click OK.

General is added to the list of groups.

10. Create two more groups with the following names:

Special

Manager

Your completed list of users and groups looks like this:

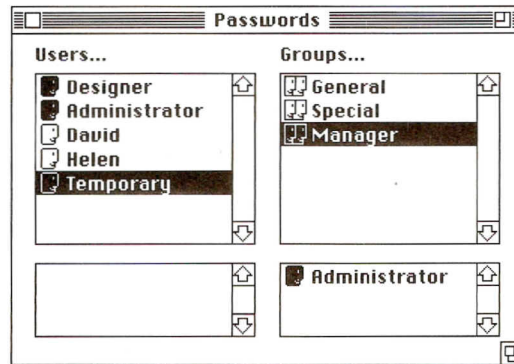


Figure 16-6
The users and groups

You are now ready to assign users to various groups.

Placing Users Into Groups

You place users into groups by dragging their names from the Users list to a group in the Groups list. Once the name is in a group, it appears in the lower group members list.

You are going to place all users in the General group, David and Helen in the Special group, and David in the Manager group. You don't need to place Designer in a group, since the Designer has access to everything.

1. Select David from the Users list, and drag it to the General group.

When you release the mouse button, David appears in the list of group members.

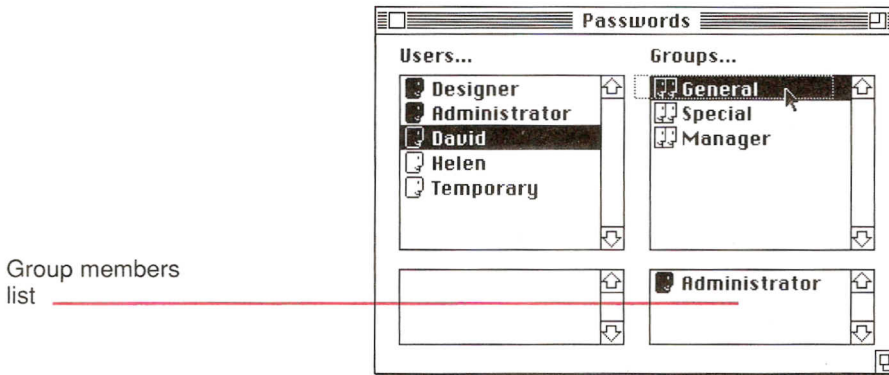


Figure 16-7
Dragging a user name to place it into a group

2. Place Helen and Temporary in the General group.
These names are added to the group members list.
3. Place David and Helen in the Special group.
4. Place David in the Manager group.

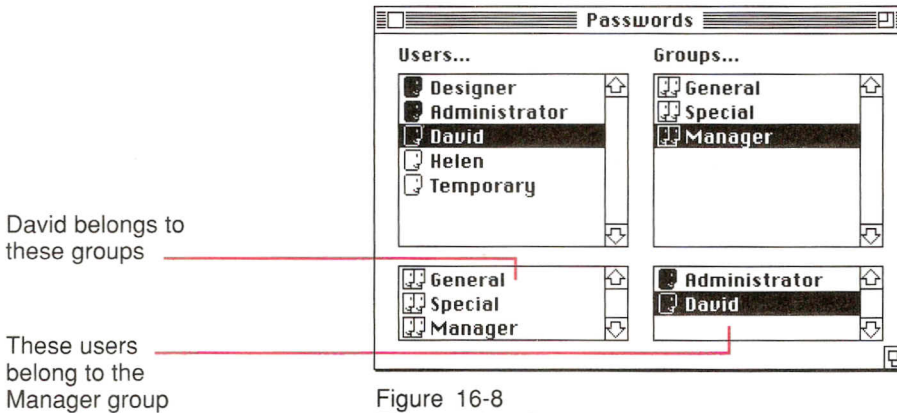


Figure 16-8
The completed access setup

If you accidentally add a user to the wrong group, simply select the user name in the Group list and drag it back to the same name in the Users list.

Assigning Groups

You have now created the user names you need and assigned the users to groups. Now you need to assign the groups to different portions of the application. This step will complete the installation of your access system.

You have named the groups so that you know who is in each group. You need to assign the Manager group to those portions of your application that you want only the head of the personnel department to be able to use.

1. Open the Menu editor to show Menu Bar #1 which contains the menus for your application.

These are the menus you created in Chapter 14.

2. Select the Reports menu, and then select the Monthly menu item.

Selecting a menu item activates the Password pop-up menu. Currently it contains the All Groups designation.

3. Choose Manager from the Password pop-up menu.

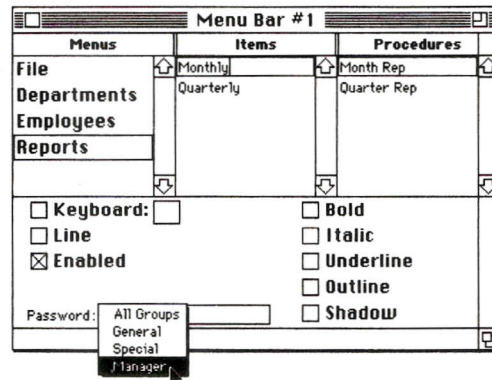


Figure 16-9
Choosing from the Password pop-up menu

The Manager group now has access to the Monthly menu item. Only David will be able to use this menu command.

4. Assign Manager to the Quarterly menu item.

Remember to select the Quarterly menu item, then choose Manager from the Password pop-up menu.

5. In a similar way, assign the following groups and menu items:

Department	Add Department	Special
	Modify Department	Special
	Remove Department	Manager
Employees	Add Employee	General
	Modify Employee	General
	Remove Employee	Special

When your application is used in the future, only those users belonging to these groups will be able to use the assigned functions.

6. Close Menu Bar #1

Seeing the System in Action

There is actually one more preliminary step to establish the access system for your application. This step is the key to the whole system:

You must give the Designer a password to initiate the access system.

When the Designer has a password, the system takes effect. Not before. (To disable the access system, simply remove the password from the Designer.)

1. Select Designer from the Users list.
2. Choose Edit User from the Password menu.

The Edit User dialog box is displayed.

3. Give the Designer the following password:

ToddAndDate

Or make up one of your own. Be sure it is a password you can remember, or write it down. Otherwise you won't be able to get back into this database.

4. Click OK.

Giving the Designer a password activates the access system. You can now proceed to test the system.

Quicker,
OR Open Database...
+ then File Menu

4. Choose Quit from the File menu.

You must quit from 4th DIMENSION because the access system takes effect on startup.

5. Double-click the Personnel 16 database icon to start 4th DIMENSION again.

This time, after the initial screen, 4th DIMENSION displays the “Enter password” dialog box:

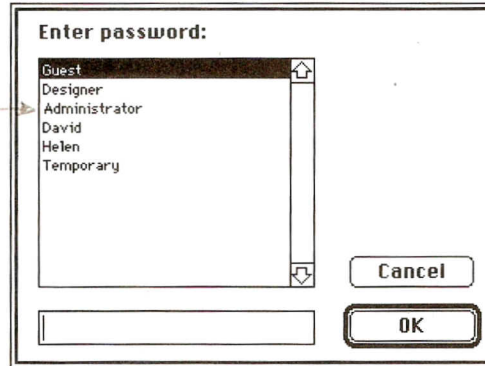


Figure 16-10
The “Enter password” dialog box

The panel contains all the user names you have created, Designer, Administrator, and one other, Guest. The Guest selection is available to be used by anyone. It does not require a password. A person who enters the application as a guest can use any function that has All Groups assigned to it.

6. Select Helen and type her password.

(Her password is the word “Gosh” with a 6 before the h (Gos6h). Remember that the password is case-sensitive. You must use a capital G.)

As you type the password, 4th DIMENSION displays icons instead of characters. The icons are displayed instead of the characters so that no one can read your password when you type it.

7. Click OK.

4th DIMENSION opens in the User Environment. You could create a Startup procedure to make the database open directly in the Runtime environment.

Administrator
Not assigned a Password
so
Database can be
entered via Admin,
by anyone.

{ Designer } Use
{ User } Menu
{ Runtime }

8. Switch to runtime and choose several menu items.

The items that have been assigned to the General and Special groups can be used at this time, since Helen belongs to these groups. The items that have been assigned to the Manager group cannot be used.

9. Choose Quit and start up 4th DIMENSION again, this time entering as the Designer.

The Designer's password is **ToddAndDate**.

This time 4th DIMENSION opens in the Design environment. You can use your application by changing to the Runtime environment. Entering as the Administrator, by the way, starts in the User environment.

Feel free to play around with the access system, creating new user names and passwords, adding groups, assigning them to different parts of the system. You can even write startup procedures [such as ALERT("Hello there Phil! Welcome to my wonderful personnel application!")] to be run at the beginning of a user's session.

The Next Step

The 4th DIMENSION access system is very flexible, yet it is extremely simple. Once you have created a few user names and groups, the idea of how to protect different parts of your program is obvious.

Using this system, you can provide complete security for your application and for your information. You probably noticed that you can protect your information even if you don't create a runtime application. Simply assign Designer a password, and no one can open your database without knowing the password.

See the *4th DIMENSION Design Reference* for complete directions for changing passwords, restrictions, and so forth.

By the way, if you have worked through all the chapters in this book, congratulations. Have fun with 4th DIMENSION!

OR
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