Includes ready-to-use models for tax planning, portfolio analysis, client billing, and checkbook balancing!

# REFLEX FOR THE MAC™


***Relational database that makes the most of your Mac's visual talents. Lets you draw on-screen lines to interconnect databases. Gives you a simple spreadsheet-style series of cross-references. Simple but sophisticated. Easy to use. Acclaimed by the critics.***

**BORLAND**
INTERNATIONAL

# REFLEX FOR THE MAC™

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# REFLEX
## FOR THE MAC™

*VERSION 1.0*


4585 SCOTTS VALLEY DRIVE
SCOTTS VALLEY, CALIFORNIA 95066

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# INTRODUCTION

This manual introduces you to Reflex for the Mac, a powerful new product that merges the power of relational database technology with the calculation capability of a spreadsheet.

Some key features of Reflex are:

**Simplicity of database design.** Reflex databases are designed in much the same manner one would use MacDraw to create an image. Instead of sketching a database design on paper and then having to type in a long list of definitions, you can now draw your database directly on the Macintosh screen. As a result, it is possible to create complex databases literally in minutes rather than days.

**Simplicity of report design.** Most database systems only provide limited reporting facilities. Reflex offers a very flexible "what you see is what you get" report and data entry form layout capability. All Macintosh supported fonts and graphics may be used. Both the Apple ImageWriter and LaserWriter are supported for output. At last, the user is in control of the total look of a report.

Reflex allows you to handle complex tasks such as "what if" tax modelling, client billing, cashflow management, and portfolio analysis without the need for programming. You will find a range of ready-to-go business solutions on the Examples disk supplied with this package so that you can start discovering the benefits of the Reflex concept right away.

## Using This Manual

This manual is divided into the four following sections:

**Section One: Single Files** will show you how to design, create, and modify single file databases. You will be introduced to some basic database design concepts as well as those features unique to Reflex. Reports will be produced on files that you create. Although Section One is written in tutorial fashion (and it is therefore assumed that users will read its contents in the correct order), the abundant use of graphics taken from the Macintosh screen make it simple to follow the sequence of events at a glance.

**Section Two: Multiple Files** begins with a general discussion of multiple file design concepts and contains many pictorial explanations. The rest of Section Two is written in a tutorial fashion and takes the reader from creating a two-file database up to using and reporting on a quite sophisticated three-file Stocks database. Many actual graphics taken from the Macintosh screen are used.

**Section Three: Details & Techniques** will help you get the most out of Reflex. It is here that information on advanced techniques will be found. Topics include importing/exporting data, printing facilities (such as creating headers and footers), and database reorganization.

**Reflex Reference** contains a wide range of general information about Reflex features. It is here that you will find: a listing of all menus and descriptions of their options; a description of all Reflex functions and their syntax; and a list of Reflex error messages with descriptions of each.

## Obtaining Help

There are two ways in which to obtain help while using Reflex. You may select general Help information by selecting the Help option located in the  menu. Alternatively you may press the Shift and question mark ("?") keys to obtain a special Help cursor which will display relevant Help information for anything pointed to. More specific details on Reflex's Help facilities are given in Section Three: Details & Techniques.

## INSTALLING REFLEX

To use Reflex on the Macintosh you require:

> 512K of memory or Macintosh Plus

> The Reflex system disk.

> A second disk drive (a floppy drive or a hard disk) recommended.

> A printer (Reflex supports the Apple Imagewriter and LaserWriter for output).

## Getting Started

Before starting to work with Reflex you should make a copy of the Reflex system disk and the Examples disk. Store the originals away in a safe place and then use the copies for daily work.

**Copying the Reflex disks to standard floppies:**

> With the Macintosh on, insert the Reflex disk. Its icon will appear on the desktop.

> Insert a blank disk in the external drive and wait for its icon to appear. If the disk has never been formatted, a dialog will appear asking if you want to have the disk initialized. In this case, click on the button marked Initialize. Give the disk a name when you are asked to do so.

> Select the Reflex disk icon and drag its ghost image on top of the blank disk as shown below.


When the blank disk icon turns black let go of the ghost image. The Macintosh will now make a copy of the Reflex disk files on the blank disk.

> Follow the same procedure with another blank disk for the Reflex Examples disk.

**Installing Reflex on a Hard Disk:**

The procedure for installing Reflex on a hard disk is only slightly different to making a backup on a floppy disk.

> Start up the Macintosh and hard disk. Insert the Reflex disk and wait for its icon to appear on the desktop.

> Open the Reflex disk icon by double-clicking on it.

> Select every item (hold the Shift key down while you click on each icon) except the System Folder since you do not want to replace your current hard disk system files. Next, drag the selected file ghost images over to the hard disk icon. Let go of the ghost images and the files will be copied.

> Insert the Examples disk and copy the files it contains in the same manner.

## BACKING UP DATABASE FILES

There are some basic guidelines for saving databases so that you can keep your information as up-to-date and consistent as possible.

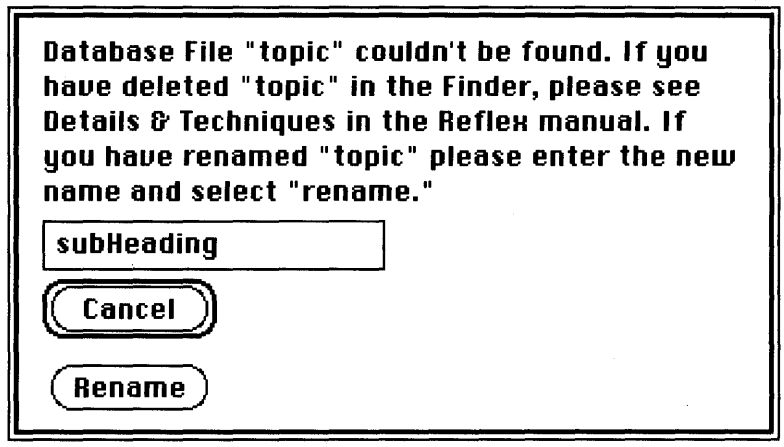
**Making backup copies of single or multiple file databases:**

> You may make copies of Reflex databases either from the Finder or by using the Save As option located in the Reflex File menu. For single files, there are no special considerations. However, for multiple file designs it is extremely important that you copy the complete set of files at one time. If you do not do this you may end up with inconsistent data in the files. The best approach is to keep related files together in one Folder and to copy that folder whenever you wish to make a backup.

> This will also ensure that your Reflex files will work well with the hierarchical filing system (HFS) by Apple for the Macintosh. With HFS, if individual files of a related set are located in more than one folder, Reflex will not be able to find them when you attempt to load the complete set of files or run a report that requires the information they contain. Your options are to keep related files in one folder; pre-open all the files that you will need; or Show the relevant file images in the Database Overview window.

> You may rename database files at the Finder level in the normal manner. For single files, there are no special considerations. For multiple file designs, if you delete or rename any files from a linked set Reflex will be able to find these files from within any related files.

If Reflex cannot find the linked file it requires, the dialog shown below will be displayed.




In the above example, Reflex could not find a file called "topic" which was part of a linked set . If the file had been renamed at the Finder level, simply entering the new name (subHeading) in the text box provided and clicking on the Rename button would have solved the problem. The situation is a little more complex when a file containing a Link or Links is deleted – refer to Section Three: Details & Techniques for more information on this subject.

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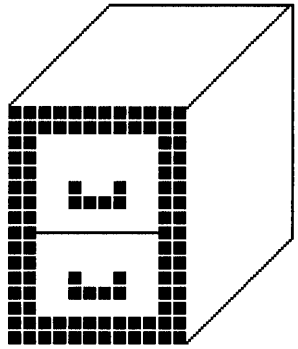
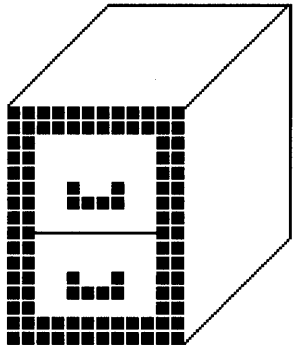
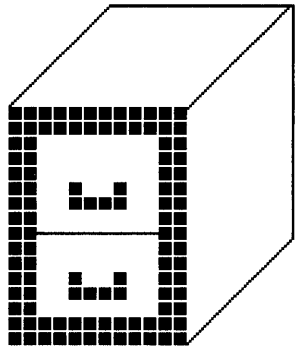
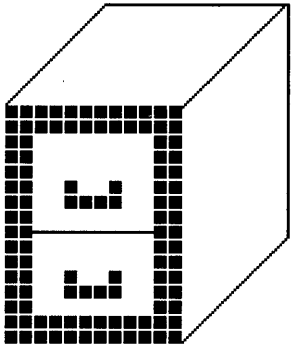
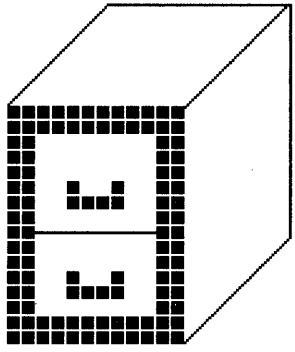
# Section One: Single Files

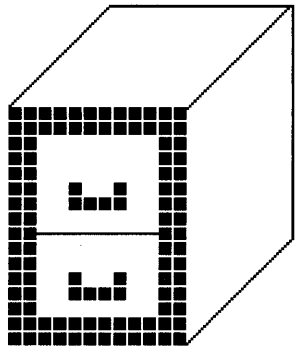












## Database Basics

Reflex provides you with serious and sophisticated database design and reporting capabilities whether you are storing the names of a few friends, managing a small office, or keeping track of the data within a large corporation. Probably the best way to learn about these capabilities is to start by building a simple database file.

In the first tutorial section you will build a file designed to store information on your friends' birthdays. While this may seem to be a rather simple application, it nevertheless allows you to put many of Reflex's powerful design and reporting features into action right away.

Once you have created the Birthday file and produced some simple reports on it, the final part of this section will show you how such a simple design can be upgraded into a more practical form — an employee record file.

If you are new to database programs you should pay special attention to the explanations and examples given in the first tutorial sections that follow. This will not only ensure that you understand the basic ideas of designing, building and using databases, but they will make you aware of any features special or unique to Reflex.

In its simplest form, a database will consist of a single file containing a number of records, which in turn contain a number of fields.

Let's stop right here and examine, from the bottom up, what we mean by **field, record** and **file.**

Consider the kind of information you will need for the birthday file we will create shortly. Below is a list of friends' names and their birthdays that are likely candidates for entry.

| FIRSTNAME | LASTNAME | BIRTHDATE |
|---|---|---|
| Frank | Smith | 8/6/59 |
| Mark | Johnson | 10/18/63 |
| Patricia | Roberts | 3/1/45 |
| Alice | Springfield | 9/6/51 |
| Roger | Davis | 4/11/48 |

**Fields**

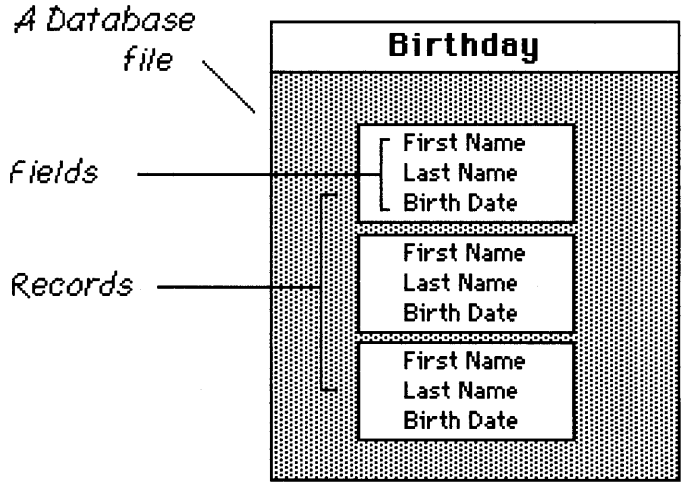
For each friend there are three distinct entries in the list: a First Name; a Last name; and a Birthdate. In database terms each of these entries is known as a **Field**. A field is the smallest unit of information that you can distinctly enter in a file.

We could, of course, add many more fields to the above list (such as home addresses and/or telephone numbers) if we wished, but let's leave it this way for now.

**Records**

Each row of the list (the combination of the First Name, Last Name and Birthdate fields for each friend) is known as a **Record**. A record must be unique in that no other row in the same file may contain exactly the same information (see the section on Key Fields below for relevant information on this topic).

Once you have one or more records, you store them on disk as a database **File**. In our example we will call our file "Birthday" and use it to store the information shown in the list.




**Key Fields**

Each record in a file must be given a **Key**. This is where one or more fields uniquely identify each record in a file. Choose the key field(s) carefully so that they make each record different from the others: choosing just firstname as the key would be inappropriate since it is possible that you know people with the same firstname.

Choosing a combination key consisting of the First Name and Last Name would be a much safer approach. You could arrange it so that all fields in a record are part of the key, but this does not necessarily ensure record uniqueness; it's much more efficient to use the minimum number of fields necessary.

**Searching A Database File**

Once you have entered data into a file you'll need to be able to search through it (there may be one or maybe hundreds of records) for useful information. Typically you will want to see only a few records in your file that meet some specific set of conditions (eg: Show me the names of all those friends that were born in 1945). Reflex provides an automated search facility, called **QueryBuild**, that helps you build an accurate database record qualification. You are also provided with a more versatile, free-form method of directly typing in record qualifications.

**Producing A Database Report**

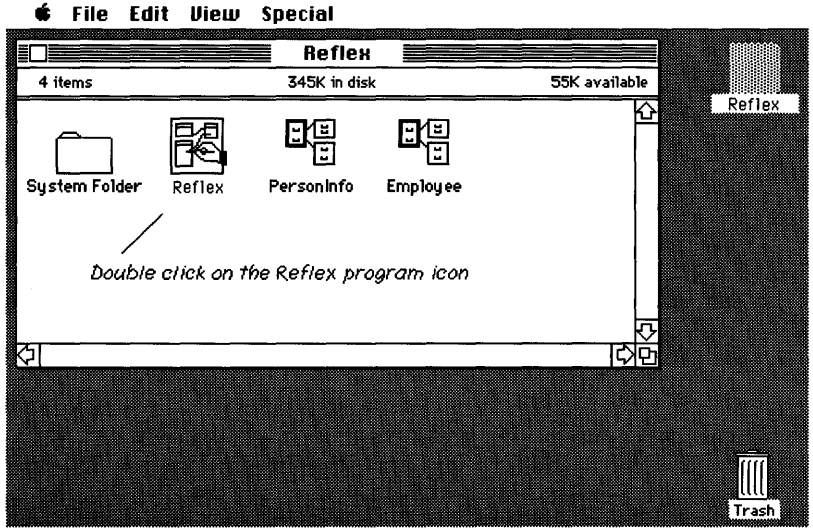
Once you've entered information into a file you can look at individual records on the Macintosh display, enter new records, or update those that already exist. However, all searches you carry out are temporary - the results of each viewing are not saved.

If you want to find some specific information in a file and then save the search specification you created for later use, or if you wish to perform more complex queries or calculations than that allowed by a database file search, you would use a **Report**.

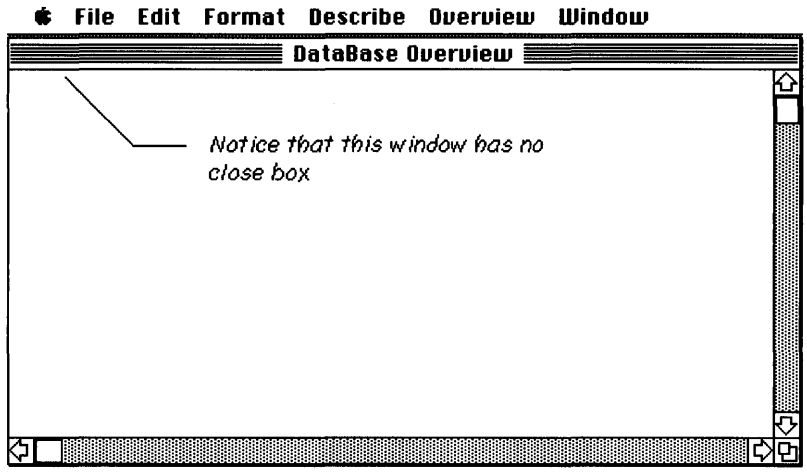
With Reflex you can automatically produce simple table-style reports, or you can take advantage of its freeform reporting features to create customized reports containing simple or complex calculations, arbitrary organization, fonts of different style and, if appropriate, graphic images.

## Creating A Simple Database

**Insert the Reflex boot disk, and turn on the Macintosh. When the Finder has loaded, open Reflex by double clicking on the application icon.**

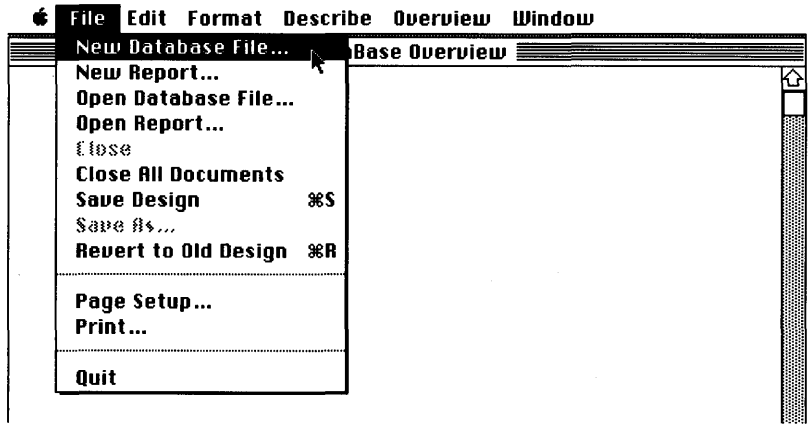



When Reflex is loaded you will be presented with the **Database Overview** window. All database files are built and modified within the Overview window; it is here that you will create fields, set their type, arrange record Keys, delete fields and, later, link database files together.



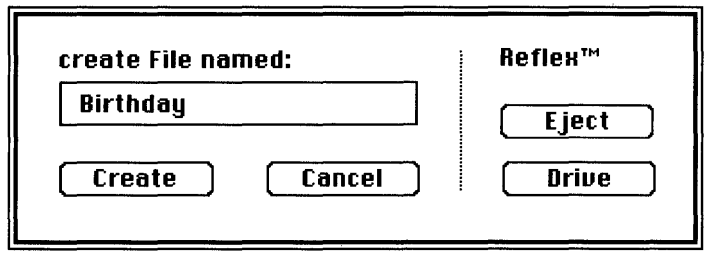

Unlike standard Macintosh windows, the Reflex Overview window does not have a close box at the top left corner. This is because the Overview Window is meant to be available regardless of what you are doing with Reflex.

**Go to the File menu and select New Database File.**



A dialog appears asking you to provide a name for the new file.

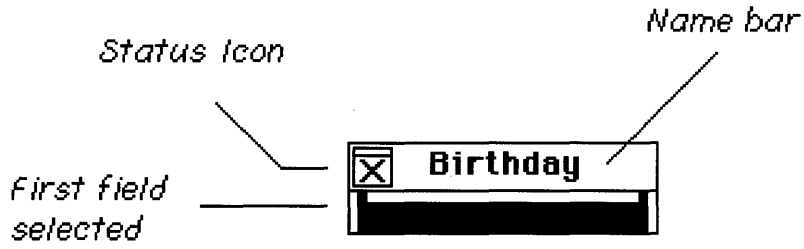
**Type the name: Birthday**




If you make any typing mistakes use the Backspace key to remove them and then retype the correct information. Note that the file name is singular rather than plural. It's a good idea to use a singular naming convention since it will make your work easier when you refer to file names in formulas and queries later on.

**Confirm that you want to create the file by clicking on Create or by pressing the Return key.**

An image of the Birthday file appears in the top left corner of the Overview window.




Within the Overview window all database files have the same general appearance. A single file image consists of a box which contains:

• A **Name bar**: This contains the file name which you entered after selecting the New Database File option.

• A **Status icon** at the top left corner: This icon informs you of the status of a file design. If the box has an "X" inside it then the current file design needs to be saved; you have either just created the file or modified an existing one. If the icon is clear this means that the file design is safely stored away on disk. If the icon is gray, this indicates that a database window for this file is open.

• An empty **field space** and/or one or more completed **field names**: A database file contains one or more fields. These contain information about the various attributes of some object or event on which you wish to store data.

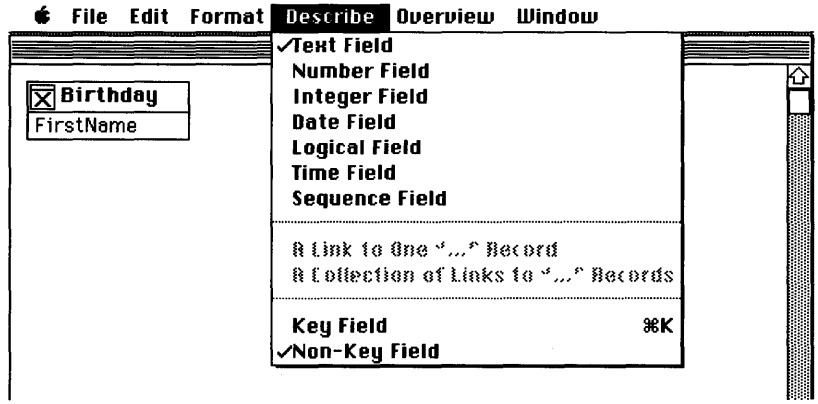
**Since the first field is already selected, you can enter a field name by typing: FirstName**

Reflex needs to have field names that do not contain any spaces. Use the "_" character if you want some separation between the parts of a name (Date_of_Birth or Purchase_Price, for example). If you accidentally enter spaces while defining a field name, they are automatically converted to the "_" character as they are entered. Spaces included in database file and report names are handled in the same way.

Notice the uppercase "N" in FirstName. Using uppercase letters inside field names helps separate words without the need for blank spaces. (On a general note, it is important to try and use meaningful field names as much as possible. Reflex allows you to use names up to 32 characters long - so use Birthdate instead of BDate, or Employee# instead of Empno.)

If you make any typing mistakes use the Backspace key to remove them. Alternatively, you can delete the whole field by clicking on it and selecting Clear from the Edit menu. Then choose Insert Field from the Overview menu to enter a field name again.

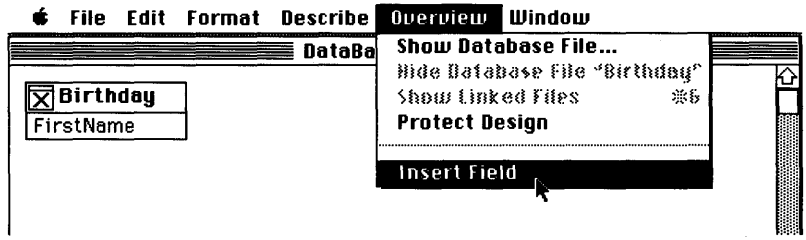
**Reflex fields can be one of seven different types. You can see the choices by clicking on the Describe menu.**



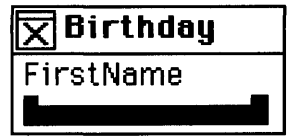

Note the check mark next to the **Text Field** menu option. This indicates that the field name you just entered (and which is currently selected), is of the field type Text. A text field may contain any characters that can be displayed on the Macintosh screen, including spaces.

Fields are automatically of type Text when they are created; you can change this default field setting via the Describe menu. Since you will be entering a person's first name in the FirstName field don't change the default.

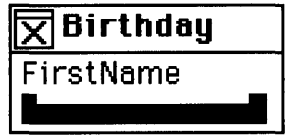
**To enter a second field choose Insert Field from the Overview menu.**



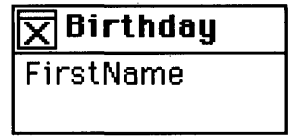
Space for you to type a new field appears just underneath the first one.




As with the first field position, this second field is already selected for you. Be careful, if you click outside of the file image at this time the field will no longer be selected.




**Selected**




**Deselected**

To reselect the new field position, select the file image, go to the Overview menu and choose the Insert Field option once again.

**Name this second field by typing: LastName**

Again, use the uppercase "N" to make the name easy to read. This field will also contain part of a person's name so you can leave it as a Text field.

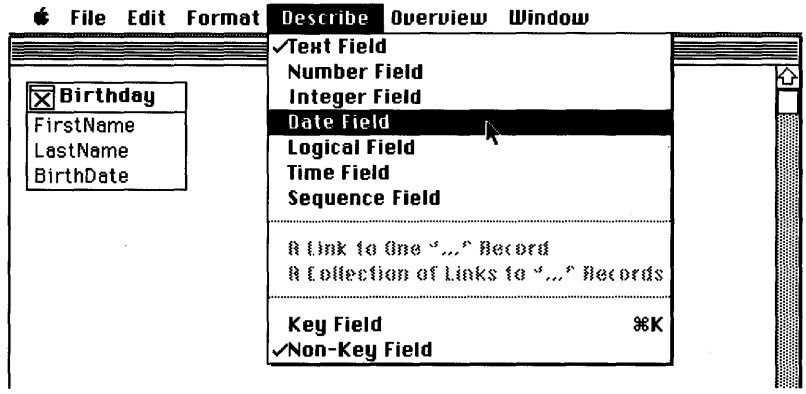
**Instead of choosing Insert Field from the Overview menu to enter the third field, this time just press the Return key.**

Another new field space appears. Pressing Return after entering a field name is a short-cut method of telling Reflex you want to insert a new field.

**Name the third field by typing: BirthDate**

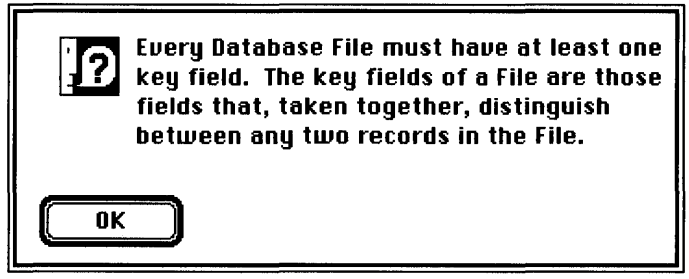
This third field will be used to store your friends' birthdates. Currently, it is a Text field so you must tell Reflex that it should be a Date field.

**Go to the Describe menu and choose the Date Field option.**




The BirthDate field can now only be used to store information in the form of a date - if you enter freeform text (such the name of a month or an incomplete date), Reflex will automatically reject it and prompt you for information in the correct date format which is Month/Day/Year. If you choose the wrong field type option or need to change a field type you can do so. Select the relevant field by clicking on it and choose the preferred field type from the Describe menu.

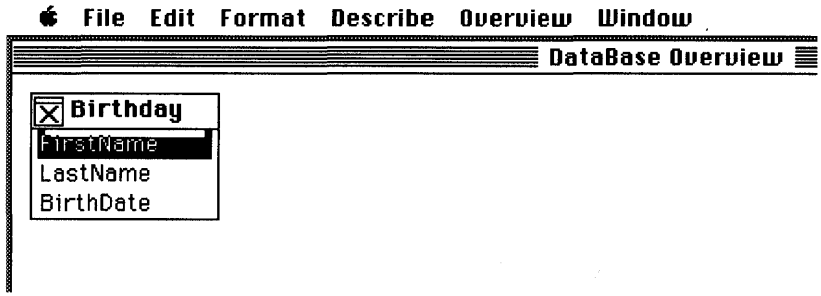
You now have a simple file design, but it's not complete yet. Each record needs to have a **Key** - a field or group of fields that is chosen to uniquely identify each record in a database. If you attempt to save your design before choosing a key Reflex will display the message below.



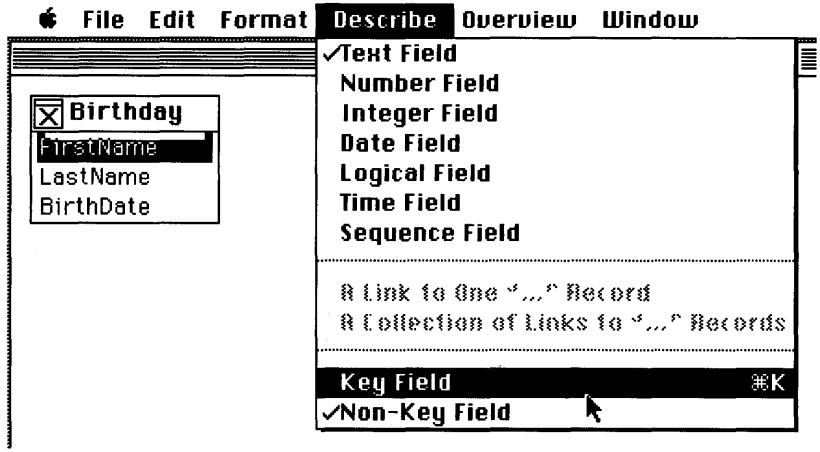

In the Birthday file you might choose to use the LastName field as a key identifier of your friends. One problem you might encounter, though, is that you have more than one friend with the same last name.

A better solution would be to use both the FirstName and LastName fields as a combination key. You might know two people called Alice, but it's fairly unlikely that they will have the same last name.

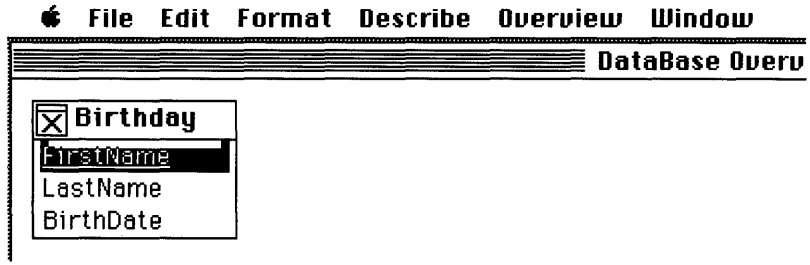
**Select the FirstName field by clicking on it.**



**Go to the Describe menu and choose the Key Field option.**




Notice that the FirstName field is now underlined to show that you've made it a key field.




If you ever make a mistake and want to change a key field back into a non-key field you can do so. Select the field and choose the Non-key field option from the Describe menu.

**Select the LastName field by clicking on it. Go to the Describe menu and choose the Key Field option.**

The LastName field is now also underlined in the file image.

Every record in our Birthday file (the information on each individual stored in the FirstName, LastName and BirthDate fields) will be uniquely identified by the combination of a first name and a last name.

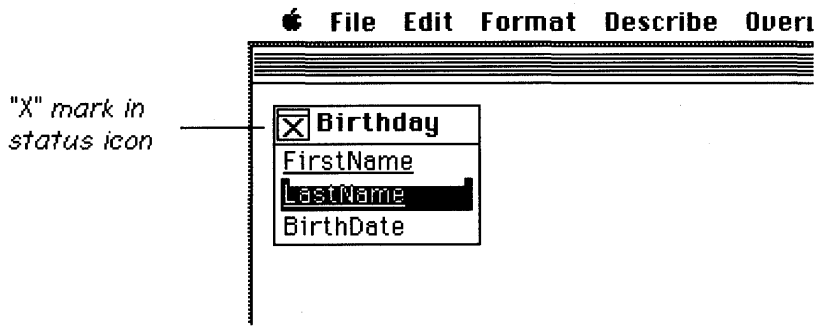
If you try to enter the same name twice, Reflex will inform you that a record with that information already exists and will offer guidance on how to resolve the situation.

In the event that you do have more than one friend with the same name you might want to distinguish between the records by including the BirthDate field as an additional part of the key. Or you could add more fields, such as a middle name, a telephone number or an address that would further ensure record uniqueness. (Reflex also provides the Sequence field type which can be used to tag each database file record with a unique record number as it is entered. You may choose a number for the record or, if you don't, Reflex will automatically provide one.)

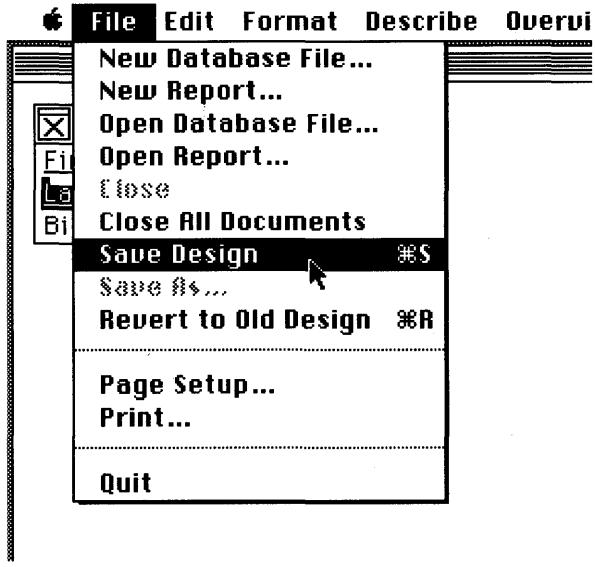
For now, let's stay with the simple design you've created and start entering some records.

## Entering Information

So long as you are building or modifying a file in the Overview window, the file image will have an "X" mark in the top left corner - the Birthday file you just completed currently has an X mark present.




**Confirm your file design by going to the File menu and selecting the Save Design option.**



This saves all information about the Birthday file to disk: its name; its structure; the names and types of fields it contains and its position in the Overview window. Also note that the status icon no longer contains an X mark. This confirms that the file is ready to be opened and information added to it.

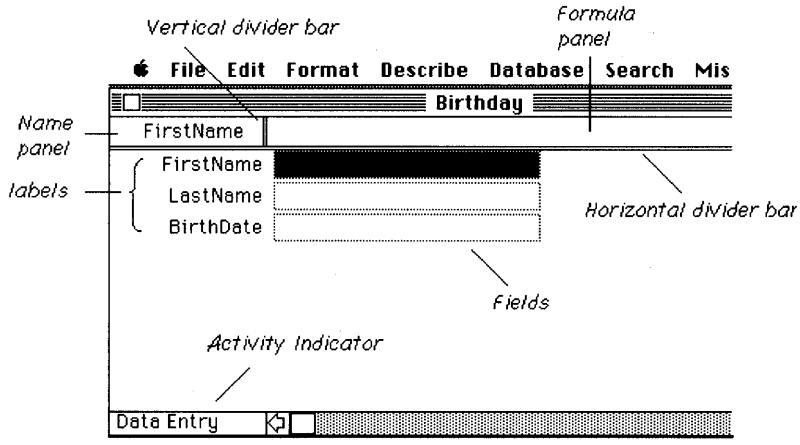
There are two ways to open a Reflex file:

- You can go to the File menu and select the Open Database File option. You will then be presented with a list of names from which you choose the one you wish to open.

- You can double-click on a file name bar, just as you would click on an application icon from the Finder.

**Double click on the Birthday file name bar.**

A blank **data entry window** appears in front of the Overview window.

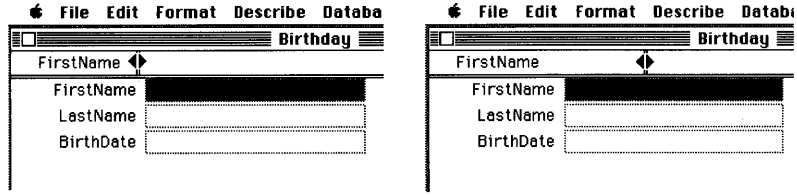



- The file name - Birthday - is in the window's **title bar**.

- There is a set of three **labels** that correspond to the names you entered in the file image (FirstName, LastName, BirthDate).

• Alongside each label there is an **empty field** - this is where you will enter the information you wish to store. Notice that the first field is already selected. The selected field's name - FirstName- is displayed at the top left of the window in its own special **Name panel**. If the need arises (you wish to see all of a long field name, for example), this name panel can be made wider.

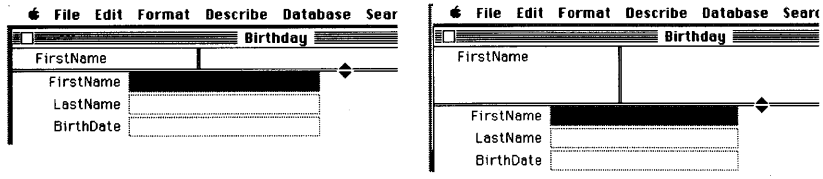
**Move the cursor over the vertical divider bar. The arrow cursor will alter shape to indicate that the field name panel can be made wider or narrower. Press the mouse button and drag the vertical divider bar to the right.**




**Return the vertical divider bar to its original position.**

• A formula panel is to the right of the field name panel. This is where search criteria will be entered. It too, can be resized to accommodate long formulas.

**Move the cursor over the horizontal divider bar. Again, the standard arrow cursor will change into a double-headed arrow indicating that this divider bar may be raised or lowered. Move the horizontal divider bar up and down to see how it may be repositioned.**




**Return the horizontal divider bar to its original position.**

• To the left of the empty fields, Reflex has preset some labels based on the names you originally supplied in the Overview window - FirstName, LastName, BirthDate - which help identify each field.

The data entry form design shown above is the default design; you can customize this any time you want. The sizes of fields and their positions can be changed, and graphic images can be easily "cut and pasted" into data entry forms from other applications.

With Reflex you can have many windows open at one time. However, information can only be entered or modified within the active window. Right now Birthday's data entry form is in the active window.

(An active window can be recognized by the horizontal lines in the title bar, scroll bars for moving around a document, a size box for changing the size of a window, and a close box for removing a window from the display. See **Macintosh, the owner's guide** for more information on Macintosh window features.)

Depending on which type of Reflex window is active, different menus appear in the menu bar across the top of the screen. For example, currently there's a **Database** menu visible; if you make the Overview window active again by selecting it from the **Window** menu, the Database menu disappears and the Overview menu appears.

This ensures that you will always have the most appropriate menus available however many different types of windows are open.

**If the Birthday window is not currently active click on it anywhere, or if it's hidden from view go to the Window menu and select Birthday. Fill in the first record's blank fields with a friend's name and birthdate. Type their first name in the already selected FirstName field.**

Edit the text as you would any Macintosh text. The important thing to realize however, is that the first time you click on an unselected field you will select the complete field (the field will turn black); entering a single character will replace all of the field's contents. If you click on an already selected field, you may then edit specific portions of the field's contents.

**Press the Tab or Return key to move to the next field.**

For data entry, the tab order (whether you use the Tab or Return key) is from left to right, top to bottom of the data entry form. When you have tabbed to the last field in a form, using the Tab or Return key will return you to the topmost field.

**Enter the last name in the selected LastName field. Complete the first record by moving to the final field and entering the Birthdate.**

Notice that an X mark has appeared in the top left corner of the window - it was placed there when you typed into the first field.

While creating the Birthday file within the Overview window there was an X mark in the file image until the completed design was saved to disk. An X mark in a data entry form has much the same purpose; it means that the newly entered record is not yet a permanent part of the file.

**Go to the Database menu and select New Record. Alternatively, just press the Enter key.**

A blank new record appears. The New Record option, or the Enter key, not only produces this blank record, it also places the previously filled out record into the Birthday file.

**Fill in the blanks again, this time with another friend's name and birth date.**

You could go on entering information in this manner, but instead let's just save the two records you've entered.

**Go to the File menu and select Save Record.**

This confirms that you want to save all entered records to disk (the first record, and the currently displayed record). The X mark at top left has now been replaced by a clear rectangular icon; this new icon shows that the record shown in the window has now been entered into the Birthday file.

- It is important to be aware that Reflex has an auto-save feature which ensures that new or modified database records are not left unsaved for too long a period. If no activity occurs for about two minutes, Reflex will automatically save changes made to all database files.

- Error messages can appear as a result of this auto-save feature (there may be some physical problem with the disk and\or disk drive). When a problem occurs, Reflex will first display a dialog alerting you to the situation and then display an informative dialog indicating which file has encountered trouble.

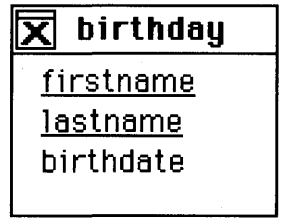
To save you the effort of entering lots of names and birthdates in the Birthday file, there is a demonstration file of the same design on the Reflex disk. You can now load that file and start learning how to search for information.

**Go to the Window menu and select Database Overview.**

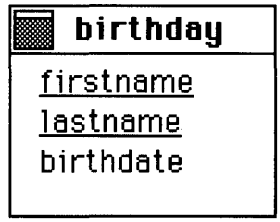
The Overview window moves in front of the Birthday window; it is now the active window. Notice that the status icon in the Birthday file image is gray. This means that a window for this file is currently open.

The status icon in the database file image provides three types of messages:

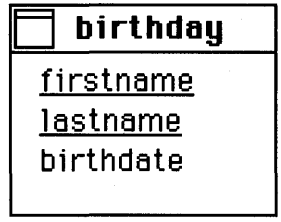
- An X indicates that there are file design changes still to be saved.




- A grayed area indicates that the current file displayed in the Overview window is open somewhere within Reflex. No changes can be made to this database while it is open.



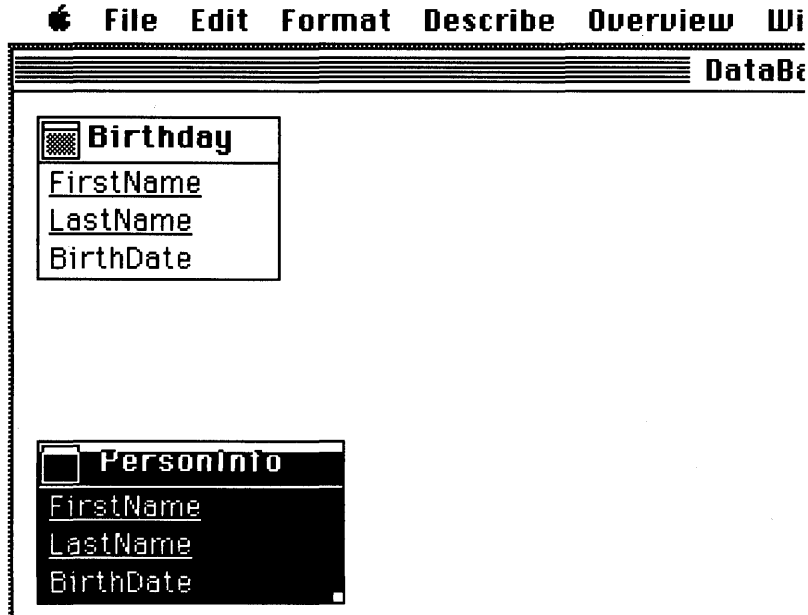

- A clear icon signals that there are no unsaved changes to the database design and it is not open.



Note that when using the double-click method of opening a file, you must not click on the status icon that appears at the top left corner of the file image. Clicking on the status icon has the same effect as the Hide Database File option in the Overview menu - the currently selected file image is removed from the Overview window. (This is very similar to the close box that can be used to remove windows.)

**Go to the Overview menu and select Show Database File. When the name list appears find and select PersonInfo. Then click on the Show button to display PersonInfo's file image in the Overview window.**

The file PersonInfo appears in the Overview window near to the Birthday file image. Except for the contents of their name bars, the two are identical in design.




To avoid confusion, it is probably a good idea to now close Birthday's data entry form and remove its file image from the Overview window.

**Go to the File menu and select the Close All Documents option.**

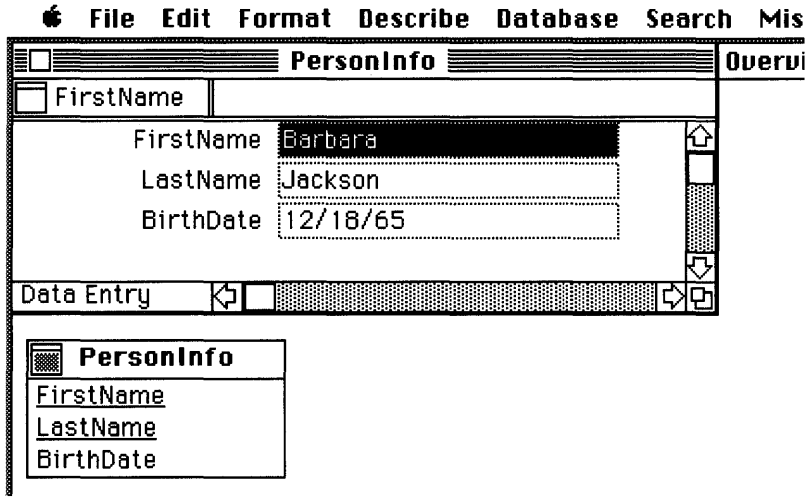
The status icon in the Birthday file image will shortly clear (it will no longer be gray), indicating that this file's data entry form has been closed.

**Hide the Birthday file image by clicking once on its status icon.**

You are now ready to start work with the PersonInfo database file.

**Open PersonInfo by double-clicking on its name bar.**

A new data entry window - titled PersonInfo - appears in front of the Overview window. The first record in the file is shown.




**If you want to browse through this file go to the Search menu and use the First, Last, Next and Prior Record options to look at records.**

- First Record displays the first record of a file whatever the current position is in that file. The first record can also be displayed by pressing the "⌘" and "F" keys at the same time.

- Last Record displays the last record of a file whatever the current position is in that file. Can also be selected by the ⌘ L shortcut.

• Next Record moves one record toward the end of a file from the current position. Can also be selected by the ⌘ N shortcut.

• Prior Record moves one record nearer to the beginning of a file from the current position. Can also be selected by the ⌘ P shortcut.

When Reflex cannot fulfill your menu choice, it will display a relevant message to that effect. For example, if you try to use the Next Record command when you are already at the end of a file you will first hear a beep (or the menu bar will flash if you have turned the Macintosh speaker off via the Control Panel). If you try to use the same command again, Reflex will display the dialog box shown below.

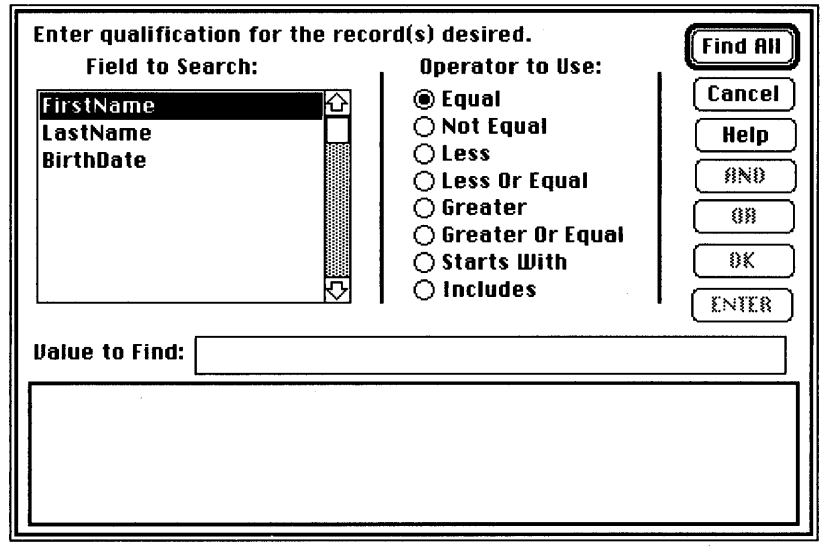

Reflex automatically arranges, or sorts, records in ascending order by the key field(s) you choose - in this case alphabetically by the combination of first and last names. The key field(s) control what records actually appear when you use the First, Last, Next and Prior Record commands.

## Using QueryBuild

If you need to find a specific record or set of records in a file, use the QueryBuild feature designed into Reflex. This method of finding records can be of great help while you are still learning how to use Reflex. It is also a lot quicker than just browsing through a file hoping to locate the information you require.

**If it is not already selected, click on the FirstName field of whichever record is currently displayed. Go to the Search menu and select the Search On option.**

The QueryBuild dialog box appears as shown below.



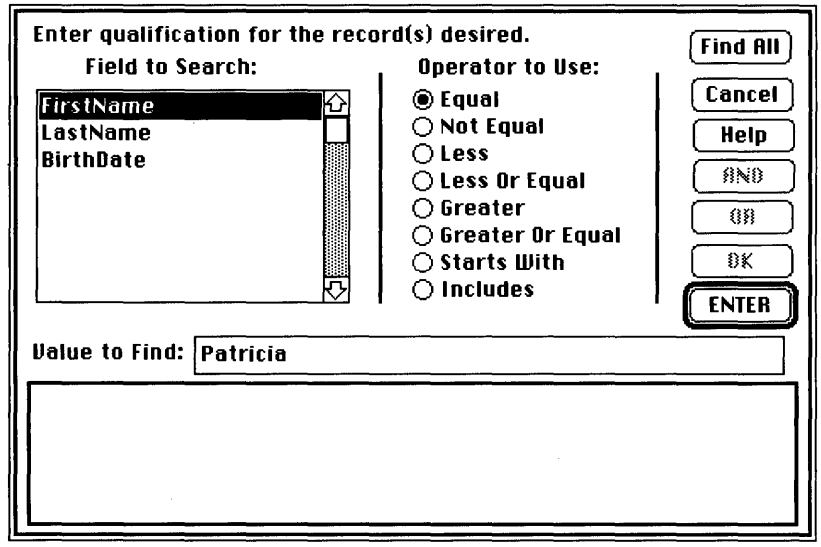

The default at this time is the Find All button at the top right corner of the dialog (note the dark ring around the button). If you use this option right now, you will be returned to the PersonInfo window and all records will be accessible. Instead, let's continue building a query with QueryBuild.

**The first field in the Field to Search box - FirstName - should already be selected. If not, select it now by clicking on it once.**

This tells Reflex which of the three existing fields you want it to search through. QueryBuild offers a range of operators which you can use to fine tune your file queries - notice that the radio button next to the word "Equal" is selected as a default.

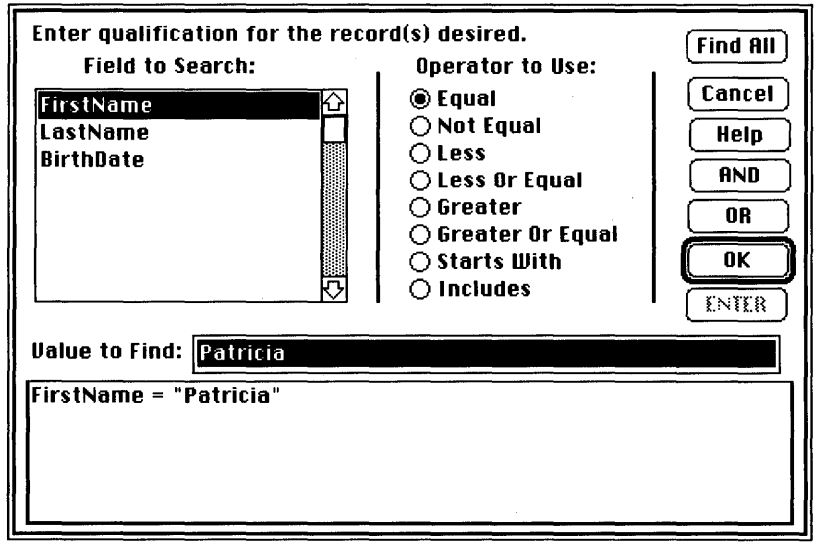
Clicking on any of the other operator radio buttons will make them active. Right now, you don't need to change this.

**Notice the Value to Find box, it already contains a flashing text insertion point cursor. Enter a first name - "Patricia" (without the quotes).**




This tells Reflex the contents of the FirstName field you are searching for. Notice that the Enter button is now the default button (i.e. the most likely next move is to actually confirm the text you have entered so that QueryBuild can start to create a relevant query for you).

**Click on the Enter button.**



Your completed qualification is now displayed at the bottom of the dialog box. With this simple query, only those records with FirstName fields that exactly equal your search value will be located and displayed for you. Case does not matter for searches; if you specify "Fred" Reflex won't find "Freddy" or "Alfred", but it will find "fred" or "FRED". To actually put the query into action:

**Click on the OK button.**

The QueryBuild box disappears. Reflex then finds the first record that meets the current qualification and displays it in the PersonInfo window. Earlier we used the First, Last, Next and Prior Record commands in the Search menu to move through a complete file. Now that we have asked Reflex to find and display only those records that meet the qualification, the record commands have the following effect:

- First Record displays the first record that meets the current qualification.

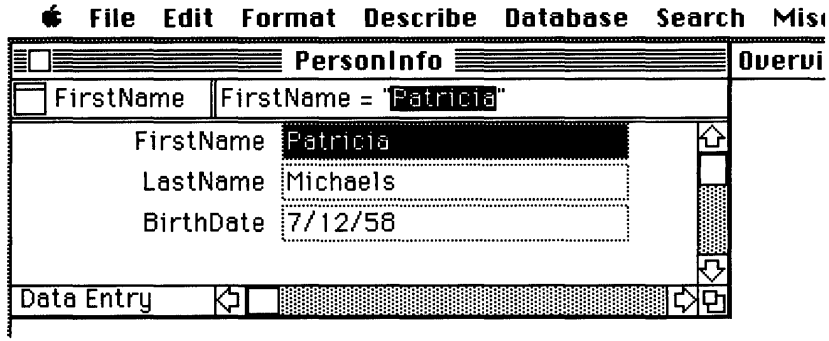
- Last Record displays the last record that meets the current qualification.

- Prior Record moves one qualified record nearer to the first record that meets the current qualification, skipping those that do not.

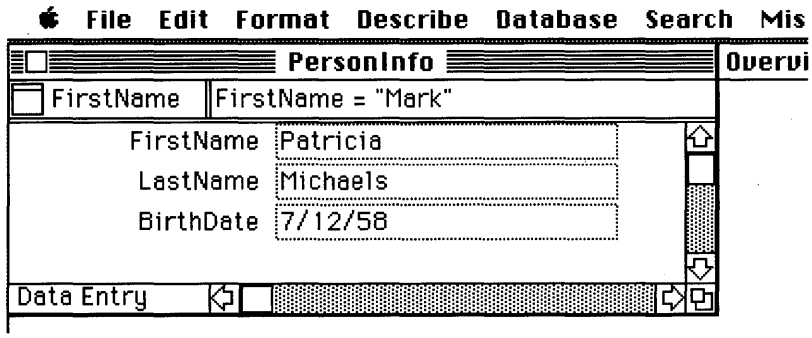
- Next Record moves one record nearer to the last record that meets the current qualification, skipping those that do not.

Notice the Formula panel towards the top of the window. Reflex has automatically pasted in the qualification you created via the QueryBuild dialog. If you want to change the qualification you can use the QueryBuild option once again, or you can edit or replace the contents of the formula panel directly.

**Go to the formula panel and select the word "Patricia" as you would any other Macintosh text.**

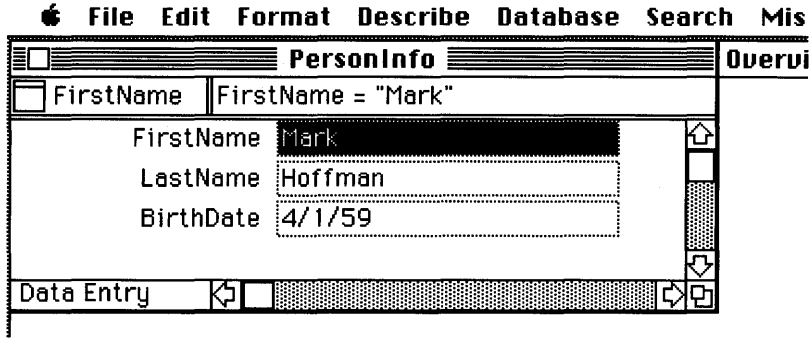



**Type: Mark**




Patricia has now been replaced by the word Mark. You have directly entered a new qualification in the Formula Panel without having to use QueryBuild. (Note that space characters are not changed to the "_" character when you enter text in the formula panel.)

**Go to the Search menu and select First Record (or use the ⌘F shortcut).**




**The record containing the first name Patricia is no longer displayed. Instead the first record containing the name Mark appears. Nothing has happened to the "Patricia" record - it is just no longer displayed. Use the First, Last, Next, Prior Record commands to see what other records have been found by Reflex.**

• If you need assistance in creating a database query select **Search On...** in the Search menu to invoke the QueryBuild feature.

• If you want to enter your database queries directly, click in the formula panel and use standard Macintosh text entry and editing methods.

• Alternatively, choosing the **Edit Record Qualification** option from the Search menu places the text cursor in the Formula panel or selects text previously entered in the panel.

It is likely that you will find yourself using a mixture of entry methods while learning about Reflex's many database file search features.

Since Reflex uses the existing qualification to decide which records it will display, you must delete any such qualification from the formula panel when you want to have access to all the records in a file. There are three ways to do this.

• Go to the Search menu and select the **Find All** option.

- Select the qualification in the formula panel - with the cursor, or via the **Edit Record Qualification** option from the Search menu - and press the Backspace key or use the Cut or Clear option from the Edit menu.

- Click on the **Find All** button from within the QueryBuild dialog after accesssing this dialog by selecting the Search On... option from the Search menu.

## Producing Simple Reports

Database files are what hold your information - where you enter and edit information and carry out simple searches for specific records. When you wish to produce a detailed listing of the information in a file or a set of files (a database) you will need to design a **Report**. Reports also allow you to perform powerful calculations, and create search formulas that can cope with many complex conditions to find information in one file, many files, other reports, or even the current report itself.

The process of producing a report can be as simple or as complex as you wish. Keep in mind the purpose of the report - is it a simple name and address list, is it a business report (such as a profit and loss statement), or is it a very detailed breakdown of services given and money owed?

Although all reports are equivalent in that they can be customized as much as desired, Reflex offers a ready-made report format; the Table-Style Report.

• **The Table-Style Report on a Database File:** The Table-Style report is a straightforward listing of the contents of a single file where each record is listed as a row of fields on the Macintosh display. The default style is that every selected field of every selected record in a database file is displayed within what is known as a **Repeating Collection**.

In brief, a Repeating Collection is the mechanism used to obtain a specific view of the records within a file.

• If there is no qualification, the repeating collection will retrieve all records in a named file.

• If the qualification asks for records where the last name is "Johnson" then only those records with a LastName field equal to Johnson will be displayed (see content pages and index for location of more specific information on this topic).

Reflex provides automated methods of choosing the fields that will be displayed and, by using query formulas, the records that will be displayed. You have full access to Reflex's retrieval formulas. If you wish, you can also customize the format of a Table-Style report so that it no longer appears as a row of fields.

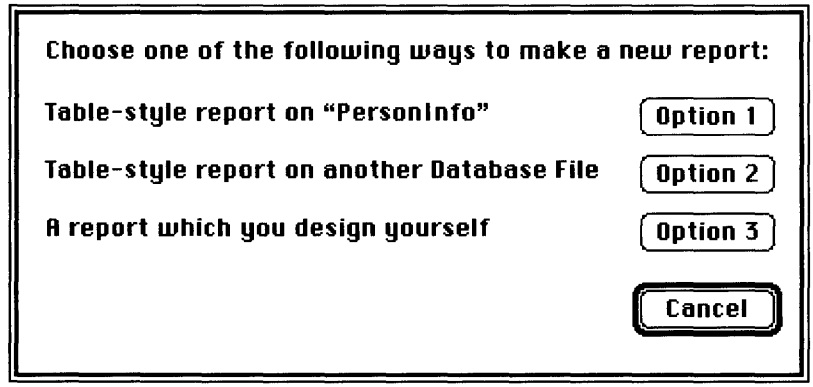
If you do not wish to use a table-style report, you may create a custom report from scratch.

• **A Report which you design yourself:** This type of report is totally freeform - there is no default format. Fields from any file can be placed anywhere within the report. You will have full access to Reflex's query formulas, and this is the type of report where you will start to make full use of Repeating Collections.

As you become more familiar with Reflex you will find it easier to decide which type of report will be most useful to you. For now, let's use the table-style report.

**Go to the File menu and choose New Report.**

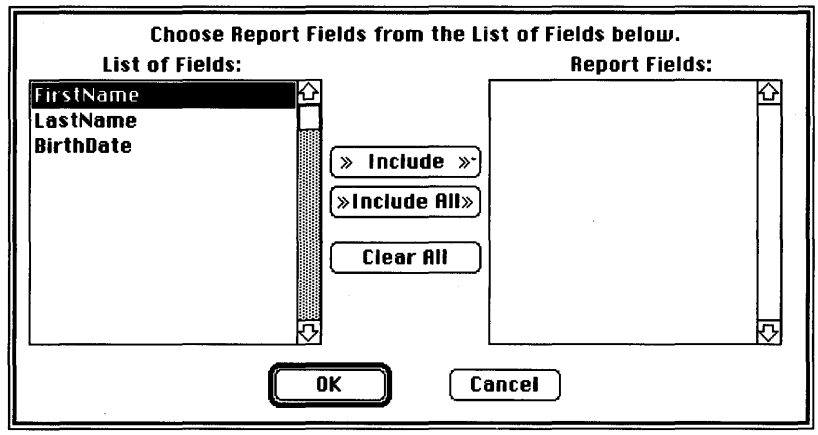
A dialog box will appear that offers three report options.




You can get a table-style report on the currently selected file (PersonInfo); you can get a table-style report on another file; and you can display a blank report with which you create completely freeform reports.

**Click on the Option 1 button to produce a report on the PersonInfo database file.**

Another dialog will appear where you can select the fields you want to include in this report. The first field of the current file - FirstName - is already selected for you.




Options available to you are:

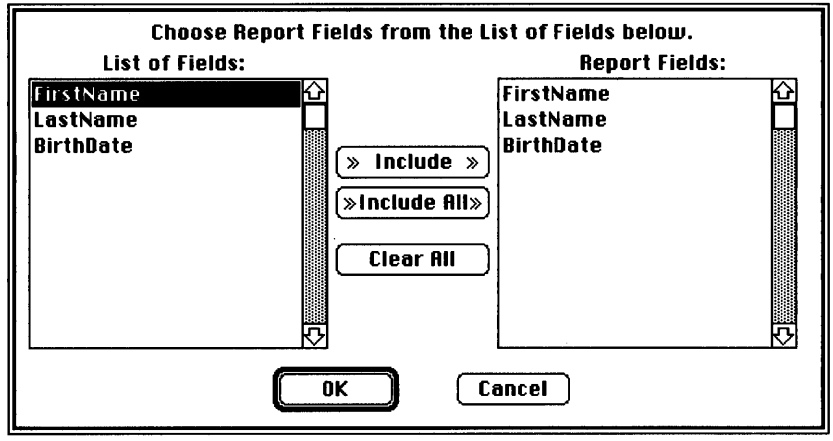
• Select each field by clicking on it in the **List of Fields** box and then click on the Include button. This will place the chosen field name in the **Report Fields** box. The order of the fields in the Report Fields box dictates the order in which these fields will appear in the report. Clicking on the **OK** button will continue the report procedure. Clicking on **Cancel** will make the dialog go away and end the report procedure.

• All fields may be included in the report by clicking on the **Include All** button. Clicking on the **OK** button will continue the report procedure. Clicking on **Cancel** will make the dialog go away and end the report procedure.

• If you have done either of the above actions in error, you can remove all the Report fields and start over again by clicking on the **Clear All** button.

**Click on the Include All button.**

The three existing field names will appear in the **Report Fields** box to the right of the dialog.



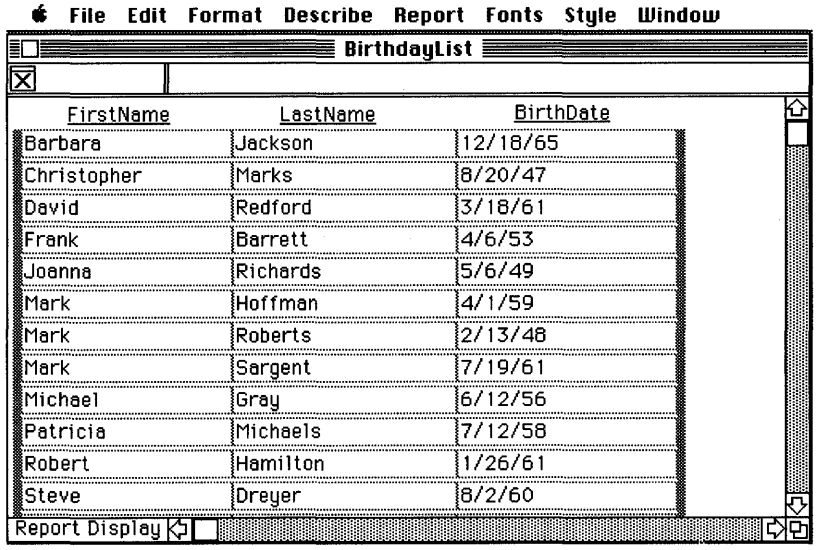

**If everything looks correct, click on the OK button.**

The QueryBuild dialog appears in order to let you specify which records you want to include in the report; you will want all of them so just click on the **Find All** button (you can also hit the Return key since Find All is the default button).

A standard file dialog will now appear asking you to supply a name for the report.

**Type: BirthdayList**
**To produce the report, click on the Create button**

The table-style report will now appear in a new report window (in some cases it will be necessary to use the window scroll bars to move around the form and see all of a report). Notice that the records are automatically sorted by the FirstName/LastName key that you set up earlier.




The Report window contains:

- The name panel and formula panel like those that appear in data entry form windows.

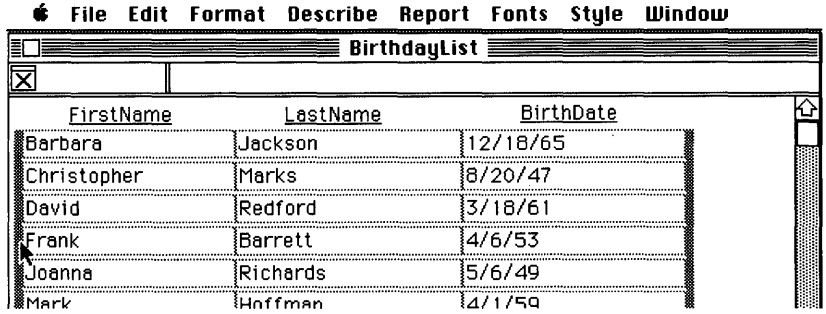
- The status icon in the top left corner which currently has an X mark inside it indicating that this is an unsaved report.

- Labels above each column identifying the contents of that column.

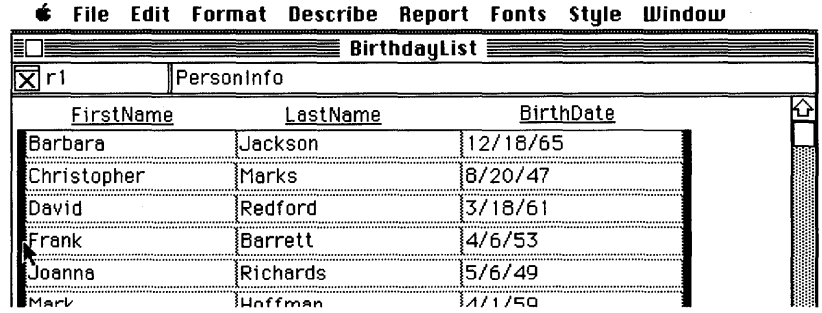
- A row for each record in the PersonInfo database.

- A box with thick vertical bars (**handlebars**) on each side that surrounds the records; this indicates the Repeating Collection mentioned earlier.

**Click on the vertical gray handlebar down the left of the displayed records.**




As you click on the gray handlebar, the repeating collection will be selected and turn black.




Also, if you look in the formula panel you will see the name PersonInfo has now appeared there. As explained earlier, a repeating collection is the mechanism by which you can obtain a specific view of the records in a file. By clicking on the current repeating collection we can see the name of the file that it will view for us. The actual fields that appear within a repeating collection are selected by you - you earlier told Reflex to include all fields in this table style report.

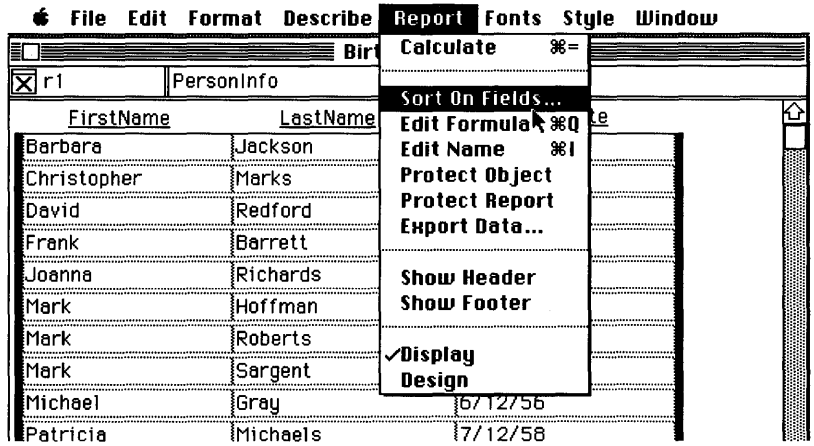
Later, you will see how to change the name of the file on which a repeating collection will provide a view. For now, let's see what we can do to customize the report that we have already produced.

Perhaps instead of arranging a birthday list by name you would really want to have the records appear in order of birthdate.

**If the repeating collection is not selected, click on it to select it once again.**

The gray handlebar should turn black as it is selected. Make sure that you have it selected correctly.

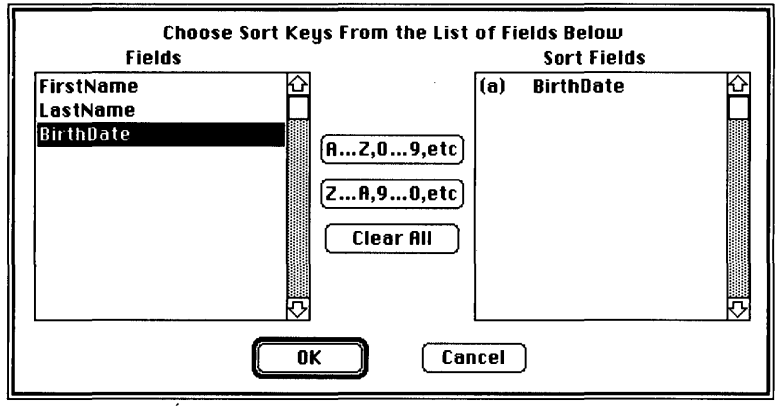
**Go to the Report menu and choose Sort On Fields...**




A dialog appears asking you to select the fields on which to sort and the order in which the records should be sorted.

**If it is not already selected, select the BirthDate field and click on the A...Z,0...9 button to sort in an ascending order (the Z..A,9...0 button is used to sort in a descending order).**

The chosen field name will appear in the Sort Fields box to the right as shown below.

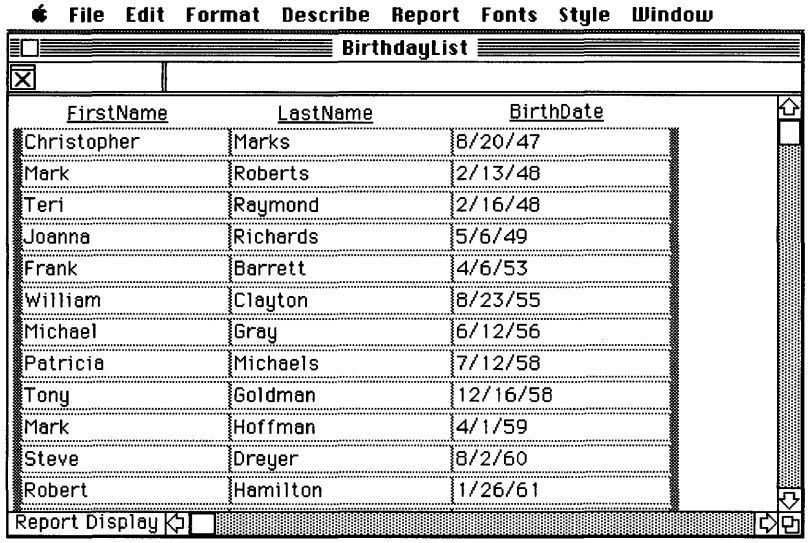



**Click on the OK button.**

The BirthdayList report will reappear.

**To sort it by birthdate go to the Report menu and choose Calculate or use the ⌘= key combination as a shortcut.**

The report is now rearranged in ascending order by the contents of the BirthDate field.




| FirstName | LastName | BirthDate |
|---|---|---|
| Christopher | Marks | 8/20/47 |
| Mark | Roberts | 2/13/48 |
| Teri | Raymond | 2/16/48 |
| Joanna | Richards | 5/6/49 |
| Frank | Barrett | 4/6/53 |
| William | Clayton | 8/23/55 |
| Michael | Gray | 6/12/56 |
| Patricia | Michaels | 7/12/58 |
| Tony | Goldman | 12/16/58 |
| Mark | Hoffman | 4/1/59 |
| Steve | Dreyer | 8/2/60 |
| Robert | Hamilton | 1/26/61 |

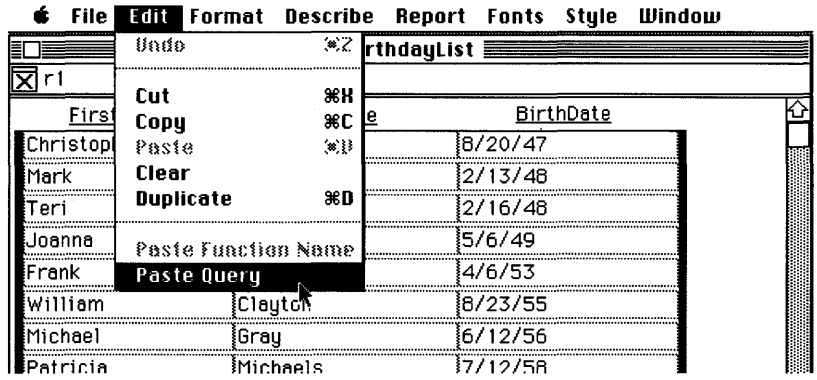
When a table-style report is first created, it is automatically calculated by Reflex. Whenever you make changes you must recalculate the report with the Calculate option or the ⌘ = shortcut. You can choose any field, or group of fields, to sort on in a report - it does not have to be one of the key fields. It can even be a computed field (a field which will display the sum of a specific report column or a group of fields, for example).

In addition to changing the order of records in the report you can also change the number of records that appear by using Reflex's formulas. Currently, the table report contains all the fields from all the records in the PersonInfo database. Let's use QueryBuild once again to list only those records of friends with a birthday after 1959.

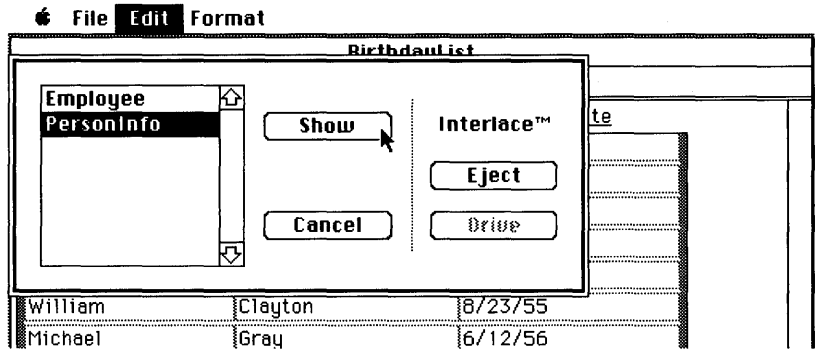
**Select the current report's repeating collection by clicking on the gray vertical handlebar that appears on either side of the displayed records.**

The gray lines will turn black to indicate that they have been selected.

**Go to the Edit menu and select Paste Query.**

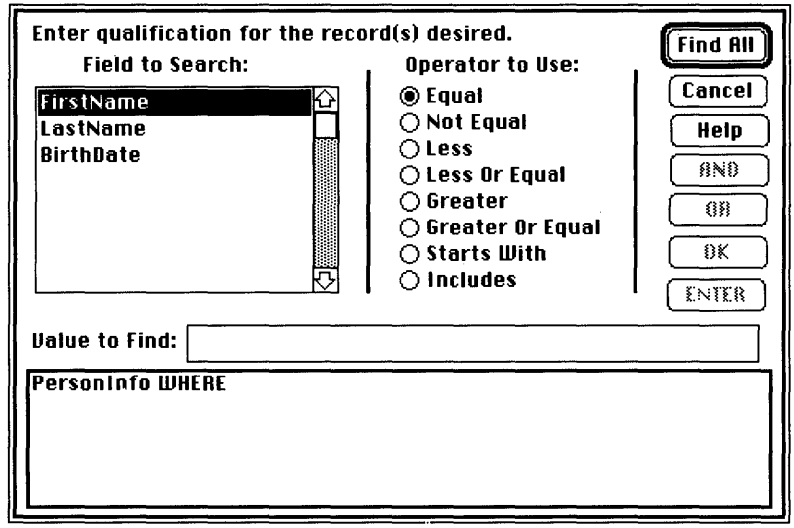



A standard file dialog will appear asking for the name of the database file you wish to report on.




**Select PersonInfo from the file list. Click on the Show button.**

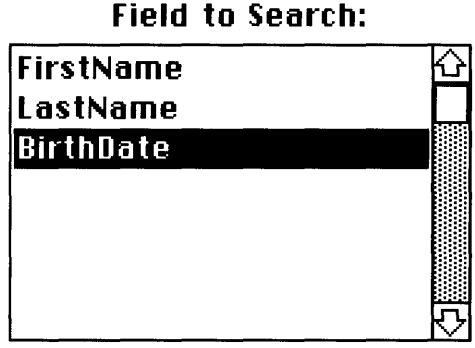
After you have supplied the name and clicked on the Show button, the QueryBuild dialog will appear. Notice that the file name that you have just selected - PersonInfo - has been automatically entered in the display area at the bottom of the QueryBuild dialog, along with the word "WHERE".




The query "PersonInfo WHERE" tells Reflex that you are interested in finding some records in the PersonInfo file WHERE they meet some specific qualification. The query is not complete, however, since you still need to supply the record qualification.

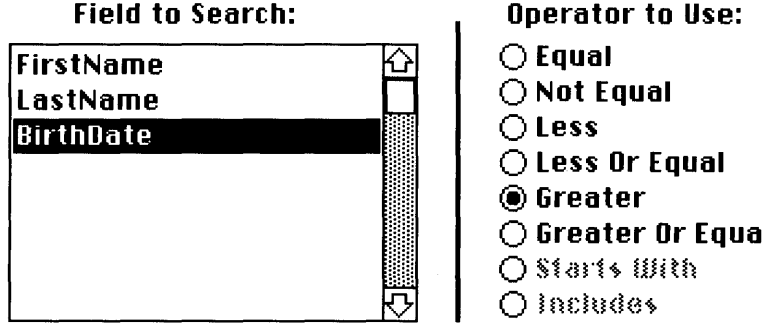
To find all those friends that have birthdays after 1959:

**Select the BirthDate field in the Field to Search box.**



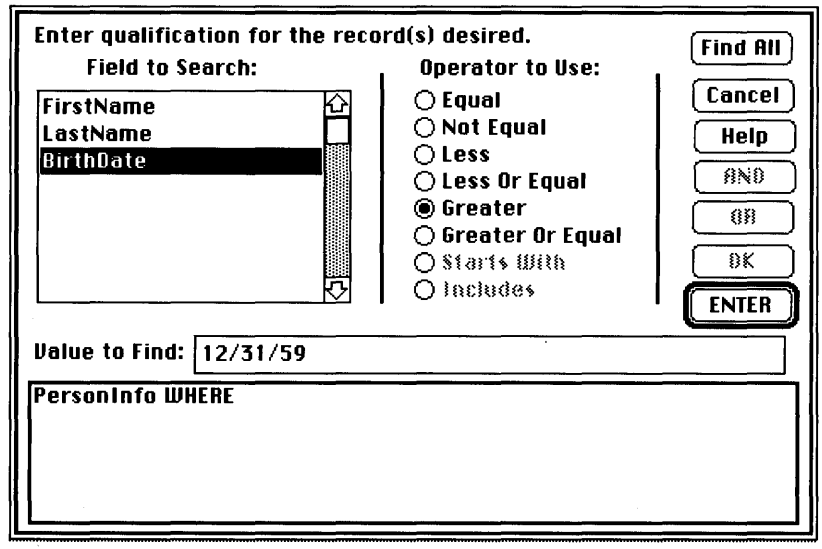

This tells Reflex which field you are interested in searching.

**Select "Greater" from the Operator to Use list by clicking on the radio button alongside it.**




This tells Reflex the type of operation you want it to perform on the chosen field.

**Enter the date value shown below in the Value to Find box.**




(You could, of course, also use 1/1/60 as a value to find and the "Greater or Equal" operator.)

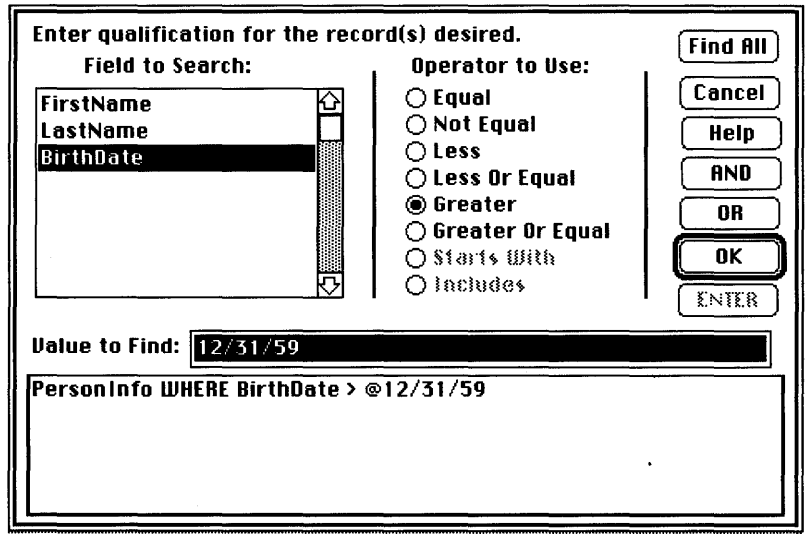
**Click on the Enter button.**

The complete query, which appears in the large display area at the bottom of the QueryBuild dialog, tells Reflex that you want all PersonInfo records where the birthdate field has a value greater than 12/31/59 - in other words, all those records that contain birthdates of 1960 and above.

It is important to note that date values can be used in formulas only if they are indicated as date constants by preceding them with the "@" symbol; this distinguishes them from straightforward numbers separated by the "/" division sign.

For example:

- the formula @ 12/31/59 is equivalent to December 31, 1959.
- the formula 12/31/59 is equal to .0065609622.....

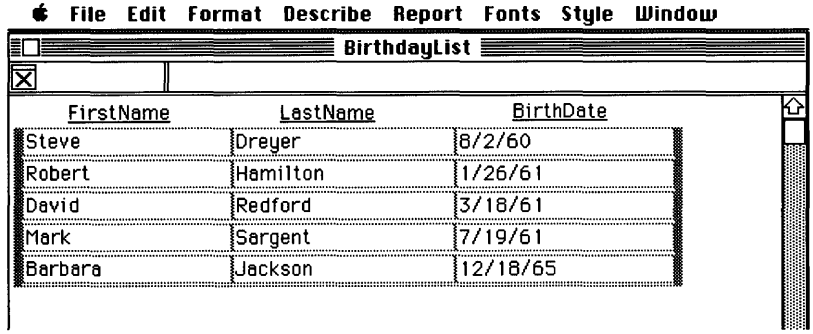



**If everything looks correct, click on the OK button. The BirthdayList report window will reappear.**

Notice that QueryBuild has automatically pasted the completed record qualification into PersonInfo's formula panel.

**Use the ⌘= shortcut to recalculate the report.**

A new report, including only those records where the BirthDate field has a value greater than 12/31/59 will appear.




You can modify this query formula as much as you want after selecting the repeating collection again and calling up the QueryBuild dialog via the Paste Query option in the Edit menu. Or, you can, after selecting the repeating collection:

- Go to the Report menu and choose the **Edit Formula** option or the ⌘Q shortcut. This places the cursor at the left-hand side of the formula panel if it is empty, or selects the whole contents of the panel if it contains text.

- Click directly anywhere within the formula panel and edit the text as you would any Macintosh text.

Other example searches you might like to try are:

**Example 1:**

List all records that have a last name that starts with the letter "R". It's useful to learn how to build this type of query formula for two reasons. You may not always know the exact spelling of some textual information you wish to display. Or you may wish to list a group of records that have something in common.

- **Step One: Click on the repeating collection and select Paste Query from the Edit menu. A standard file dialog will appear asking you to select the file to search. When you have selected PersonInfo, click on the Show button**

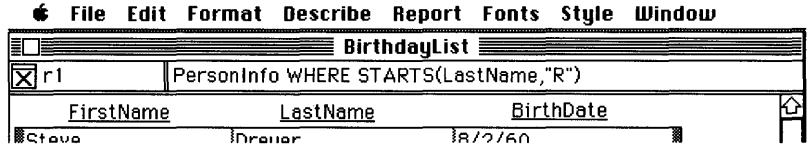
- **Step Two: The QueryBuild dialog will appear. Click on the LastName field that appears in the Field to Search box.**

• **Step Three: Click on the radio button alongside the Starts With operator in the Operator to Use column.**

• **Step Four: Enter the letter "R" (without the quotes) in the Value to Find box and then click on the Enter button.**

• **Step Five: If everything looks correct, click on the OK button.**

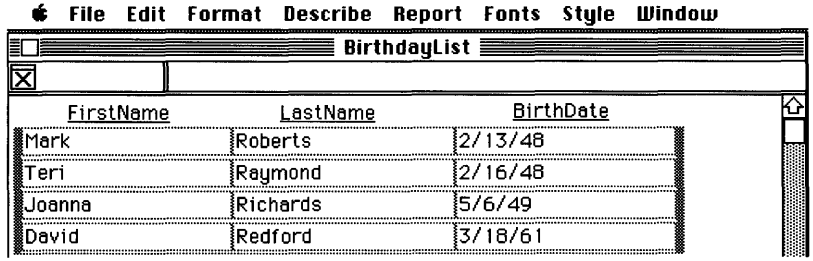
The formula panel should appear as:




Again, there is the name of the database file followed by the word WHERE and then a qualification. In this case, the qualification includes the STARTS function name since you want to display only those records that contain a LastName that starts with the letter "R"

• **Step Six: Recalculate the report with the ⌘= shortcut.**

After calculation, the report should appear as below:



**Example 2:**

List all those records that have a firstName of Mark and a birthdate after 1948:

- **Step One: Click on the repeating collection and select Paste Query from the Edit menu. A standard file dialog will appear asking you to select the file to search. When you have selected PersonInfo, click on the Show button.**

- **Step Two: The QueryBuild dialog will appear. The FirstName field should be already selected in the Field to Search box (if it isn't, just click on it).**

- **Step Three: Make sure that the radio button alongside the Equals operator is selected.**

- **Step Four: Type in the word "Mark" (without the quotes) in the Value to Find box and then click on the Enter button. The query formula thus far, will be displayed at the bottom of the dialog.**

- **Step Five: Notice that among the buttons on the right side of the QueryBuild dialog are two marked "AND" and "OR". These are used to join multiple qualifications together into one cohesive query formula.**

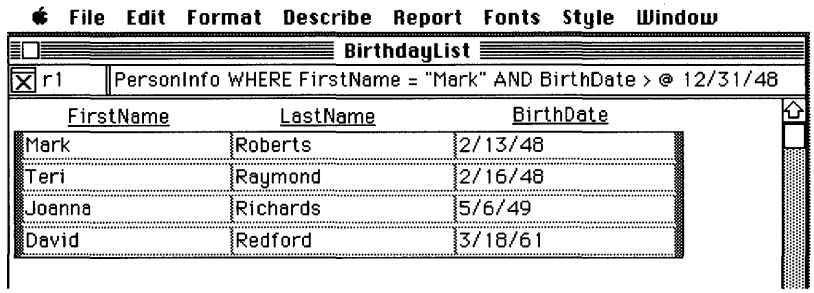
**Click on the "AND" button. Notice that the word AND appears at the end of the currently displayed query formula at the bottom of the dialog.**

- **Step Six: You are now ready to complete the query formula. Click on the BirthDate field in the Field to Search box. Make sure that the radio button alongside the Greater operator is selected.**

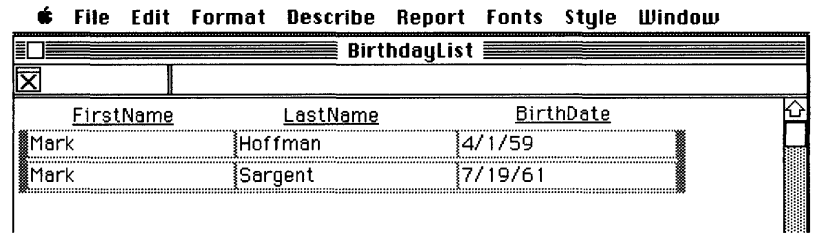
- **Step Seven: Type the date value 12/31/48 and then click on the Enter button. The completed query formula appears at the bottom of the dialog.**

- **Step Eight: If everything looks correct, click on the OK button.**

The formula panel should appear something like below (you may have to resize the formula panel see all of the formula at once):




**Recalculate the report and it should appear as below:**



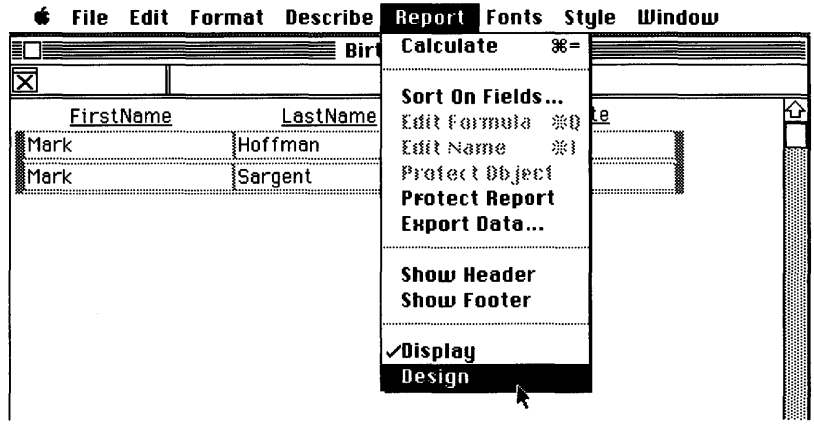

Up to now we've been selecting complete records - that is, we have not changed the number of fields that are displayed. This is not difficult to do.

**Select the repeating collection. Go to the formula panel in the report window and make sure that it only contains the word:**

**PersonInfo**

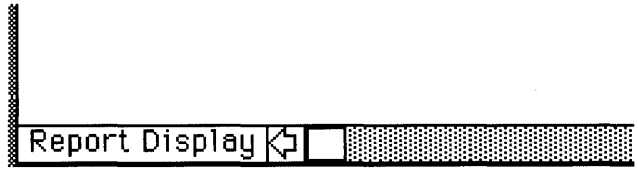
Edit the text as necesssary to ensure that this is the only word in the formula panel.

**Next, go to the Report menu and select the Design option.**

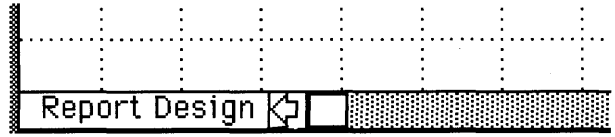



Notice that the Display option currently has a check alongside it to indicate that this is the current activity. Further visual confirmation is given in the activity indicator at the bottom left of the report window. It contains the phrase:

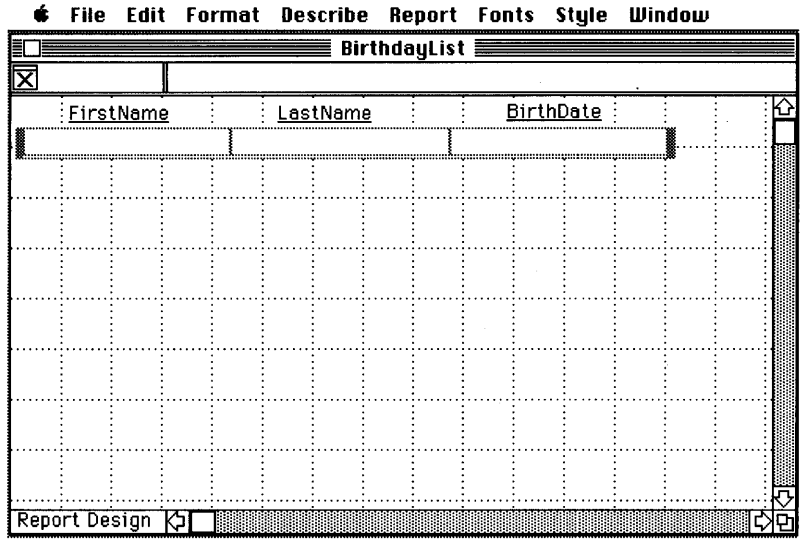
- "Report Display" while information is displayed




- "Report Design" when you are making changes to the report design.



Having selected the Design option the activity indicator should now read "Report Design" and the report window should appear as below:

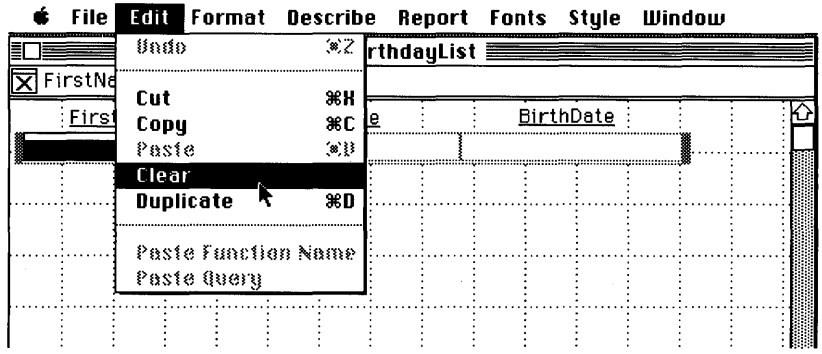



Note that the blank repeating collection and the fields that it contains are a **Design Template** - it shows how each repeating collection record will be presented when you actually calculate the report with the Calculate option in the Report menu or use the ⌘= shortcut.

**Click on the first field under the title FirstName.**

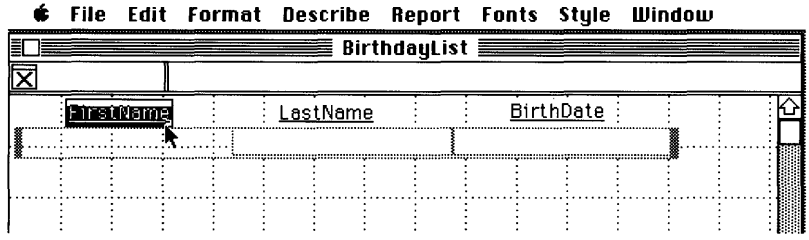
The field is now selected (black) and the name of the field will appear in the name panel. As mentioned earlier, a repeating collection only gives a view of the records within a file - it is the fields within the repeating collection that control which fields from each record will actually appear. We can test this by deleting a field from the report.

**With the Firstname field selected, go to the Edit menu and choose Clear.**

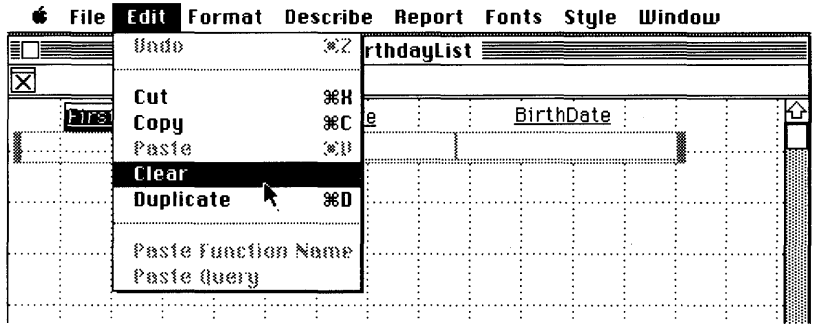



The FirstName field will disappear from within the repeating collection (note that its label remains since the two objects are not dependent on one another). You could calculate the report right now, but it would still have the heading for FirstName and the repeating collection would be unnecessarily wide (it is now easier to see the gray, box-like shape of the repeating collection since there is a blank space where the FirstName field used to be).

**Select the FirstName label by clicking on it anywhere.**



**Go to the Edit menu and choose Clear.**

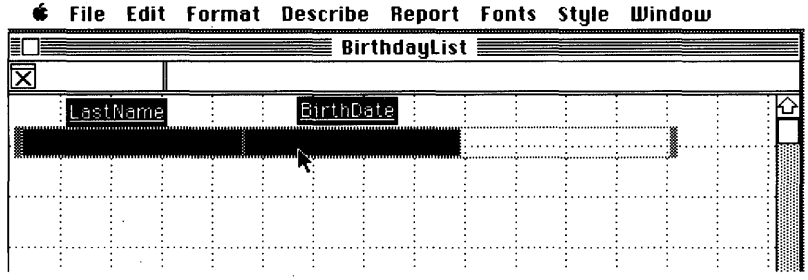



**To show that objects in reports may be moved around freely: Click on the LastName label. Then, with the Shift button pressed, click on the BirthDate label and the two remaining fields.**


**Release the Shift button. Click anywhere on the selected objects and, with the mouse button still depressed, move the objects slightly to the left.**

The fields and labels will suddenly float freely within the report, keeping track of every move you make with the mouse.

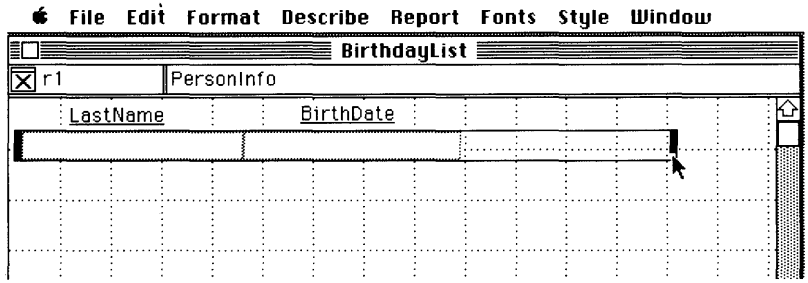
**Move the four objects to the left until they meet the vertical gray handlebar of the repeating collection and then release the mouse button.**



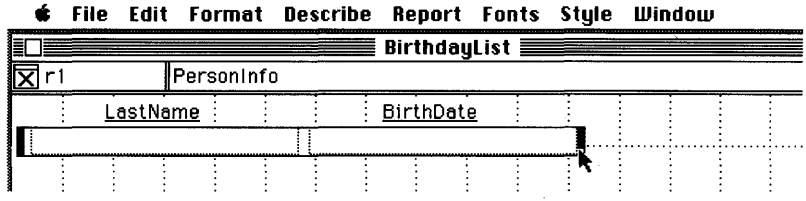

Any number of objects in a data entry layout form or a report may be selected for movement using this Shift-Click technique.

You could go ahead and calculate the new report now, but there is some empty space to the right of the BirthDate field that you might want to remove. This is no problem since you can resize repeating collections much as you would an ordinary field or label.

**Select the repeating collection by clicking on either of the handlebars. A small white resize box will appear at the bottom right corner of the gray repeating collection. Place the cursor over it and keep the mouse button down as you drag the corner to the left.**

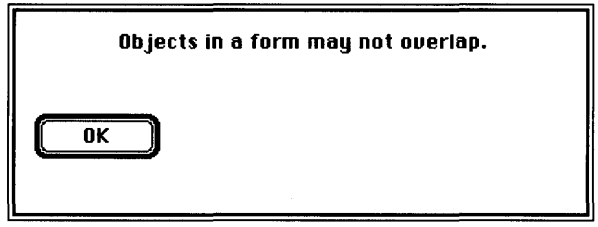


As you move left, a ghost image of the repeating collection will first appear and then shrink in size as it keeps step with your movements of the mouse. When the ghost image is just big enough to contain the two remaining fields, let go of the mouse button; the repeating collection will now be smaller.

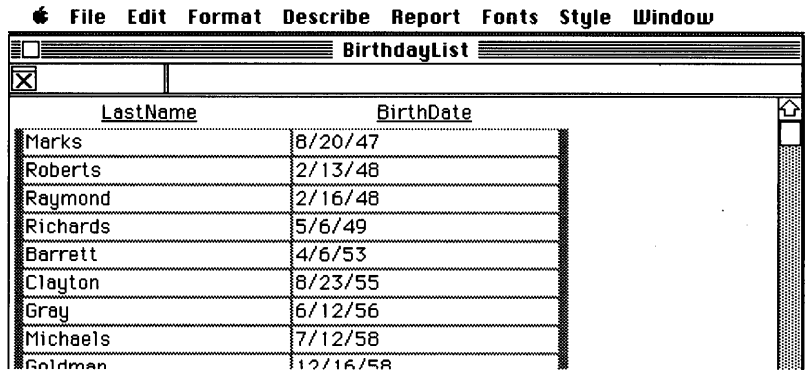



If it is not quite the right size, just follow the same procedure until it is acceptable.

• You cannot make a repeating collection smaller than the field(s) it will contain - any attempt to do so will first result in an audible error signal and then, on a second attempt, a dialog which states:




**When the repeating collection and the fields are correctly positioned, go to the Report menu and choose Calculate or use the ⌘= shortcut.**




Now you have a report which contains only the last name and birth date of each friend - the first name field is not displayed because of the design changes you made.

Any report can be modified in this way. The only limits are:

- The repeating collection must be asked to query an existing database.

- Any formula you enter must conform to the valid formula syntax.

If either of these conditions are not met, you will receive a relevant error message.

Once you have produced a satisfactory report, you can save it to disk for future use or you may print out a copy by going to the File menu and selecting Print.

- If you save a report to disk, you are in fact only saving the design template. When you open a report again you must recalculate it; this ensures that each report will include only the most up to date information.

Before you do any printing, however, you should get to use a few more features of Reflex.

## Rearranging Fields in Files

There is one very important topic that should be covered before moving on to upgrade the Birthday/PersonInfo database file design into something a little more practical - it has to do with the way in which fields, and especially Key fields, can be ordered in a file image.

You may have noticed that when you used the First, Last, Next and Prior Record commands with both the Birthday and PersonInfo files, the order in which records appeared was based on a person's first name. Also, when you created a default format report on the PersonInfo file the records were again presented primarily in first name order (with first name sort conflicts being resolved by means of using the sort order of the last name). To obtain a different sort order you had to use the Sort on Fields... option in the Report menu.

While this arrangement may suffice for a personal birthday file, there is another way to design the database file so that records can be browsed through and sorts can be performed in a more sensible fashion: You must arrange the Key fields in the order "LastName" and then "FirstName".

Currently, you should have both the BirthdayList report window and the PersonInfo data entry windows open (check in the Window menu). Before making any design changes to the PersonInfo file image it is necessary to close the associated data entry window - but since you won't be needing the BirthdayList report window again we can remove it as well.

**Go to the File menu and choose Close All Documents.**

This will close the BirthdayList report window and the PersonInfo data entry window. The Overview window will become the active window. The image of the PersonInfo file is now easy to see.

Reflex allows you to move fields around inside the file image box. To experiment with this feature:

**Click on the LastName field.With the mouse button still held down, drag the field downward until it is slightly below the BirthDate field.**


Don't worry that the field's ghost image might move beyond the file image box, just let go of the mouse button when the LastName field is correctly positioned. As soon as you let go the LastName field assumes its new position below the BirthDate field (the BirthDate field moves upwards one place). Notice that the LastName field has also lost its status as a Key Field.


- If you move a non-Key field above an already existing Key field, the non-Key field will automatically be converted into a Key field.

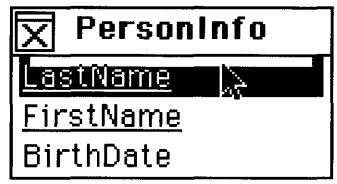
- If you move a Key field below a non-Key field, the Key field will automatically be converted into a non-Key field.

- If you move a Key field just above or below another Key field, it will remain a Key field.

- If you move a non-Key field just above or below another non-Key field, it will remain a non-Key field.

You now want to make the LastName field the top-most Key field.

**First click outside of the file image to deselect the LastName field (if you do not do this you will only end up selecting the field text itself). Then reselect the LastName field and move it above the FirstName Key field.**



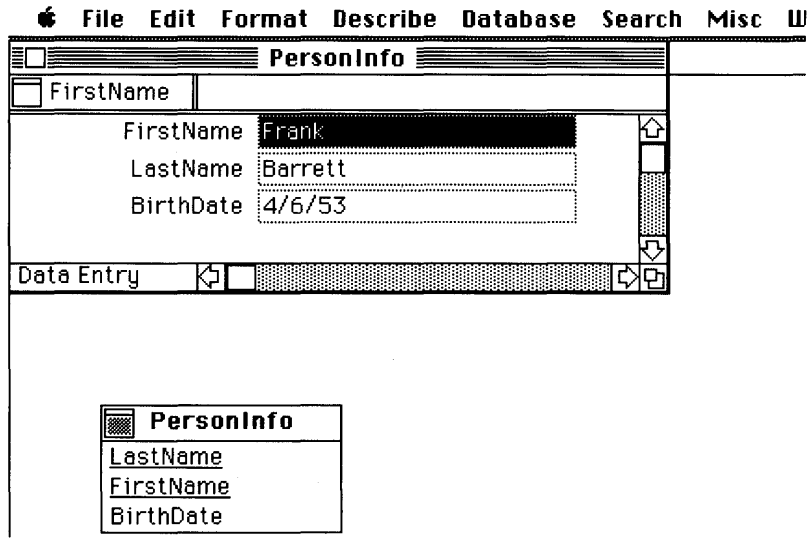

You may find that the first time you try this that the field doesn't drop into the correct position - simply pick it up again and make sure that you place it clearly above or below the relevant field(s). Note that the LastName field is now underlined, indicating that it has once again become a Key field.

**Confirm the new field order by going to the File menu and selecting Save Design.**

Shortly, the X mark will disappear from the status icon in the PersonInfo file image, indicating that the design change has been saved.

To see the effect of making the LastName field the top-most field:

**Open the PersonInfo file by double-clicking on its name bar.**



Clearly there is a major difference - the first record displayed is for Frank Barrett, whereas it was previously a record for Barbara Jackson.

**Use the First, Last, Prior, Next Record commands to see the other records.**

Also, even though you have changed the order of the fields in the Overview file image, the fields in the data entry form are still in the original FirstName, LastName, BirthDate order.

- The Tab or Return key still moves in the usual left to right, top to bottom order.

- Any new fields inserted in the file image (as opposed to just re-ordering present fields) are added at the bottom of the relevant data entry form .

- Changing the order or number of fields in a file image does not affect the order of fields or the way fields are tabbed to in a data entry form.

If you wish to have the fields in a data entry form arranged differently to the default provided by Reflex (i.e. you want to place a new field at the beginning or in the middle of the data entry form), you can select Form Layout from the Database menu and make any allowable change.

Any Table-Style report on the new PersonInfo database file will be sorted by LastName and then FirstName unless you specify otherwise.

The value of placing Key fields in a specific order may seem minimal when we are talking about a simple birthday file. However, as you begin to develop more and more sophisticated databases, the need to have the most efficient design possible will become apparent.

## The Employee Database

In the introduction to this first section, the Birthday/PersonInfo file was described as being a simple example. We can, however, redesign it to be much more useful - we can turn it into a fairly detailed personnel file that could be used to store information on company employees.

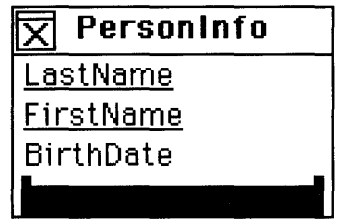
Currently, you should be able to see the PersonInfo file image and its data entry window.

**Remove the PersonInfo data entry window by clicking on its close box at the top left corner.**

The PersonInfo file image should now be selected (black); if it is not, just click once on the name bar, or on the last field in the image.

**Go to the Overview menu and choose Insert Field.**

Just as before, a space for a new field appears underneath the lowest existing field.




**Type: Address**

**After entering the name, press the Return key, which is the shortcut method of inserting a new field space in a file image.**

**Type: City**

As you can see, it is not difficult to add fields to an existing file - simply insert a new field space and enter the name of the field you wish to include in the file. If you make any typing mistakes before asking for another new field, simply backspace.

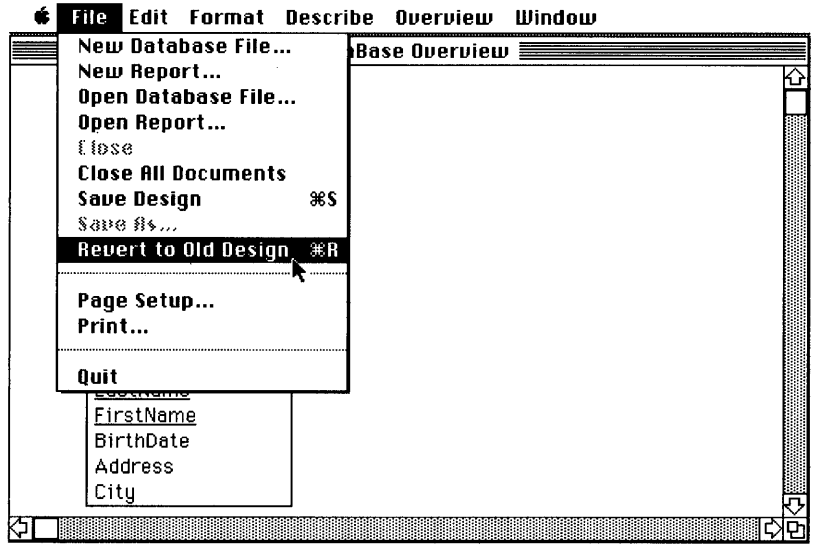
To clean up errors spotted after the field has been entered:

- Select the field, go to the Edit menu and choose Clear. Retype the correct field name.

- Alternatively, select the field and then select part of the fieldname as you would any other Macintosh text and just retype the correct information.

To save you time and effort, there is an almost complete employee file - called Employee - provided on disk. You could now save the changes that you've just made to the PersonInfo file, but instead let's use Reflex's revert option.

**Go to the File menu and select Revert to Old Design.**




A dialog will appear asking you to confirm that you do indeed wish to revert to the last saved database file design.


**Click on the button marked Revert.**

When the X mark disappears from the status icon this indicates that all changes to the original file structure have been discarded and the file image is now exactly as it had been before the addition of the Address and City fields. You can now remove the file image by clicking on the status icon in the file image - this has the same effect as clicking on the close box of a window.

**Next, go to the Overview menu and select Show Database File. When the standard file dialog appears, locate and select a file called Employee. Click on the Show button.**

This will place an image of the Employee file in the Overview window.

Notice how the first three fields have the same names as those in the PersonInfo file you were working with earlier.

Additionally, we have fields for:

- **Address, City, State, Zip**, and **JobTitle**: These are Text fields.
- **Salary:** This is a Number field.
- **Employee#:** This is a Sequence field.

**Use the field type options in the Describe menu to verify these field types.**

Specifically, notice that the Sequence field option in the Describe menu has a check mark next to it when the Employee# field is selected, but the option is not actually available - it is gray. (In fact, the Sequence Field option is gray - but it has no check mark - when the other fields in this file image are selected).

- This is because you can only have one Sequence Field per database file; Reflex will automatically increment the Sequence value as new records are entered, and/or you may select particular values for one or more records.

When we were just dealing with a few friends in a simple birthday file, we didn't have to worry too much about more than one person having the same name. In an employee file, where there may be records for hundreds of people, the chance of such an event taking place is much higher. To avoid conflicts we need to use a new Key that will ensure that every record can be uniquely identified.

Considering the various fields to choose from, we can see that one very good Key would be the Employee# field - every employee has a unique number. You could use others, but let's use it here.

**Select the FirstName field. Go to the Describe menu and choose Non-Key Field.**

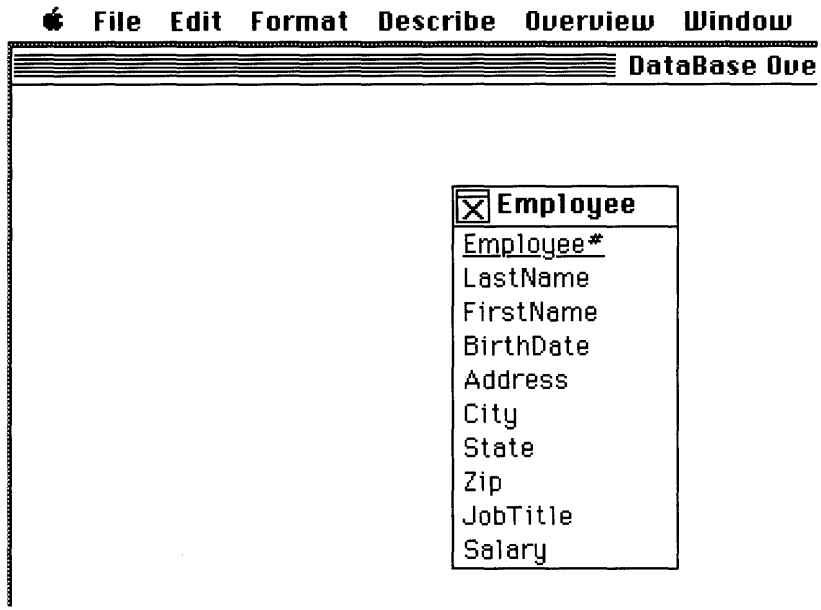
The underline disappears from the FirstName field and the field moves just below the LastName key field.

**Select the LastName field. Go to the Describe menu and choose Non-Key Field.**

The LastName field is no longer a key field. Now make the Employee# field a key field.

**Select the Employee# field. Go to the Describe menu and choose Key-Field or use the ⌘K shortcut.**

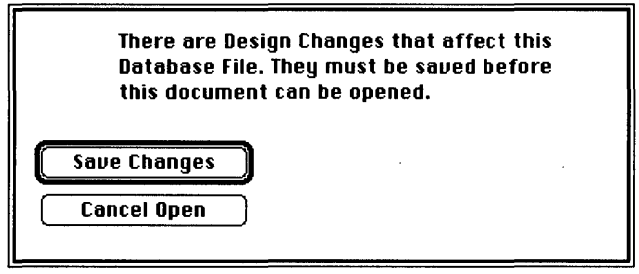
The Employee file image should now look as below:




Note the "X" mark in the status icon - it indicates that changes have been made to the design of this database file.

**Double-click on the Employee file's name bar in an attempt to open it.**

Since you have made some major changes to the file structure, Reflex will now display a dialog asking if you want to save the changes or cancel the open process:




**Click on the Save Changes button.**

After saving all changes, Reflex will then open the Employee file.

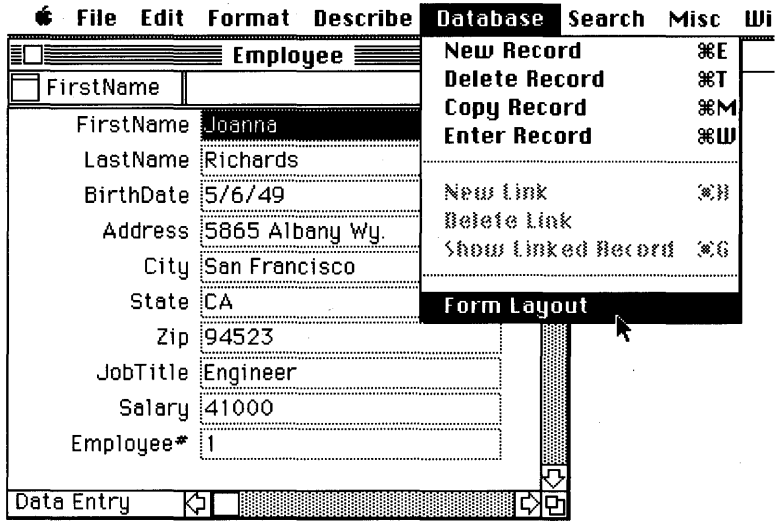
The Employee file already contains a number of records which can be viewed, reported on or, if you wish, changed (but don't change them yet). First, notice how the Employee# field is at the bottom of the data entry form even though you placed it at the top of the file image in the Overview window. The FirstName field is at the top of the form and above the LastName field although this was changed as well.

• As mentioned in the last chapter, changing the order or number of fields in a file image does not affect the order of fields or the way fields are tabbed to in a data entry form.

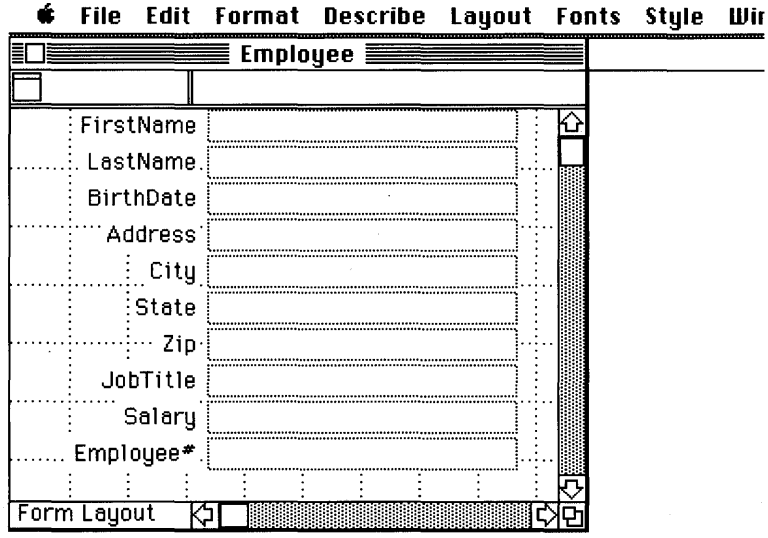
Although you can leave the form as it is, this does present an opportunity to find out how to redesign a data entry form.

## Redesigning Data Entry Forms

**Go to the Database menu and select the last item - Form Layout.**




The data entry form window now switches to a Form Layout window.



There are a number of visual clues as to the switch:

- Field data is no longer displayed.

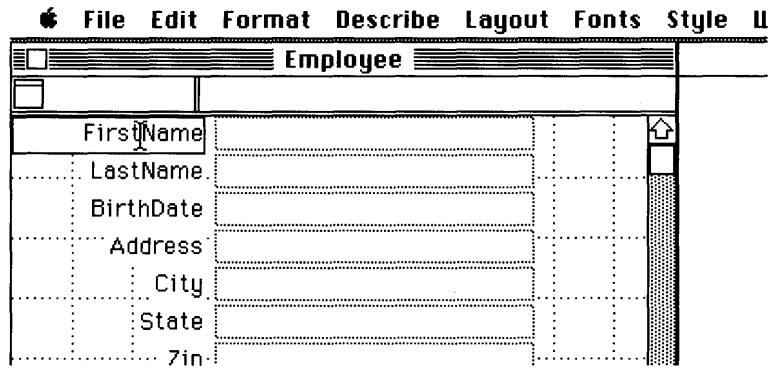
- Grid lines, to be used in accurately positioning objects in the data entry form, are shown as a default (they can be turned off via the Hide Grid option in the Format menu).

- The activity indicator, at the bottom left corner of the window, now reads "Form Layout" as opposed to "Data Entry".

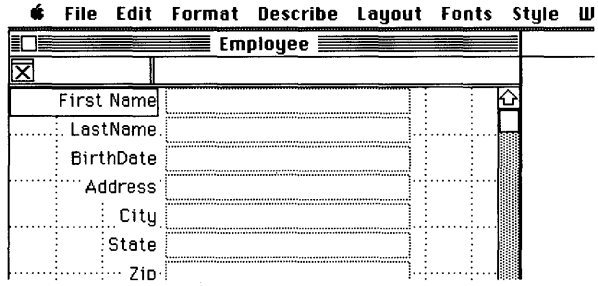
- Also, the Database menu has now been replaced by the Layout menu.

When you are working with a Layout window, you can make simple changes (such as changing the contents of a label), or you can radically alter the form design (by adding and deleting labels and pictures). With the Employee form, all you will be doing is changing the contents of a few labels, resizing some fields, and taking the Employee# field from the bottom of the form to the top.

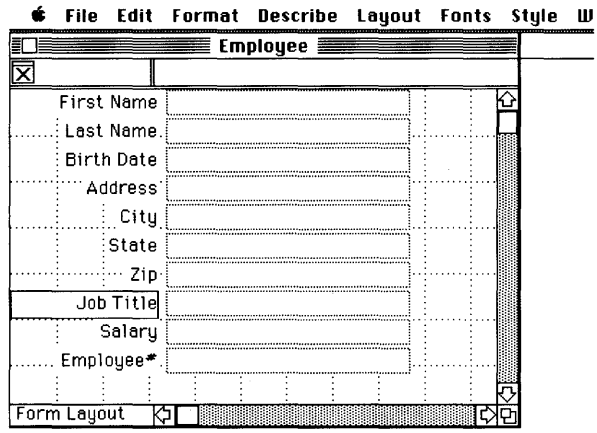
**Double-click on the FirstName label and place the text insertion point between the "t" and the "N" characters.**



**Press the space bar to insert a space character between the two characters.**



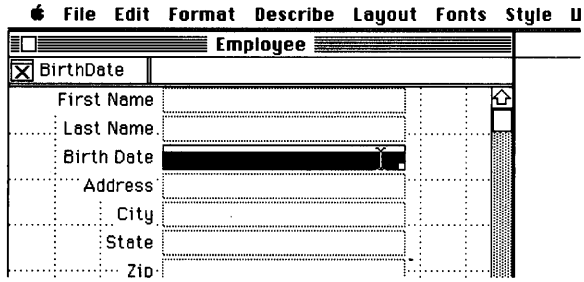

**Select the LastName, BirthDate, and JobTitle fields in turn and insert a space in each so that the form looks as below:**




Notice that even though you change the labels, the actual name of the associated field does not change (check this by selecting a field and looking in the name panel at the top left corner of the window).

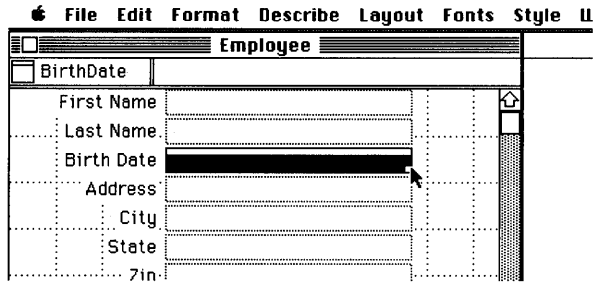
• Fields and labels are independent - Reflex merely provides a default label based on the field name supplied in a file image. You may change a label (or any other default form design feature for that matter) by switching into a Layout Form window anytime you need to.

**Next, select the BirthDate field by clicking on it once.**

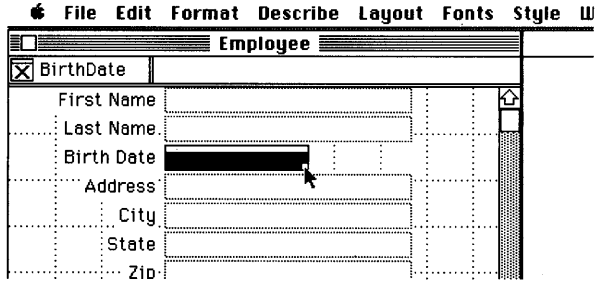



This field is too large for a birth date value, so let's reduce it.

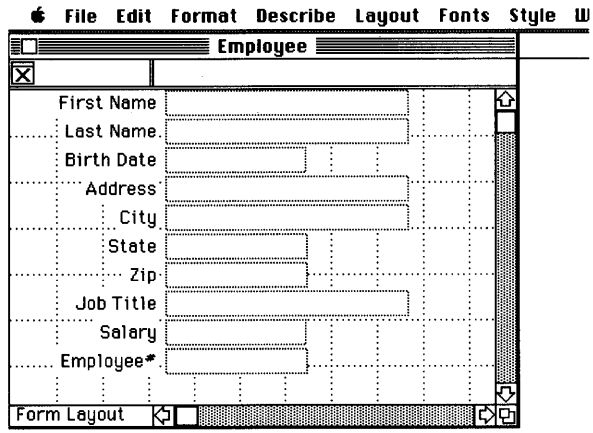
**Move the cursor over the small white resize box at the lower right corner of the selected field.**




**With the mouse button held down, drag the resize box to the left - it will follow every move you make with the mouse. Let go of the mouse button when the field looks something like the one shown below.**



**Select and resize the rest of the fields shown below (State, Zip, Salary and Employee#) in the same manner.**

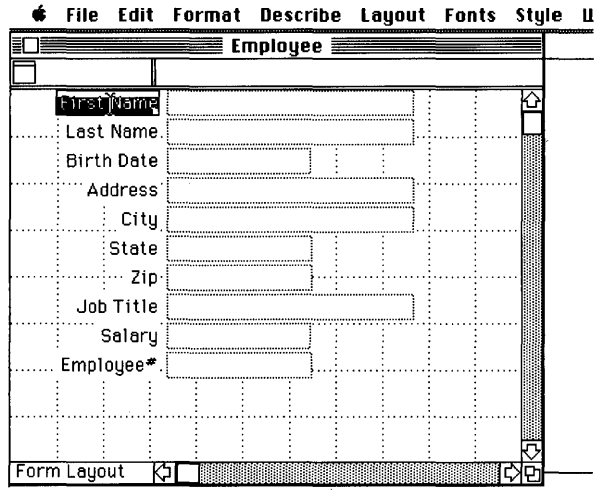



So far, you've changed some labels and resized some fields. The next step is to reposition the Employee# field at the top of the data-entry form. (There is no special reason why you have to do this; it is just being included as a practice task.)

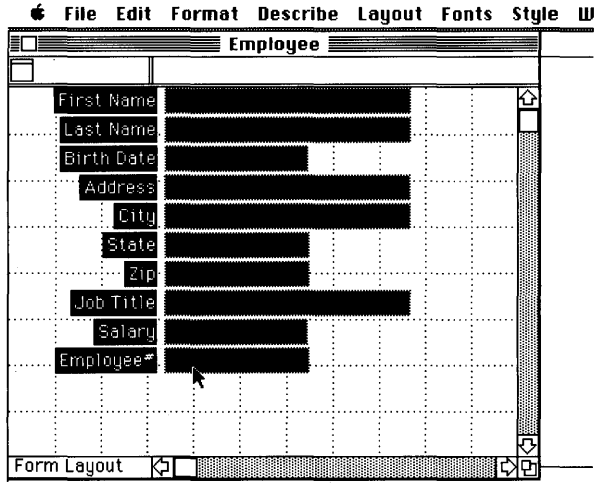
**Since you will be moving fields around, it is a good idea to give yourself some extra room by making the Employee layout window larger (at least make it a little deeper). Just use the Employee window's resize box at the bottom right corner as you would with any other Macintosh window.**

Once you have done this, you will need to make a space at the top o the data entry form to place the Employee# field.

**Select the First Name label by clicking on it once. Make sure that you do click once - otherwise you will select the label text only rather than the whole label itself. (If you run into problems, just click anywhere else on the form and then reselect the First Name label.)**

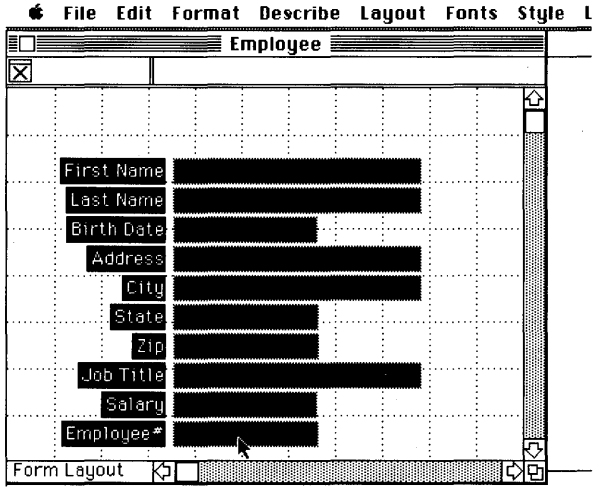



**Then, with the Shift button held down, click once on every other field and label in the form until they are all selected (black).**

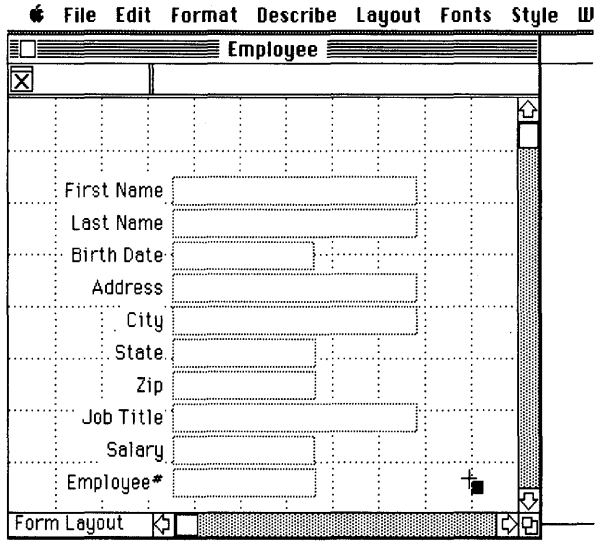



Now that all the fields and labels have been selected, you can move them, all at once, to another location.

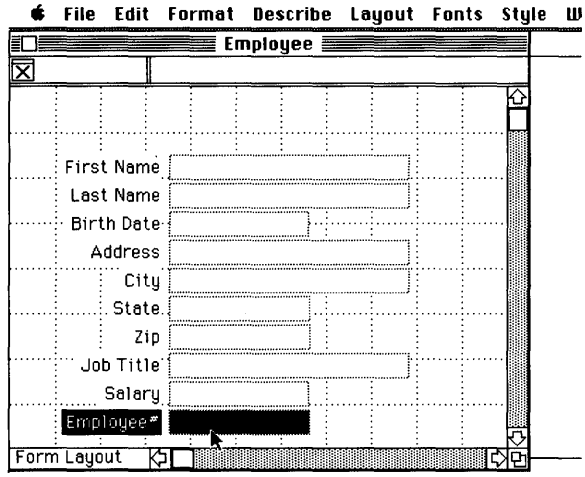
**Place the cursor on the last field - Employee# - and, with mouse button held down, drag the fields toward the bottom of the window.**



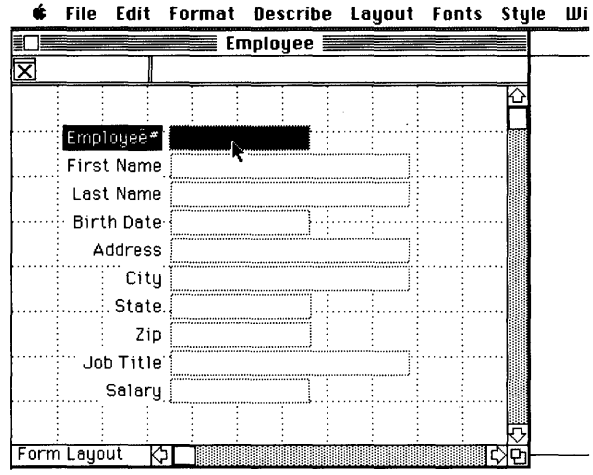

**Click anywhere on the form to deselect all the fields.**



**Now select both the Employee# label and field by using the Shift-Click technique just described.**

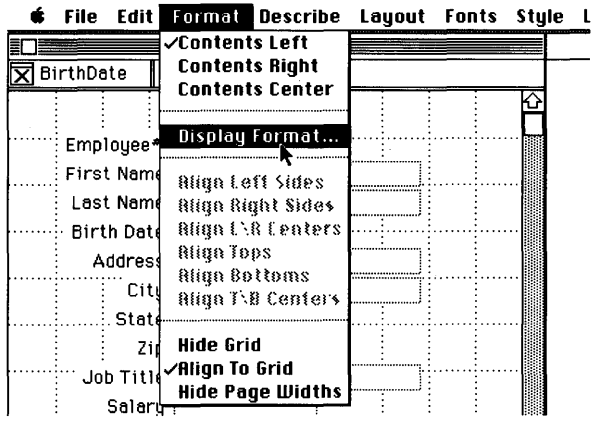



**Finally, keep the cursor over the Employee# field and hold down the mouse button. With the button still depressed, move the label and field to the new position at the top of the form.**

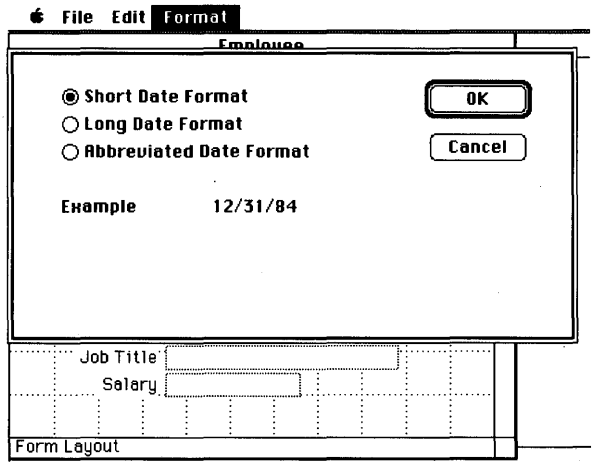



At this point, you could return to data entry activity, but there is another type of design change you should make to this form.

**Select the BirthDate field and then choose the Display Format option from the Format menu**

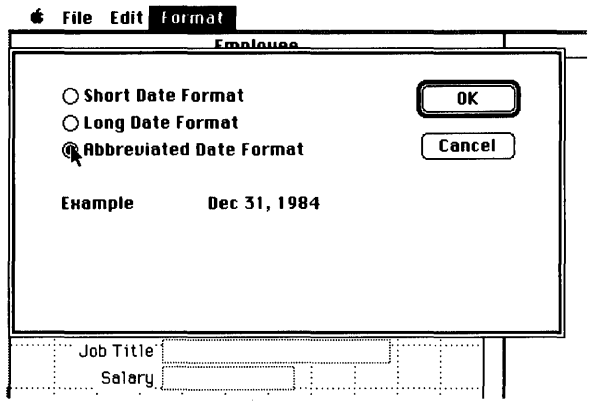



After selecting Display Format, the following dialog will appear.




Currently, the BirthDate field is set to display date information in the short month/day/year form - an example of this is included in the dialog. Let's change this so that BirthDate entries will be displayed in the Abbreviated Date format.

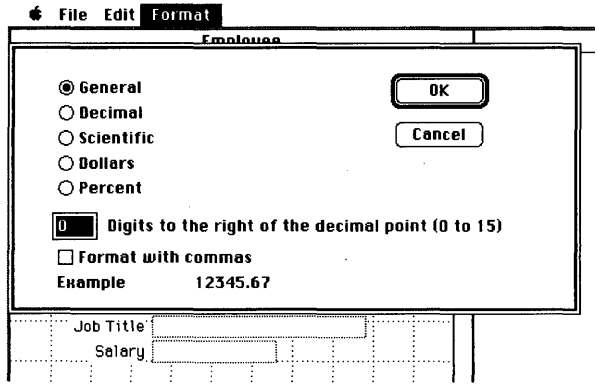
**Click on the radio button next to "Abbreviated Date Format" and then click on the OK button.**



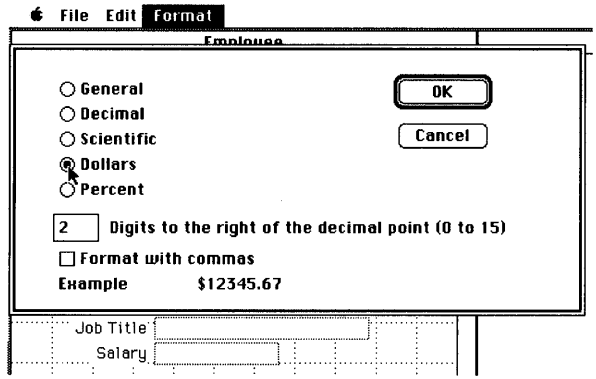

You have just set the display format for the BirthDate field. Before you see the effect of this change, let's make sure that the Salary field is displayed in the correct dollar format.

**Select the Salary field and then choose the Display Format option from the Format menu.**

A different display format dialog will appear.

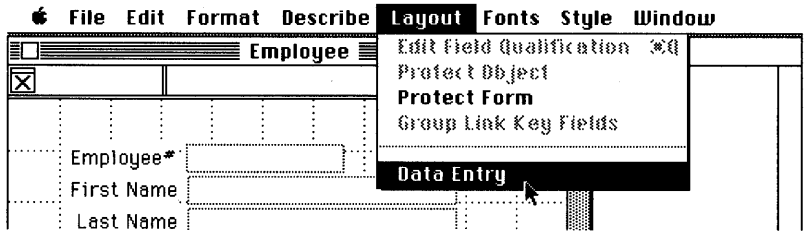


**Click on the radio button next to "Dollars". Then enter the number "2" in the box just below the last radio button - this ensures that only two digits (the cents value) will appear after the whole dollar amount. Click on the OK button.**

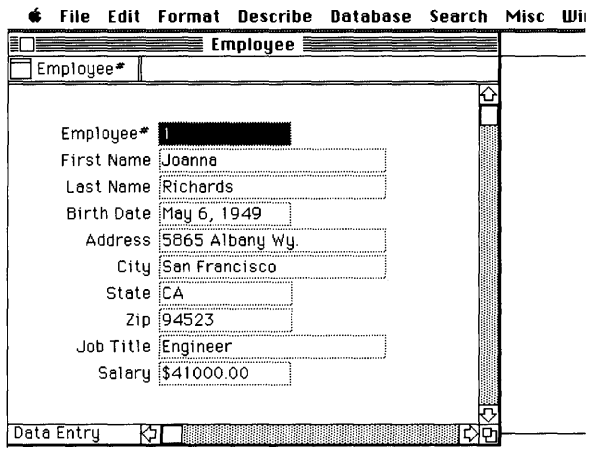



Now you can see the effect of the two display format changes.

**Go to the Layout menu and select Data Entry.**




Selecting Data Entry from the Layout menu switches the layout window back to a data entry window and displays the first record in the file. Note that the grid lines are gone, and you now cannot select the field labels or make any other major design changes.




You have now made some major changes to the original Employee file.

- The database file Key has been changed from FirstName, LastName to the Employee# field.
- Some labels have been reformatted.
- Some fields have been resized.
- The Employee# label and field were moved to the top of the data entry form.
- The default display formats of the BirthDate and Salary fields were changed.

In addition to the above changes, you could have:

- Moved individual fields and labels, or groups of fields and labels, to any position on the form.
- Made the data entry form look like a form you currently use for recording data (by pasting in a form design created with any Macintosh graphics application).
- Changed the font and font size/style of labels and/or fields.

- Displayed the values within the fields differently. There are options for positioning field contents Left, Right and Center in the Format menu.

- You could have also created a "comments" type label which can be of variable size (depending on how much text you wish to enter) and which may provide appropriate guidance for the person doing data entry.

## Reporting on the Employee Database

Some example reports you may wish to produce from the Employee file using QueryBuild or direct formula panel entry are given below. Unlike the earlier examples given in the section on producing simple reports, the reports shown here demonstrate how you can sort information in any order you wish - you are not constrained by the order of records in the database file itself.

**Example 1:**

- **List records of all employees by the Employee#, LastName, and salary fields only. Sort by salary.**

To do this:

**Go to the File menu and select New Report.**

A dialog will appear asking what type of report you wish to create.

**Select the first option - A table-style report on "Employee".**

Another dialog will then appear asking you to select the fields to include in the report.

**Select the Employee#, LastName, and Salary fields in that order, "including" them in the report by clicking on the Include button after each selection. When all three fields have been included in the Report Fields box to the right of the dialog, click on the OK button.**

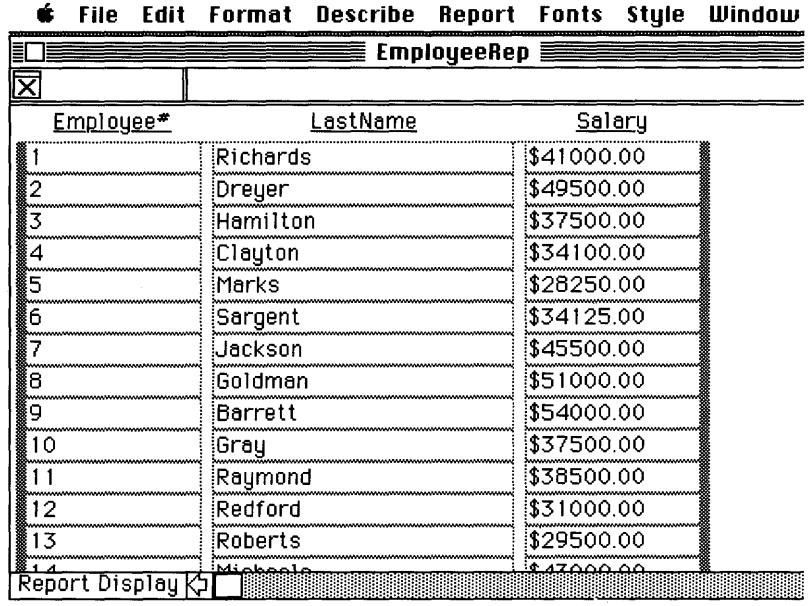
At this point, Reflex will display the QueryBuild dialog, in order that you may specify which records in the current database file you are interested in seeing. You'll want to see all of them at this point so:

**Click on the Find All button at the top right corner of the QueryBuild dialog.**

A standard file dialog will appear.

**Enter the name of the report you wish to create (if the name is already taken by another document, you will be notified of this). Click on the Create button.**

The report (here named EmployeeRep) should appear as below:



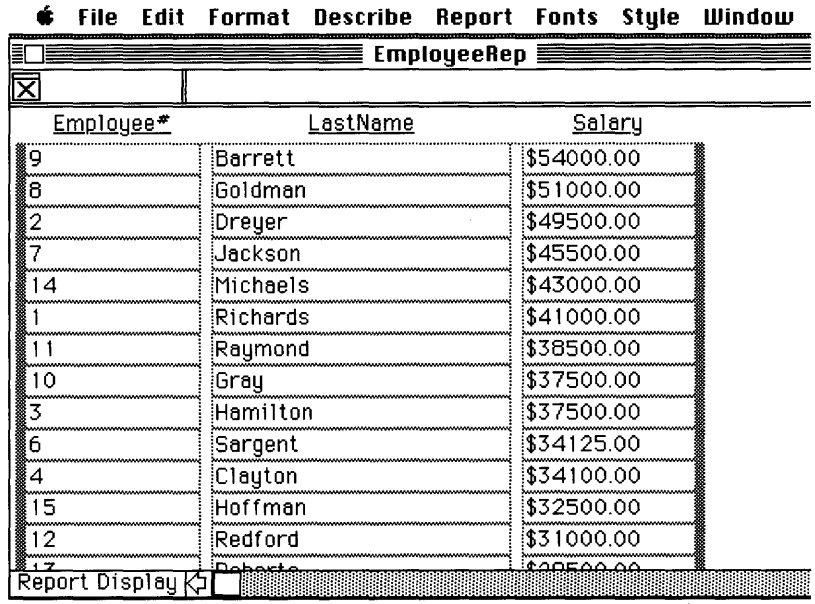

Currently, the report is sorted by the Employee# key field, but we want to see the records arranged in descending order based on the Salary field. To do this:

**Select the repeating collection by clicking on either of the vertical handlebars. Go to the Report menu and select the Sort On Fields... option.**

When the Sort On Fields... dialog appears:

**Select the salary field and then click on the button marked "Z...A,9...0". Click on the OK button. Finally, recalculate the report with the ⌘= shortcut.**

The newly sorted records should appear as below:




**Example 2:**

**• List records for employees that have a salary greater than $35,000 by LastName and JobTitle only. Sort by JobTitle and LastName - in that order.**

Rather than adding to the current report:

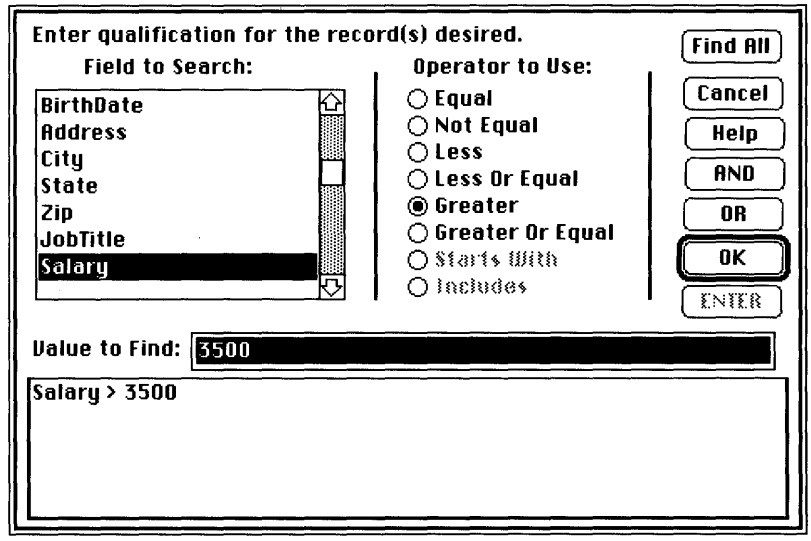
**Just click in the close box located at the top left corner of its window. Then go to the File menu and select the New Report option.**

A dialog will appear asking you to select the type of report to be created.

**Select the first option - a Table-Style report on "Employee". When the report field dialog appears asking you to indicate the fields to include in the report, make the necessary selections (LastName, JobTitle) and click on the OK button.**

The report field dialog will go away and the QueryBuild dialog will appear.

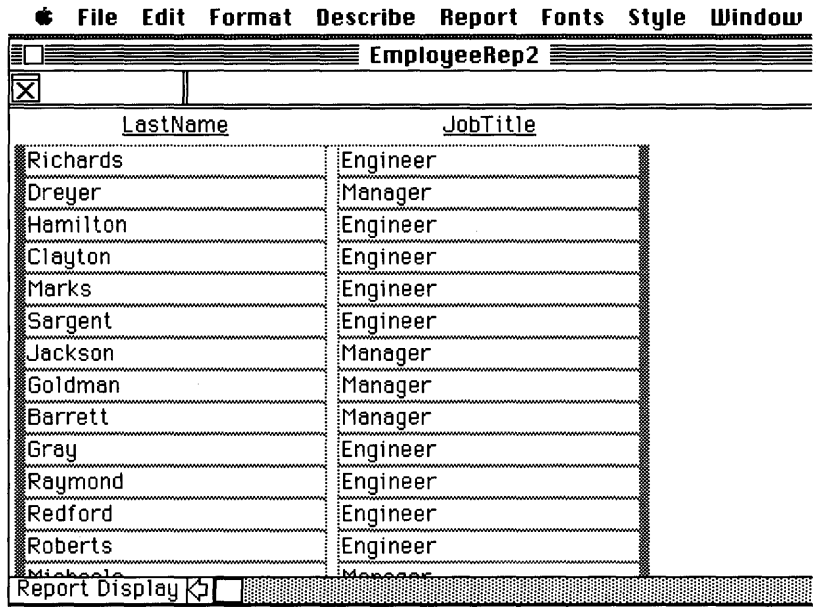
**When QueryBuild appears, select the Salary field name (you will have to scroll down the list of names in the Field to Search box) and enter the record qualification shown below:**




Note that the qualification "Salary > 35000" appears in the display at the bottom of the dialog only after you enter the number in the Value to Find box and click on the Enter button.

**Once the qualification is entered, click on the OK button and supply a name for the report when the standard file dialog appears.**

Reflex will now produce the report for you. It should appear as shown below (this example report is called EmployeeRep2):




Sort this report by JobTitle and LastName.

**Select the Sort On Field... option from the Report menu. Next, select the JobTitle field and click on the A...Z,0...9 button.**

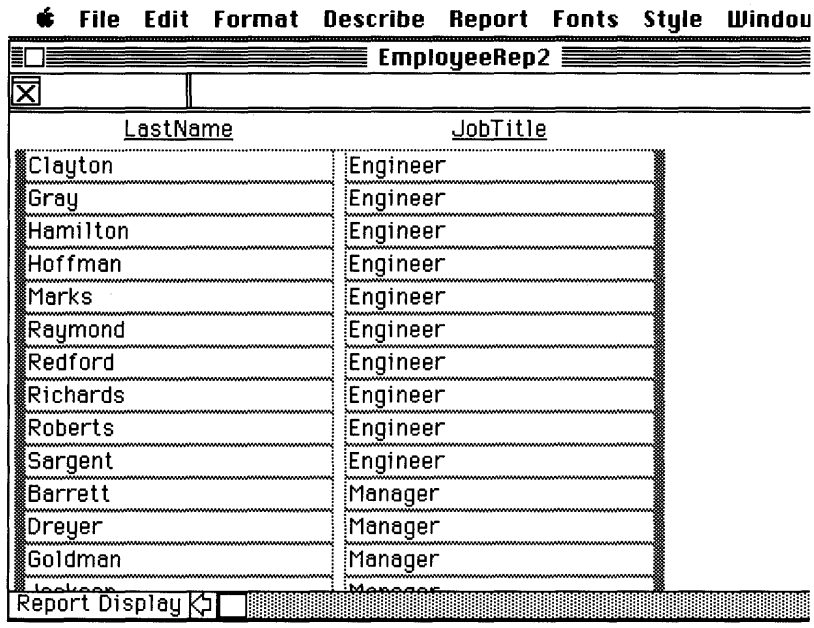
The JobTitle field name appears in the Sort Fields box on the right of the dialog.

**Now select the LastName field. Click on the A...Z,0...9 button again.**

The LastName field name appears in the Sort Fields box immediately under the JobTitle field name.

**If everything looks correct, click on the OK button and then recalculate the report with the ⌘= shortcut.**

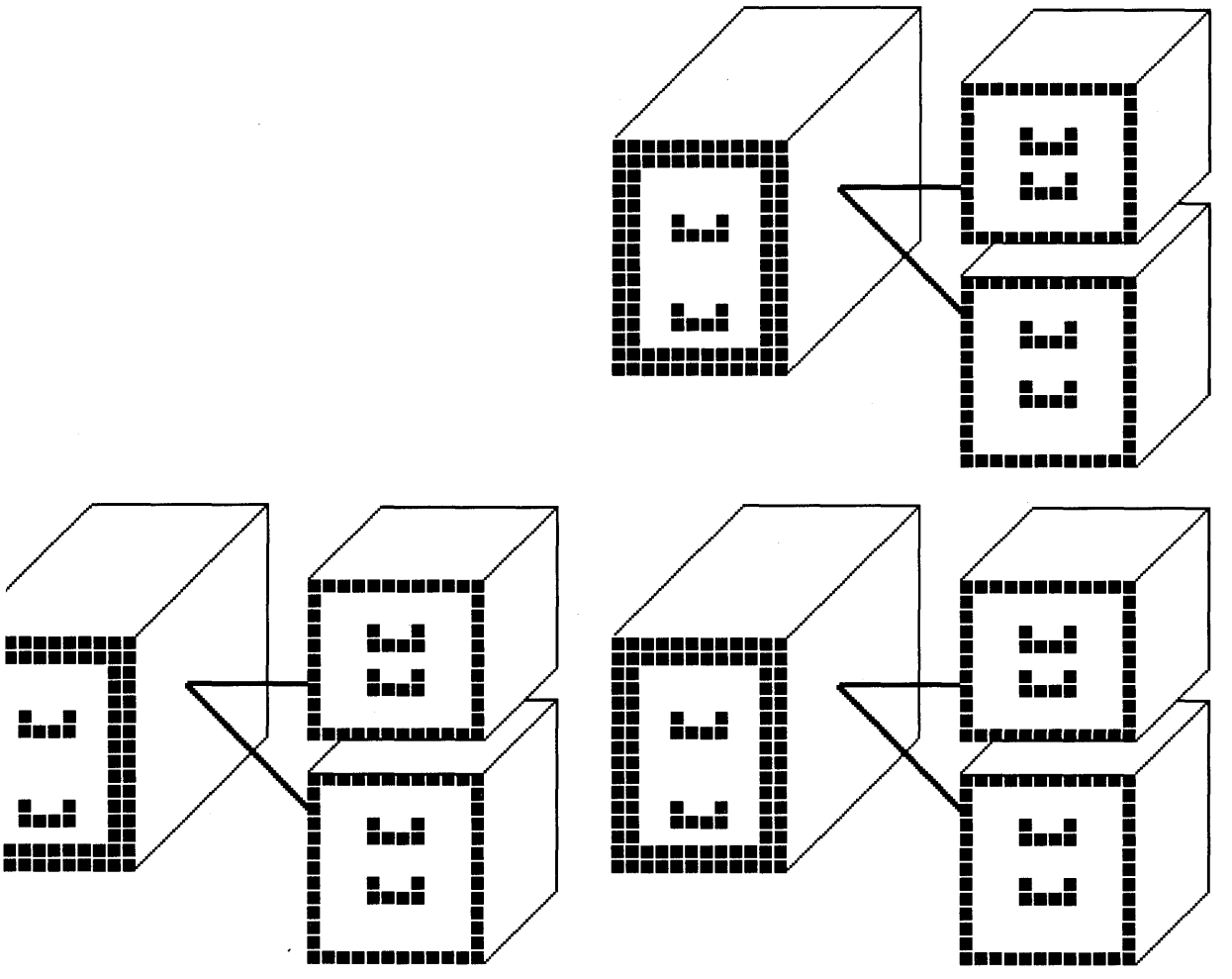
It should look like the one shown below:




If you wish, you may now print the reports you have created or design some completely new versions. Just ensure that you work with a copy of the Reflex program disk and that you do not alter any of the files on the enclosed Examples disk since you will be needing them for Section Two.

Although you have only been dealing with single file databases so far, you can still use Reflex's powerful functions and formulas -you don't need to create multiple file databases to become eligible. Specific information on Reflex functions and formula use can be found in the relevant sections indicated in the contents page - Section Two is recommended reading, however.

# Section Two: Multiple Files



## Multiple Database Design

Deciding what is and what isn't a "good" database design is a tough job.

You may think that by consulting a set of approved rules the task would be made much simpler: after all, there are grammatical and syntactical rules for writing letters, with or without word processing programs; similarly, there is an analogous mathematical "grammar" for producing accurate numerical information with or without computer-based spreadsheets.

Unfortunately, while there are well defined concepts and techniques for building useful databases, it is extremely difficult to discuss them in general terms. Just as the law cannot have rules that are as complex as all the situations that people find themselves in, the rules of database design cannot be made to account for each and every type of application that needs to be developed.

In this Second section, you will begin using Reflex's features to design and create multiple file databases. To begin with, the databases will be of fairly limited sophistication. By the end of the second section, however, they will be powerful enough to provide quite complex information.

## A Single File Database

The illustration below shows, in table fashion, a single database that contains information about the stocks owned by a group of people; this example has been chosen more for simplicity of presentation than real-world accuracy.

| FirstName | LastName | Tel# | Stock1 | Stock1_Amt | Stock2 | Stock2_Amt |
|---|---|---|---|---|---|---|
| Frank | Smith | 303 444 2777 | Great Northern | 10 | Canyon Oil | 100 |
| Mark | Johnson | 991 011 1021 | Solgen | 240 | Apex Chemicals | 15 |
| Patricia | Roberts | 772 403 1254 | Revstar | 143 | Great Northern | 200 |
| Alice | Springfield | 449 320 0417 | Zenith Paper | 300 | Revstar | 90 |
| Roger | Davis | 566 404 7777 | Canyon Oil | 24 | Solgen | 500 |

Notice that:

- In our example, we are modelling individuals who own a number of stocks. Our file is designed to show two stocks per stockholder when we read each record in that file.

- Each row of the table is known as a record. Each record must be unique in that no two records may have exactly the same values in the key. Our single file example lists information on five stockholders and therefore contains five records.

- The unique column headings (FirstName, LastName, etc..) allow us to attach some meaning to the entries that appear below them. Therefore, the names of all the individuals who hold stocks are listed in the FirstName and LastName columns. The column headings are the names of the fields that go to make up records.

## Limitations Of The Single File Database

The arrangement shown above, is one of a few possible designs for a single file database of this form. There is little margin for improvement.

While information can be successfully entered into and reported from this database, it will eventually become obvious that the way the data is arranged in each record limits, or complicates, the types of queries that can be made of the database as a whole.

For example:

The request: "List all those stockholders who own Canyon Oil" would appear to be trivial, but it is not. We can obtain the relevant information but only by asking the question in a clumsy manner:

Stock1 = "Canyon Oil" OR Stock2 = "Canyon Oil"

- We have to ask for both stock values to be checked because we cannot be sure that Canyon Oil will always be listed as Stock1 for every holder.

- We cannot even enforce an arbitrary rule that says only Canyon Oil can be entered as the first field because, as the table shows, not every stockholder owns the stock.

What if we wanted to list the total amount of one stock - Revstar, for example - held by our stockholders?

We have to tell the database program to look through both stock name fields for the value "Revstar" and upon locating any such entry to move over to the relevant stock amount field and note the Stock_Amt. After all Revstar fields have been found, the program must then sum (add up) each of the stock amount values. We would achieve this with the following formula:

SUM(Stock1_Amt from Stocks where Stock1 = "Revstar") +
SUM(Stock2_Amt from Stocks where Stock2 = "Revstar")

These difficulties are trivial when compared to the following development:

- How do we handle the event when a current stockholder buys a third stock?

Clearly, we can go back and add an extra pair of fields to the file design so that Stock3 and Stock3_Amt can be entered. But what happens when somebody has four or five stocks? What number of fields will handle all occurrences of stockholder purchases?

If we feel that ten stocks might be a realistic limit, or make the decision that we will not accept any client that has more than ten stocks, we are still only compounding some very real design flaws.

Most stockholders will have fewer than the maximum number of stocks and therefore each record will contain many empty fields. Such a database becomes increasingly wasteful of disk storage and is clearly a poor design. (Also, be aware that any reports you created for this file will have to be updated to take account of all new fields and their names).

Further, querying the database file becomes acrobatic in that each of the ten stock fields of every record must be checked, say, to find out who owns a particular stock or set of stocks. Also, the performance of the database - in terms of time taken to respond to a query - will become more and more unacceptable as additional stockholders are entered.

## A Multiple File Database Design

There is no hard and fast rule about when you should adopt a multiple file database design approach. What we can say is that a database must be able to cope sensibly with most of the complexities a particular application will require.

In addition to the deficiencies mentioned earlier, most users will also find the Stocks database just described to be inelegant: There are a large number of fields which may or may not contain information; Each record may be too large to fit neatly on the computer display; Formatting printed reports neatly on a single page could be quite difficult or impossible.

Now let us consider how to go about designing a more practical, multiple file version.

Basically, Reflex can be said to provide a way of storing information about "objects" or "events" in multiple files that are connected together by means of Links.

When we use the words "object" or "event", we're really talking about identifying the individual real world items about which we wish to record data.

## Objects

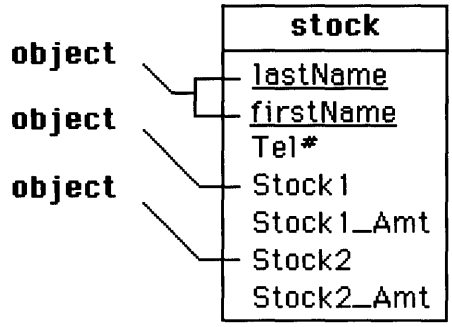
- In our example database both the person (as identified by the firstname and lastname fields) and stocks (as identified by their names) are objects.

Which objects are used in a database design depends very much on the type of real world situation you are interested in; specific applications can be modelled in a number of ways. In the current Stocks database design we are interested in storing information about a group of stockholders and the stocks they own. The database file contains three objects:

- The first Object is the person we are wanting to store information about - A Key of lastName and firstName is used to identify this object.

- The second Object is the name of the first stock that the person may own - Stock1 is the name used to identify this object.

- The third Object is the name of the second stock that the person may own - Stock2 is the name used to identify this object.




An Object only identifies the thing we are going to record data about - it does not really tell us much about its qualities. For this we rely on Attributes.

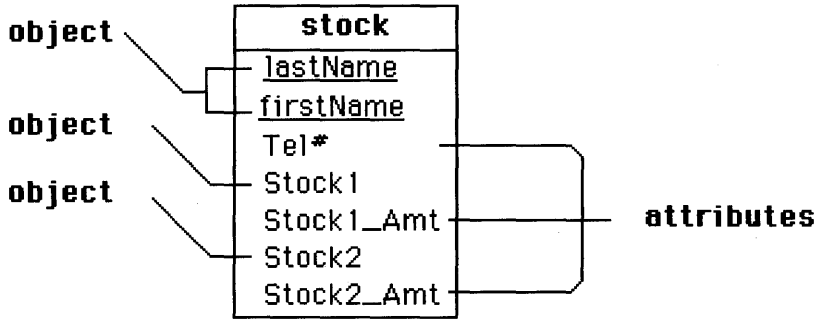
## Attributes

An Attribute is a feature or property of an object.

For stockholders these would be a firstname, an address, a telephone number, or even a birthday. For stocks these might be the amount of stock owned, the price of the stock, or the type of stock.

In the Stocks database file:

- The first object - the person - has a single attribute called Tel#.
- The second object - the first stock - has a single attribute called Stock1_Amt.
- The third object - the second stock - has a single attribute called Stock2_Amt.

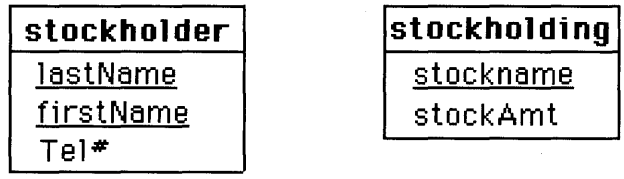


## A Multiple File Stocks Database

There are two major changes we have to make to the single file Stocks database in order to have it function more efficiently.

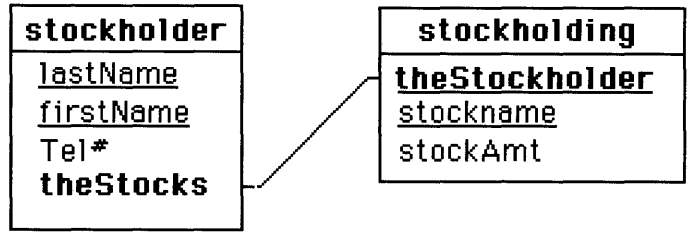
First, place all logical groupings of objects into separate database files; if we do this with the Stocks database, we end up with two files.

One file- called stockholder - only contains information about the people who own stocks. The other file - called stockholding - only contains information on the stocks that these people own.




Notice that the two files can store the same information as the original single file design, only now, the person fields and the stock fields exist separately. Naturally, this means that there is no way to find out which people own which stocks.

Therefore, the second step is to connect the records of these files with **Links,** which appears in Reflex as shown below:



• The stockholder file has a key (lastName and firstName) that will uniquely identify each record.

The new **Collection of Links**, which we've called **theStocks**, has been included to associate each record in the stockholder file with records in the stockholding file (more on this in a moment).

• The new stockholding file has its own unique key combination (**theStockholder**, and stockName). The Link called **theStockholder** is the "other side" of the **Link Collection** called **theStocks** that now exists in the stockholder file. It has been included to associate each record in the stockholding file with the corresponding record in the stockholder file.

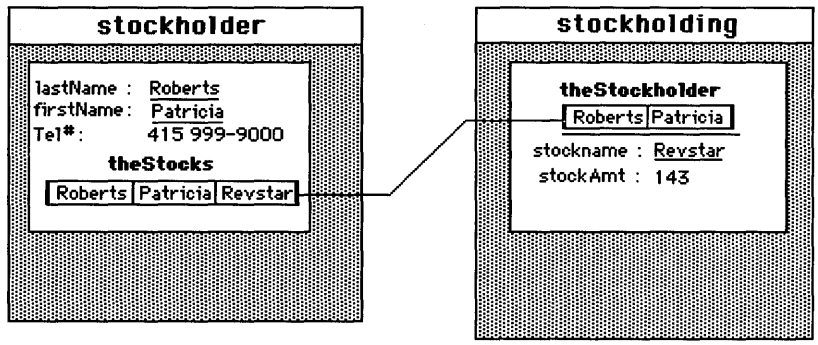
To explain why you need the Links in the new two file design, we must consider the ways in which the records in multiple files can be related, or connected.

## Linking Records In Different Files

When you wish to create multiple file databases with Reflex you cannot be vague about the nature of the relationship between the records in each file involved; there are only a few possibilities to choose from and you must choose the most appropriate one if the system is to function appropriately.

## A Link to One Record

The simplest association between a record in one file and the records in another, can be set up by choosing "A Link to One Record" from the Describe menu. You might use this relationship if you had to set up a multiple file system to store information on a stockholder who owned only one stock (although this is a rather unlikely reason to create a Stocks database). This is specified in Reflex via the "A Link to One 'stockholding' Record" option in the Describe menu. A link between records is shown on the next page.



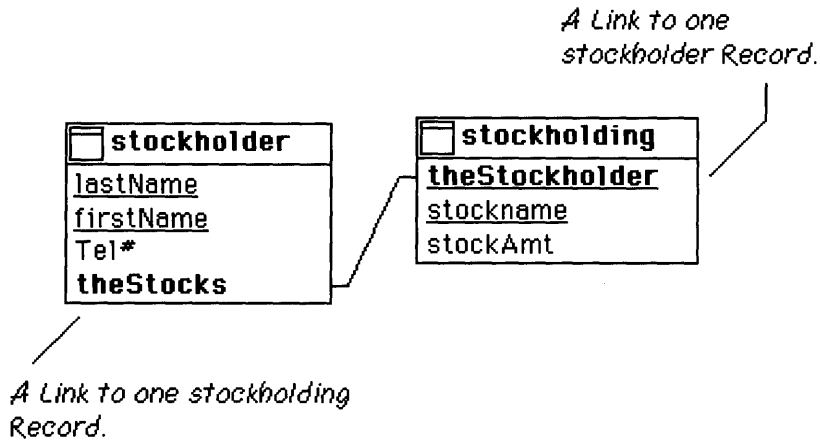

Here we have one stockholder record and one stockholding record, connected by a link line. The objects which the line connects are called Links and they always exist in pairs. A Link does what its name suggests - it links records in one file to records in another file.

In our example, the Link in the stockholder file, which we've called **theStocks**, uniquely identifies an associated record in the stockholder file which contains a matching Link called **theStockholder**. This specific stockholding Link, in turn, uniquely identifies the associated record in the stockholder file which contains the Link called **theStocks**. In other words, if stockholder "A" is linked to stockholding "X" via **theStocks**, then "X" is linked to "A" via **theStockholder**.

• Following the link line from the stockholder file to the stockholding file we can say that the Link called **theStocks** will link with at most one record in the stockholding file; this is what we set by using the "A Link to One Record" option in the Describe menu.

• Equally, we can set the Link called **theStockholder** in the stockholding file to be "A Link to One Record" in the stockholder file. Then one record in the stockholding file will link with at most one record in the stockholder database file.

This database would actually appear as below in Reflex:

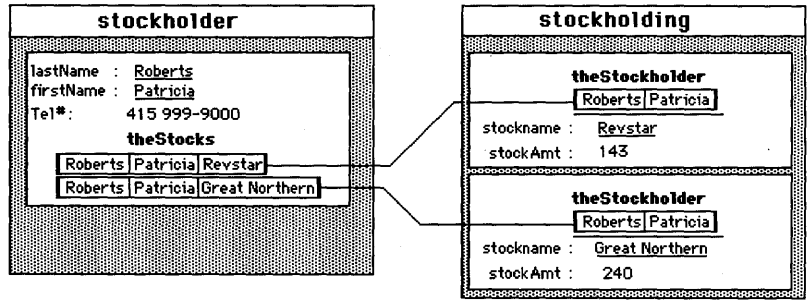



If you were to enter some data into a database with two files Alpha and Beta that are linked one to one, you would: fill in the Link on one end or the other to indicate which Alpha record is associated with which Beta record, or which Beta record is associated with which Alpha record. Reflex (with Link checking enabled), ensures that the record on "the other end" of a Link actually exists. The program also automatically fills in the symmetric Link in that record so that there is an association back to the record on "this" end of the Link.

## A Collection of Links to Many Records

So what happens when we progress to store information on a stockholder that owns more than one stock?

This is where you need to use **A Collection of Links to "stockholding" Records** from the Describe menu. We can visually represent this record association as:

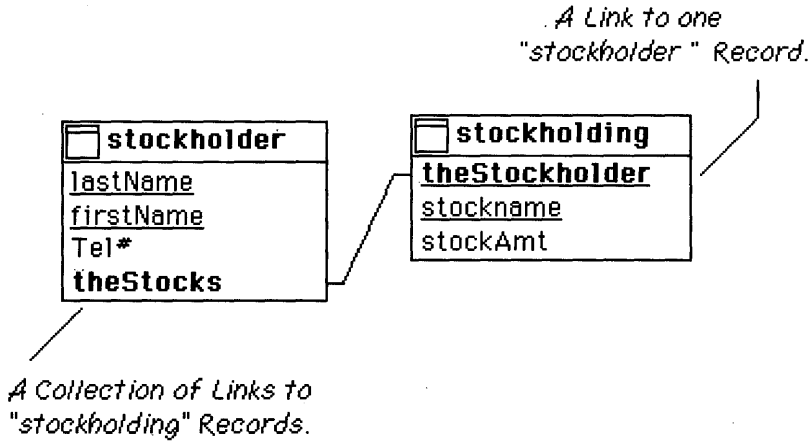


Here we have a situation where for every record in the stockholder database there may be zero or more linked records in the stockholding file. (It is important to note that this is only a representation of how the records may be linked. Reflex only requires that one Link line be drawn between associated file images. Complete details of how to do this are given in the tutorial that follows.)

- **theStocks** has now become **A Collection of Links to "stockholding" Records.**

- **theStockholder** will remain **A Link to One "stockholder" Record.**

This two-file database would appear as shown below in Reflex:

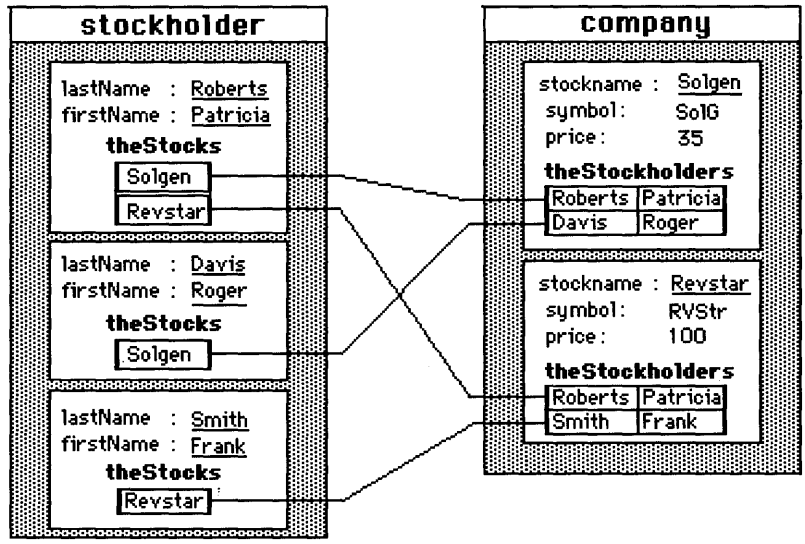



Even though this one-to-many record arrangement may seem to be quite adequate for the stockholder and stockholding database design, there is one other appropriate way to associate the records in separate files.

## Many Records

### A Pair of Link Collections to Many Records

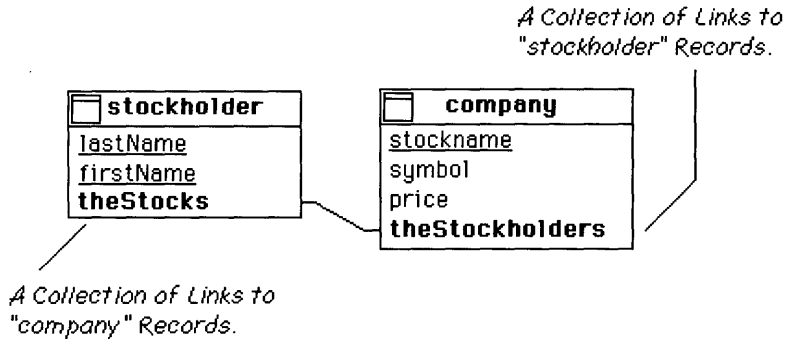
The two-file database example discussed so far is not the most appropriate database design in that it stores information primarily from the stockholder's point of view; its focus is on the individual's stockholdings. It is simple to redesign the example to more easily find out which stockholders own stock in a particular company; to do this we must use the arrangement where each end of a Link pair is a Collection of Links to records.




• The Stockholder file contains essentially the same fields as those shown in the previous example. The Link called **theStocks** is set as **A Collection of Links to "Company" Records**. This essentially says that "Stockholders may have many stocks".

• The Stockholding file has been renamed and altered so that it now stores information about each company (stockName, symbol, price) and a Link to each stockholder (**theStockholders**). The Link called theStockholders is set as **A Collection of Links to "Stockholder" Records**. This essentially says that "Companies may have many stockholders".

This database would appear in Reflex as shown on the next page:




The rest of Section Two provides a detailed look at how to design and create multiple files and how to search them for information.

## Building a Multiple File Database

The first multiple file database system that you will create with Reflex is based on the stockholder/stockholding design discussed under the title "Multiple File Database Design".

Although not a complete model to begin with, this stocks database will - by the time we've finished with it - be sophisticated enough to store information on any number of stockholders and the stocks that they own.

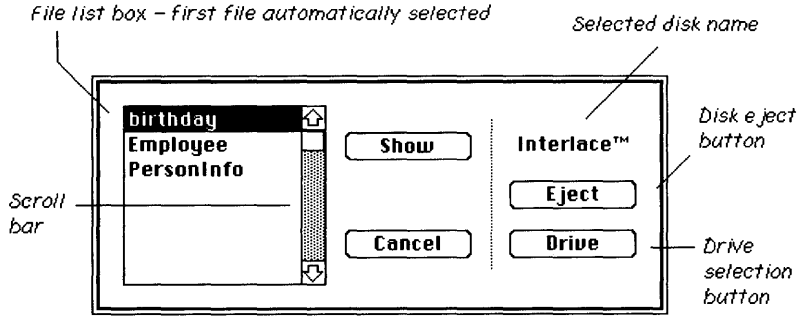
Initially, we only have a single file: Stkholder (remember that it is easier to refer to singular names than the plural when it comes to creating query formulas). You will learn how to create the second database file that you'll need - Stkholding - and then link the records in both files. Lastly, you will be able to rearrange these two files and add a third one to create a really useful stocks information database.

Although Reflex allows you to have many document windows open and many database file images displayed in the Overview window at one time, it will be a lot less confusing if we begin with a clear screen. So, before starting this tutorial section:

**Go to the File menu and select Close All Documents. To hide any file images in the Overview window, click on the status icon in each image.**

Next, you will want to take your first look at the current design of the Stkholder file.

**Go to the Overview menu and select Show Database File. A standard file dialog box will appear.**



This standard file dialog box has:

- A **file list box** with an associated scroll bar. The scroll bar allows you to move through a file list that is longer than can be displayed in the file list box. Select a file by clicking on it with the mouse.

- A **Show button.** Any selected file will be "shown" in the Overview window when you click on this button.

- A **Cancel button.** Clicking on this button will end the database file "show" process and send the standard file dialog away.

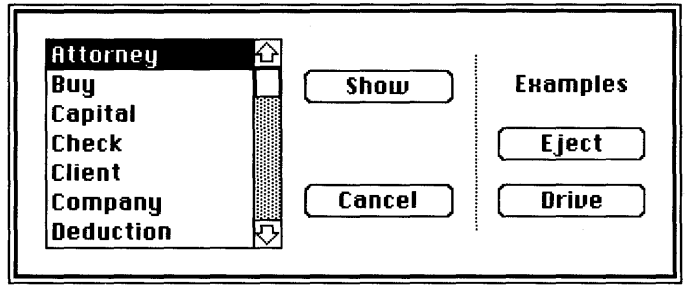
- The selected **disk name.** This informs you of the currently selected disk - it is the disk from which files may be loaded, or to which files may be saved.

- The **disk Eject button.** Clicking on this button will eject the currently mounted disk in the selected drive - this option is not available when the selected disk is a hard disk.

- The **Drive selection button.** Clicking on this button will switch you from the currently selected disk drive to another disk drive. The disk name and the contents of the file list box will be updated when new drives are selected in this way.

As you can see, the Reflex™ disk is currently selected. However, the database files you want are not on this disk, they are on the Examples disk you have been supplied with. To access them:

**Insert the Examples disk in the external drive.**

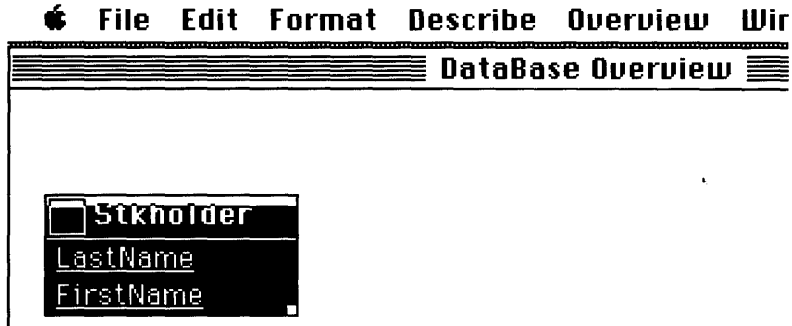



Notice that the disk name changes - from Reflex to Examples.

**Use the scroll bar to locate the file called Stkholder (the list of files may not be exactly as shown above). Alternatively, you can use the fast-find method: just press the "S" key to automatically select the first file that starts with that letter or type as many letters as necessary to identify the file you are trying to locate (i.e. "stk").**

**When you locate the Stkholder file, select it with the mouse and click on the Show button.**

The Stkholder file image will appear in the Overview window. It will already be selected for you.




As you can see, it already contains some basic fields for each stockholder. However, it would be much better if we added a few more fields, so that we can store information on a stockholder's address and maybe even their telephone number.

**Since the file image is already selected, go to the Overview menu and select Insert Field.**

A space for the new field appears just under the lowest existing field.

**To enter a new field name just type: Address**

For the next field you can use the shortcut method of inserting a new field.

**Press the Return key; another field space appears.**
**Type: City**

**Repeat this procedure for the remaining fields listed below.**

**State**

**Zip**

**Tel#**

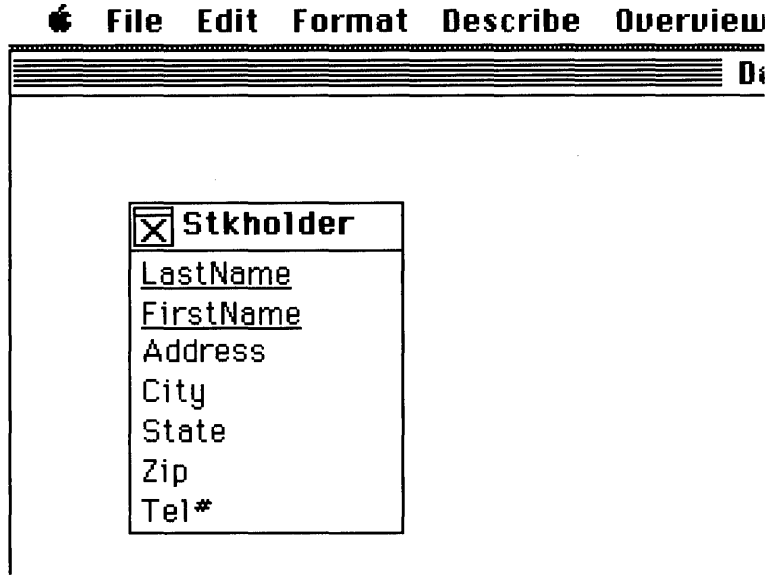
All the new fields you've entered are Text fields. Since Reflex automatically creates new fields as text fields, you don't have to alter them in any way.

One field that may at first appear to be a Number or Integer type field is the telephone number field which we've called Tel#. However, this must be a text field because it is not a valid number; it contains a space and the dash character (eg: 221 343-9999). Likewise for Social Security Numbers, etc... Also, Text fields are sorted differently than Number fields.

| As Numbers | As Text |
|---|---|
| 1 | 1 |
| 2 | 10 |
| 10 | 19 |
| 19 | 2 |
| 20 | 20 |
| 21 | 21 |

**SORT ORDERS**

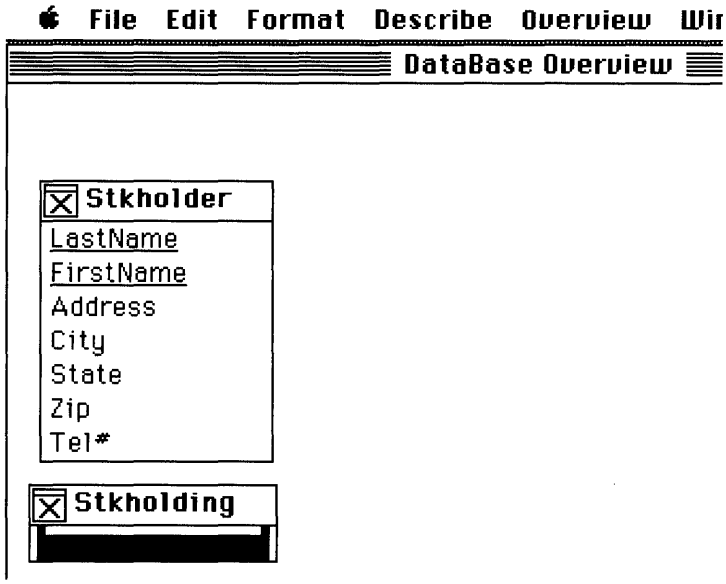
The Stkholder file should now appear as below:



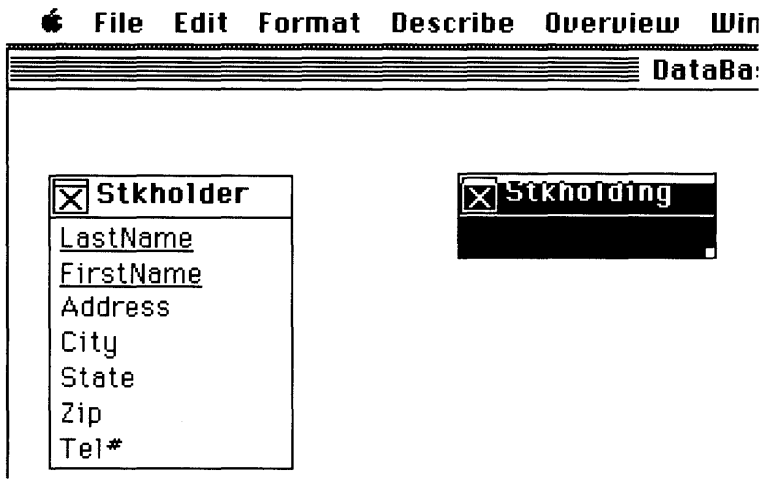

The X mark in the status icon at top left of the file image indicates that there are unsaved changes to the Stkholder file design. You could go to the File menu and use the **Save Design** option to save all your additions, but since we are about to make some other major changes, let's just move on.

**Go to the File menu and select New Database File. A standard file dialog will appear, asking that you provide a file name. Type: Stkholding and then click on the Create button.**

A new file image for Stkholding will appear in the Overview window, just underneath the Stkholder file image.




This second file will be used to store information on the stockholdings of each stockholder. Just so that these file images will be easier to work with, we will arrange them as shown below:



To move a file image:

**Place the cursor over the name bar of the file and press the mouse button. Be careful not to click on the mouse when the cursor is over the status icon since this will "hide" the file image. With the button still pressed down, pick up the file image and move it.**

File images may be moved around freely in the Overview window, but you cannot place one file image on top of another.

**To start entering fields in the Stkholding file, make sure that it is selected and then go to the Overview menu. Select Insert Field.**

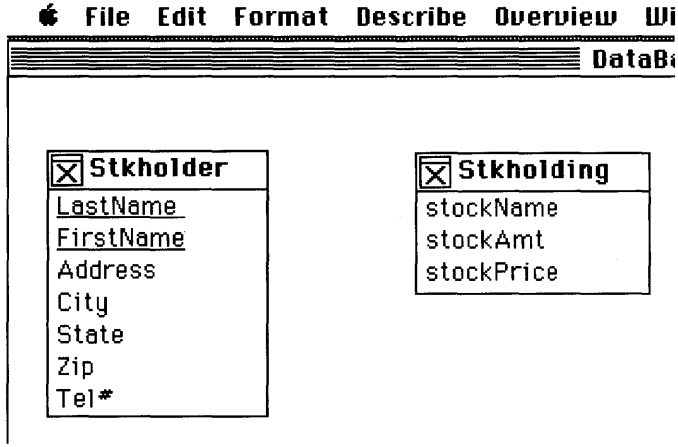
An empty field space will appear in the Stkholding file image.**You will need to enter the following fields:**

- **stockName**: This needs to be a Text field. It will be used to store the name of each stock.

- **stockAmt**: Since stockholders will always own whole stock amounts - there will be no fractions of stocks to store - this needs to be an Integer field . You could make this a Number field, but Integer fields take up less storage space, can be computed more quickly, and prevent the entry of erroneous fractional amounts.

- **stockPrice**: This needs to be a Number field since it will contain fractional money values.

Enter all the fields listed above into the Stkholding file until it appears as below:



Once you've entered all the fields, you must then set each field to th correct type. StockName is a text field so you can leave that one as i is. StockAmt and stockPrice have to be set as Integer and Number fields respectively.

**Select the stockAmt field by clicking on it. Go to the Describe menu and choose Integer Field.**

The stockAmt field is now of the Integer Field type and will only handle whole number entries (a check mark will appear next to this menu option when the stockAmt field is selected).

**Select the stockPrice field by clicking on it. Go to the Describe menu once again and choose Number Field.**

The stockPrice field is now of the Number field type and will accept whole number entries or floating point entries (whole numbers with a fractional part).

You now have two file images sitting in the Overview window. They each contain some of the fields that will be needed to store information on stockholders and the stocks that they own. How do you get the records in these two files to work together?

With Reflex, you associate the records in one file with the records in another file by using **Links** in each. Initially, a Link is just a name in the file image; it looks exactly like a text field until you use a link line to connect it with a Link name in another file image. On connecting two Link names with a link line, the names change to a bold font and they take on a special status in the Describe menu.

Be aware that you **cannot** create a Link line between two existing field names - Link lines can only be drawn between new field names in file images (these can be field names in completely new files or new field names added to existing files).

- When a Link is first created it is set as **A Link to One "..." Record**, where the actual name of a connected file is displayed within the quotes in the relevant Describe menu location.

- Alternatively, you may set a Link at either end of a Link line to be **A Collection of Links to "..." Records**, where the name of a connected file is displayed within the quotes in the relevant Describe menu location.

In the current example, you clearly want to make sure that every stockholder record in the Stkholder file is linked to every relevant stockholding record in the Stkholding file. First, let's make the connection between the two files and then discuss the procedure in more detail.

**Select the Stkholder file by clicking once on its name bar. Go to the Overview menu and choose Insert Field.**

A new field space will appear. This is where we will put the first name.

**Type: theStocks**

Right now, this new field looks just like the others - and in fact, it has a Text field type. Check this by selecting the new field and going to the Describe menu. There should be a check mark alongside the Text Field option.

Since a Link has to link to something, you must now create another name in the Stkholding file.

**Select the Stkholding file by clicking once on its name bar. Go to the Overview menu and select Insert Field. (Alternatively, you can just click on the last field in the Stkholding file image and press the Return key).**

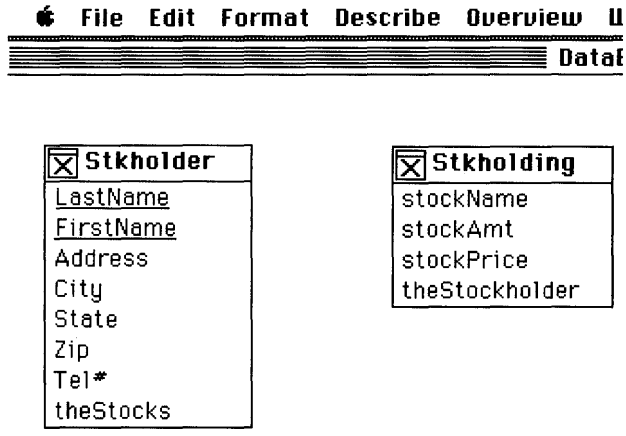
Now enter the second Link name.

**Type: theStockholder**

(It is important to note that the name you give a Link should never be the same as the name of the database file which contains the records it links to. This can cause errors when you start to use these names in formulas and queries to search for information since it will not be clear which name - the Link or the database - Reflex should search).

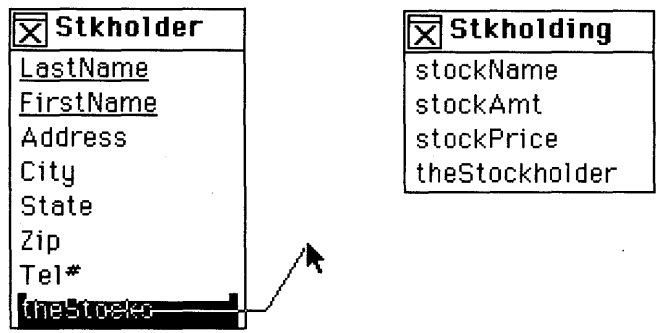
If the file image is not wide enough to accommodate any name you enter, just use the resize box at the bottom right of the file image to make it wider much as you would resize a window (click once on the name bar to select the file image - this will show the resize box).

This second name has a Text field type for now, too. The two files should appear as shown below:




Clearly, the names are not yet connected and therefore cannot serve any special purpose. To connect them:

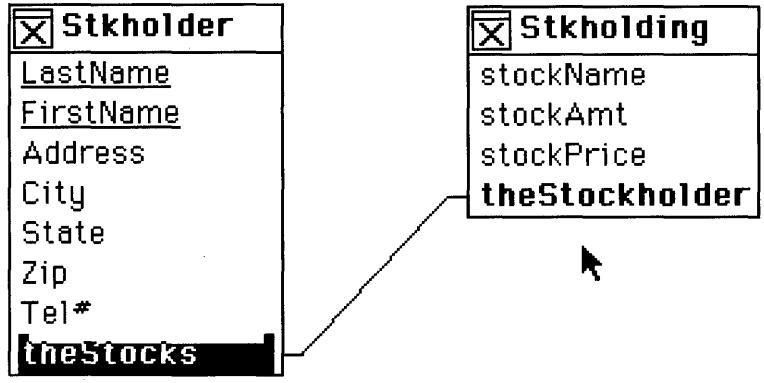
**Place the mouse cursor over the name called theStocks in the Stkholder file. With the mouse button depressed, move the cursor towards the second name called theStockholder in the Stkholding file.**



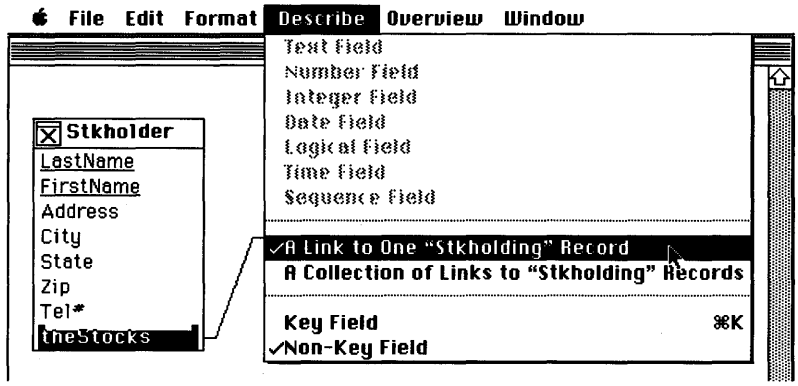
A line will appear as you move the cursor away from the Stkholder file and closer to the Stkholding file. This is the Link line we mentioned earlier; it will connect the Link names in both file images.

**To complete the link line, continue moving the cursor until it is over the name called theStockholders. When you have it centrally placed over this name, let go of the mouse button.**

The line will become permanent indicating that the two names are now connected. Also, notice that the names now appear in bold type, signifying the change from a simple name with a Text field type to a Link.




**Now check on the status of each Link by first selecting theStocks (if it is not already selected) and then going to the Describe menu.**




Notice that the Describe menu now indicates that theStocks is currently **A Link to One Stockholding Record** (there is a check mark to confirm this). What's the explanation for this?

When you completed the line between the two Link names you were actually telling Reflex that, until you say otherwise, records in the stkholder file and records in the stkholding file are associated in some way.

The only thing that you haven't told Reflex is what type of association this should be. The fact that theStocks is currently **A Link to One "Stkholding" Record** is simply due to the fact that this is the default setting.

There are two possible settings we can select for theStocks.

- One record in the Stkholder file can be associated to at most one record in the Stkholding file - A Link to One "Stkholding" Record.

- One record in the Stkholder file can be linked to zero, one, or more records in the Stkholding file - A Collection of Links to "Stkholding" Records.

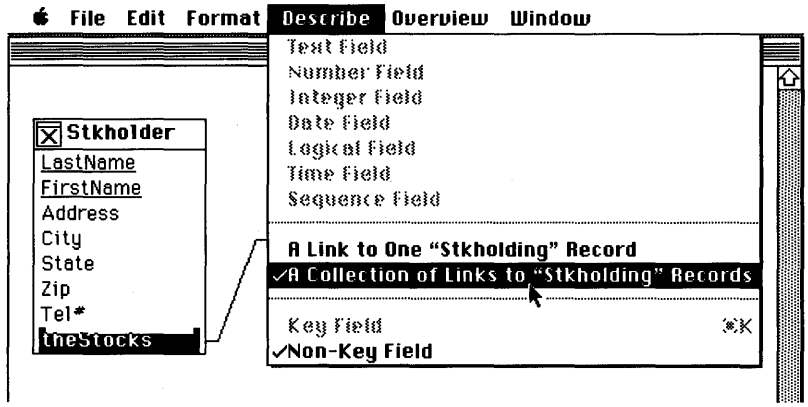
What would be the best option to use?

The first option (one-to-one) only allows you to store information on stockholders that own at most one stock. Stockholders typically own more than one stock.

The second option (one-to-many) allows you to store information on stockholders that own many stocks. This is the more appropriate record to record association to use.

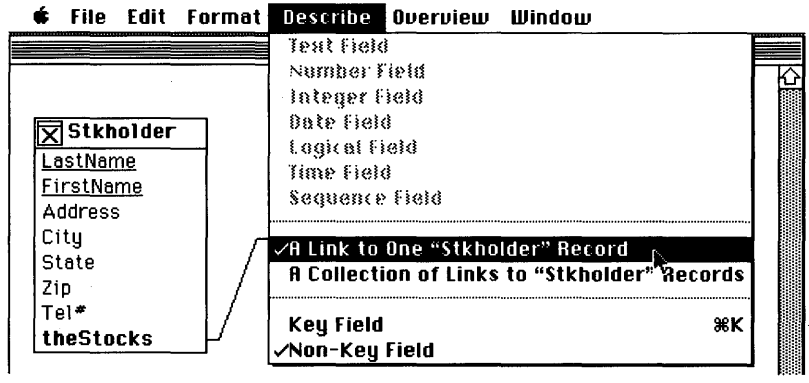
**Select the Link called theStocks and go to the Describe menu. Skip the A Link to One "Stkholding" Record option which currently has a check mark by it, and instead choose A Collection of Links to "Stkholding" Records.**

You have just set the Link called theStocks correctly - now each Stkholder record may be linked to zero or more stock records in the Stkholding file (the check mark is now alongside the A Collection of Links to "Stkholding" Records option).




Now see if you need to set the Link called theStockholder in the Stkholding file.

**Select the Link called theStockholder. Then go to the Describe menu and check its current setting.**



Notice that the default setting for the Link called theStockholder is *A* **Link to One "Stkholder" Record**. Is this correct?

Consider the following arrangements:

- Each record in the Stkholding file may be linked to zero or one record in the Stkholder file.
- Each record in the Stkholding file may be linked to zero, one, or more records in the Stkholder file.

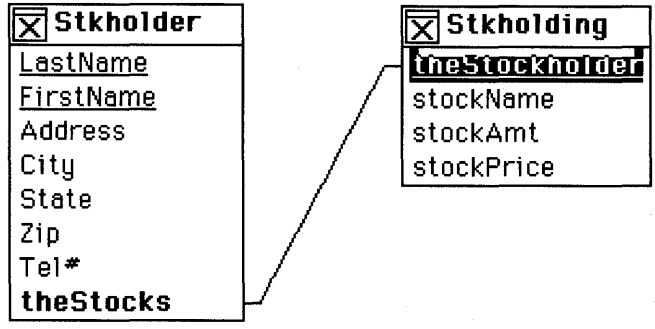
A Link to One "Stkholder" Record is the correct setting. This is because the two file database you are working with is designed to store information on individual stockholders and the collection of stocks that they each own. No attention is paid to storing information on the companies that issue the stocks and who the stockholders are for each of those companies.

Since the setting is correct, you can continue. All that is left to do is choose the Key for the Stkholding database file (Reflex requires that every file has at least one Key field). The correct Key is a combination of theStockholder and stockName.

For our purposes, this Key should ensure that the records in the Stkholding file will be unique.

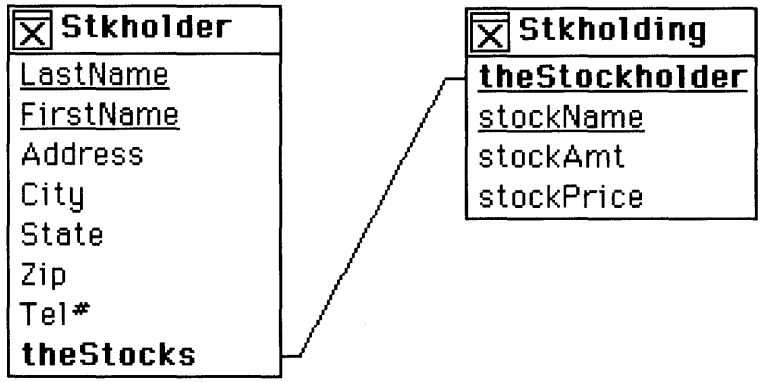
**Select the Link called theStockholder. Go to the Describe menu and select the Key-Field option.**

Notice that theStockholder jumps to the top of the field list in the stockholding file and that it is now underlined. The underline visually confirms that this is now a Key field.



**Select the stockName field. Go to the Describe menu and select the Key-Field option once again (or you can use the ⌘K shortcut).**

The stockName field is now also underlined.




Both files are now complete. You can now save their designs.

**Go to the File menu and select Save Design.**

Reflex will now save the file designs to disk and, when this procedure has finished, the X marks in the file image status icons will disappear. The files are ready to be opened, but to save you time, two files with the same design as Stkholder and Stkholding are provided on disk. They already contain information for you to work with.

**Clear the Overview window by clicking once on the status icons in the Stkholder and Stkholding file images - it does not matter which file you hide first.**

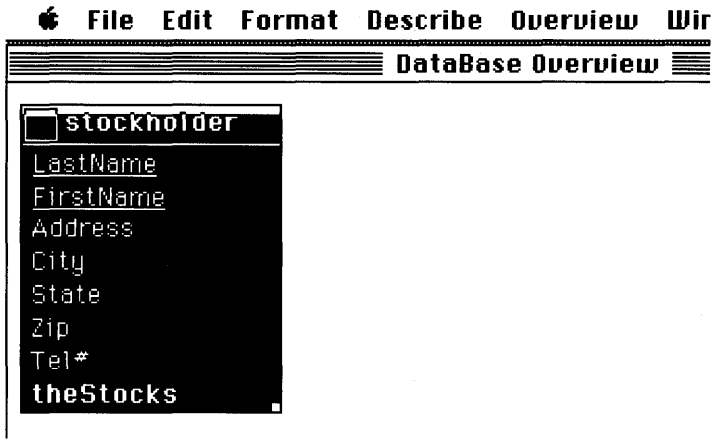
Now that the Overview is totally clear, you can show the already completed stock files.

**Go to the Overview menu and select Show Database File.**

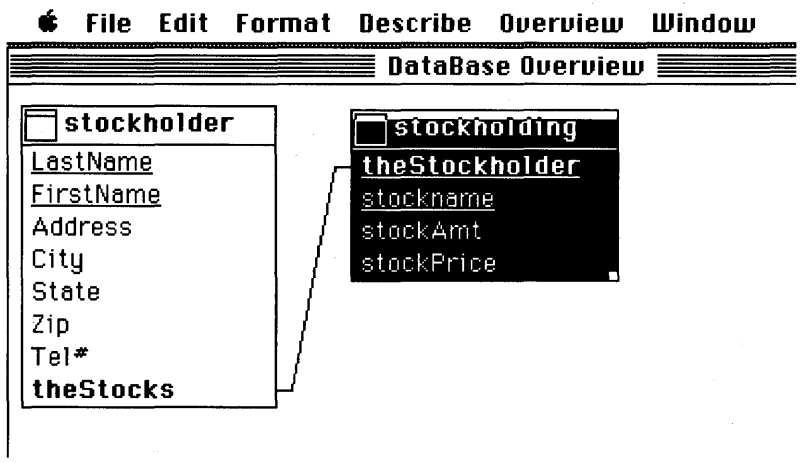
When the standard file dialog appears, asking that you select the file to be shown, locate a file called stockholder (the Examples disk must be selected for this to work).

**Select stockholder with the mouse and click on the Show button.**

The stockholder file image will appear in the Overview window - it will already be selected for you.



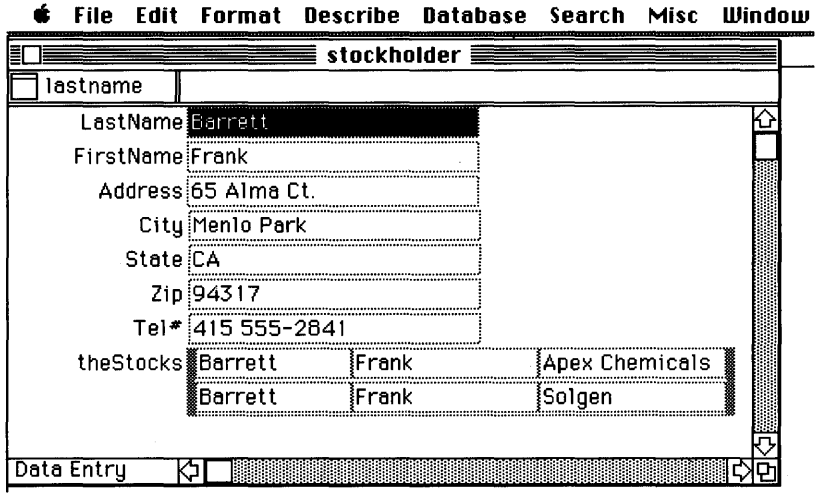

**To display the image of the linked file - it is named stockholding - use the Show Linked Files option in the Overview menu or the ⌘G shortcut.**



As you can see, the two new files are of the same design as the two you just created. Take a look at the information they contain-starting with the stockholder file.

**Double-click on the name bar of the stockholder file.**

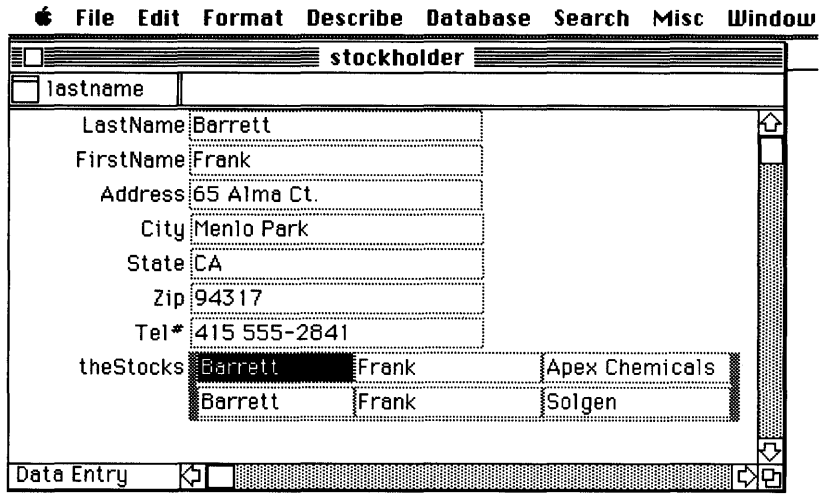
A data entry window for the stockholder file will appear in front of the Overview window. The fields in the data entry form should look like those shown below:



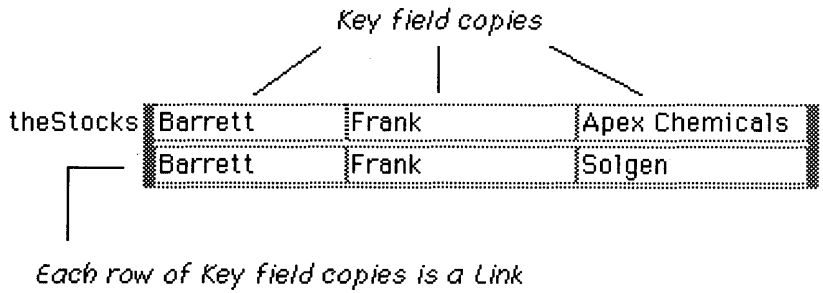

The first field in the Overview file image appears as the top-most field in the data entry form. To the left of each field appears a label; the default labels have the same names as the fields you entered in the Overview image. The first field - LastName - is already selected for you and its name appears in the name panel at the top left corner of the stockholder window.

You can always customize this form by going to the Database menu and selecting Form Layout but, for now, let's leave it the way it is.

**Use the Tab key to move down the fields until you get to the first Key field copy in the Link labelled theStocks.**




The major difference with the data entry forms that you were introduced to in Section One of this manual is the appearance of the Link Collection - here it's called **theStocks**. Notice its special appearance.




There are two sets of three fields arranged as rows inside the gray, box-like, **Collection of Links** called theStocks.

• There is a LastName field, a FirstName field, and a stockName field. These are copies of the contents of the Key in the stockholding file (theStockholder and stockName). Each row (a combination of the three key fields just listed) is a Link to one record in the stockholding file. You can check this by clicking on one of the Key field copies in any Link and going to the Describe menu.

Probably the best way to check what's going on is to open up the stockholding file and take a look.

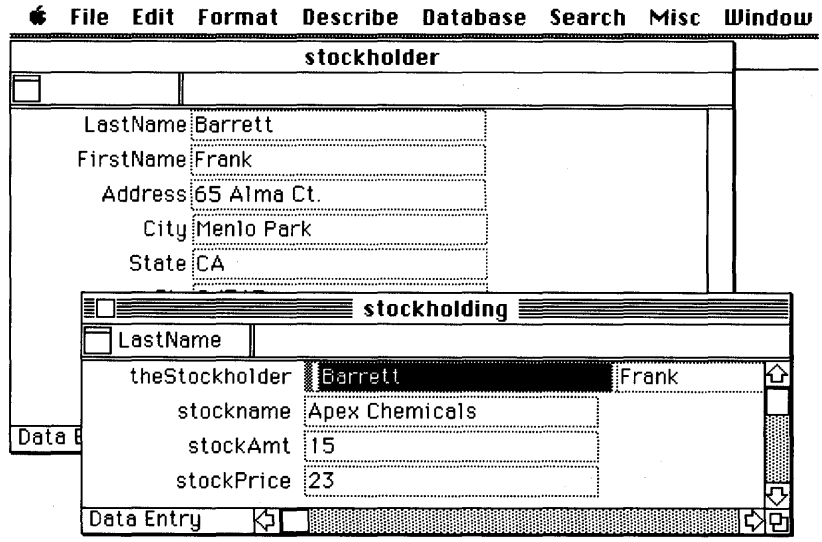
## Entering Information in Multiple files

**Select the first LastName field inside the Collection of Links called theStocks (confirm that you have done this by checking the name panel at the top left of the stockholder window). Go to the Database menu and select Show Linked Record or use the ⌘G shortcut.**

By selecting the Show Linked Record option you are asking Reflex to automatically open up the file that contains the record associated with the Link you are currently viewing. A window containing the linked record in the stockholding database will open up behind the stockholder window. Take a look at this second window:

**Go to the Window menu and select the "stockholding" window name.**

The stockholding data entry window will appear. It will contain the stockholding record which is linked to the Link you selected in the stockholder data entry window.



Notice that the Link called theStockholder in the currently active window contains the values of the first two fields (the Key) in the stockholder file. You can explore this record to record link in a very dynamic manner by changing the name of a stock that somebody owns.

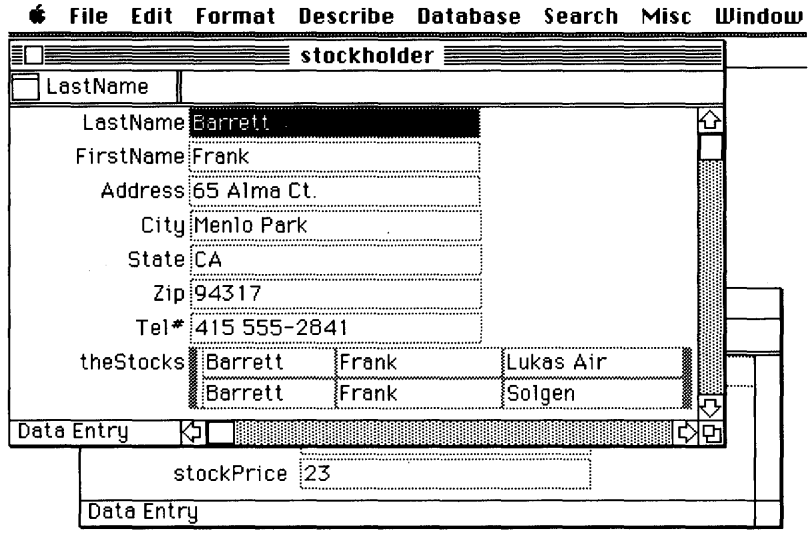
**Select the stockName field in the stockholding data entry form.**

Currently, the stockName field contains "Apex Chemicals"; let's put another stock name in and see what happens.

**Type: Lukas Air. Then complete the record update by selecting Enter Record from the Database menu or by using the ⌘W shortcut**

As soon as you confirm the new stock name by selecting the Enter Record option, Reflex automatically changes the list of stocks that are owned by Frank Barrett in the stockholder file. Originally, Frank Barrett owned Apex Chemicals and Solgen. After the update, Frank Barrett is correctly shown as owning Lukas Air and Solgen.

**Check this by making the stockholder window active - just select its name from the Window menu or click anywhere on it.**



As you can see, records in the two files are linked in such a way that changing some or all of the contents of fields that are part of the Key will automatically update copies of that information held in associated records.

Before we move on, you had better change the record you altered back to its original state just so the database information remains consistent.

**Replace Lukas Air with Apex Chemicals in the Frank Barrett stockholding record.**

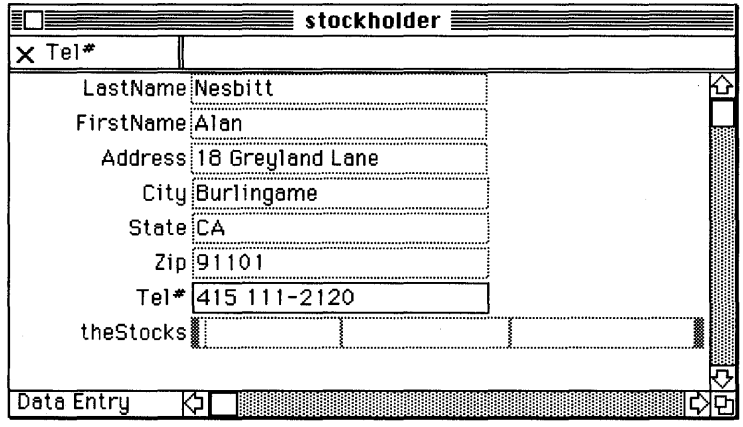
• So far, you've changed a record in the stockholding file and seen it update a linked record in the stockholder file.

To explore the other ways in which associations are maintained between records let's add a new record to the six that already exist in the stockholder file.

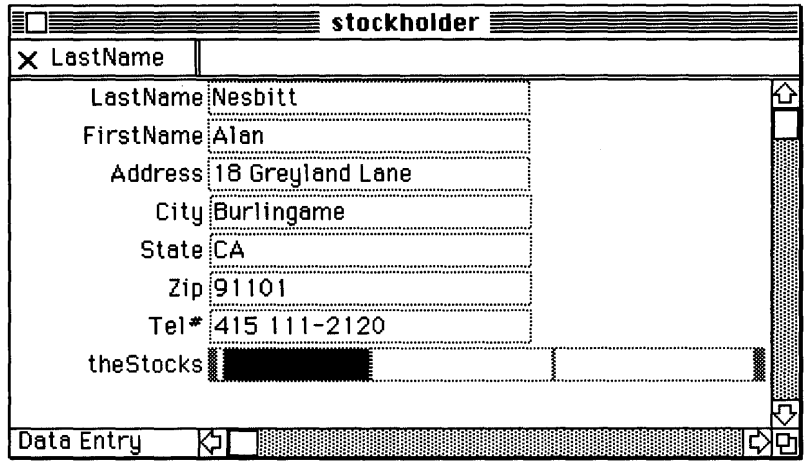
**Make the stockholder data entry window active. Go to the Database menu and select New Record (you can also use the ⌘E shortcut to do this if you wish).**

A blank new record will appear in the stockholder window.

**Type in the information shown below using the Tab key to move from field to field. Stop when you have entered the Tel# value.**

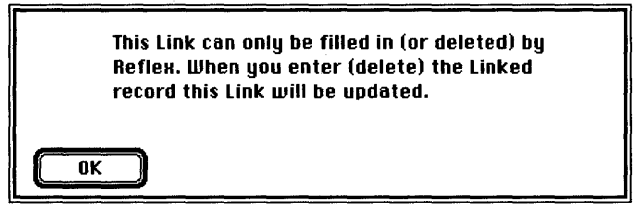


**Press the Tab key once again to select the first field in the empty Link called theStocks.**




**Begin typing as if you were about to enter some information into this empty field (type just a few characters).**

Instead of text appearing, a dialog box will be displayed informing you that you cannot enter anything into this Link:




Reflex is telling you that the Link you are trying to fill in is for display purposes only - the program will copy over all relevant information from an associated record in the stockholding file when that record is filled out (created). Until then, the empty Link must remain empty.

This dialog appears whenever you attempt to fill in a Link where the "other side" of the Link is part of a record Key; in the current case you are erroneously trying to fill in a Key field copy of a stockholding file record where no linked record exists.

To complete the procedure then, you must enter a related record in the stockholding file.

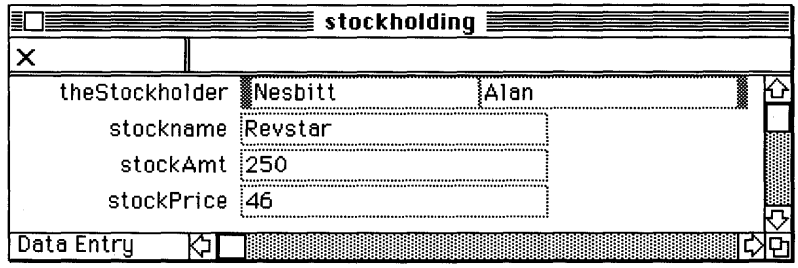
**Make the stockholding database window active by clicking on it or selecting its name from the Window menu.**

The stockholding database window will move in front of the stockholder database window.

**Create a blank new record by going to the Database menu and then selecting New Record or using the ⌘E shortcut.**

The first field in this record (the first field inside the Link called theStockholder) will already be selected for you.

**In this LastName field type: Nesbitt. In the FirstName field type: Alan. Complete the record as shown below.**

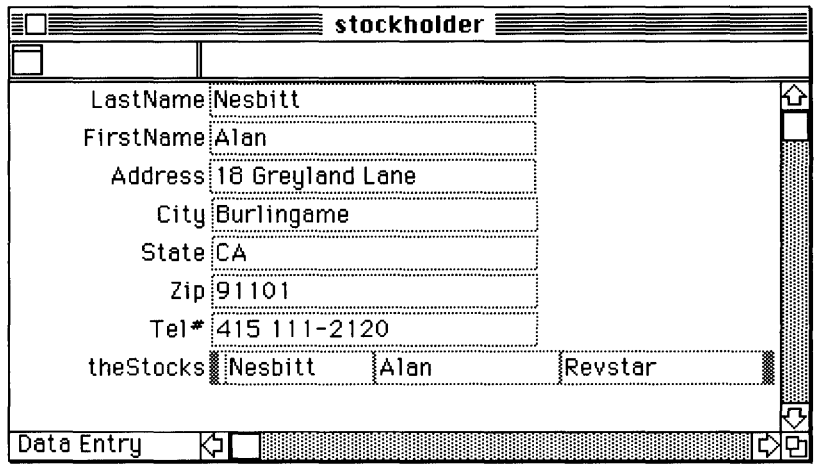



When you enter this record, Reflex will copy over information from the current stockholding record to the associated stockholder record.

**Enter the new record into the database by using the Enter Record option in the Database menu or the ⌘W shortcut.**

Reflex will not only enter the new record into the stockholding database, but it will also copy over the Key field information from this new record to the Alan Nesbitt record in the stockholder database. Check this by making the stockholder window active.

**Click on the stockholder window or select its name from the Window menu.**



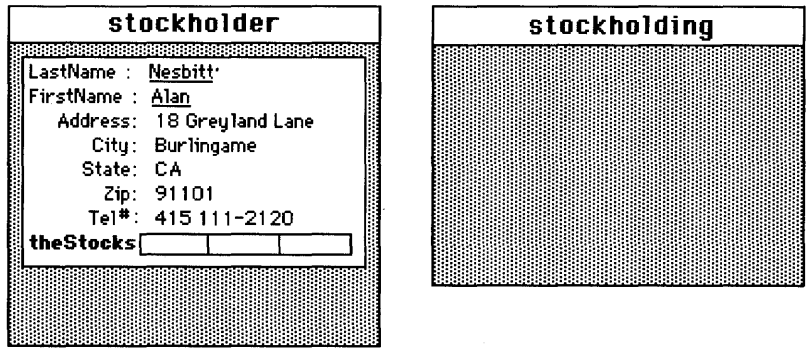

Reflex has copied over the last and first name (Nesbitt, Alan) and the name of the stock (Revstar) that you just entered in the stockholding file.

• Now you've seen how to enter a new stockholder record in the stockholder file and create a linked record in the stockholding file.

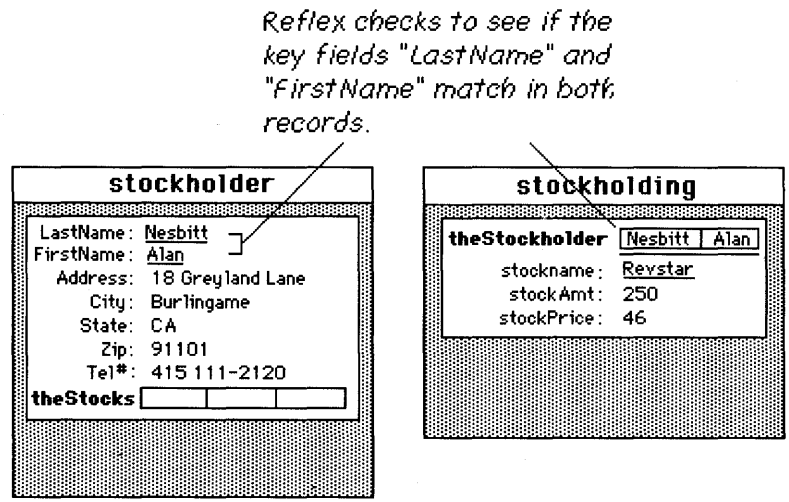
First, you created a record for Alan Nesbitt in the stockholder file. On attempting to enter data in the Link called theStocks, you found that Reflex didn't allow you to do this. The reason is that the Link called theStocks is intended to contain copies of the Key fields from an associated record in the stockholding file (this is only because the other side of the Link - called theStockholder - has been included as part of the Key). Reflex does not allow you to fill in "this side" of any Link where the "other side" is part of a record key.

In this particular database design, the procedure you've just gone through can be shown in a pictorial fashion as below:

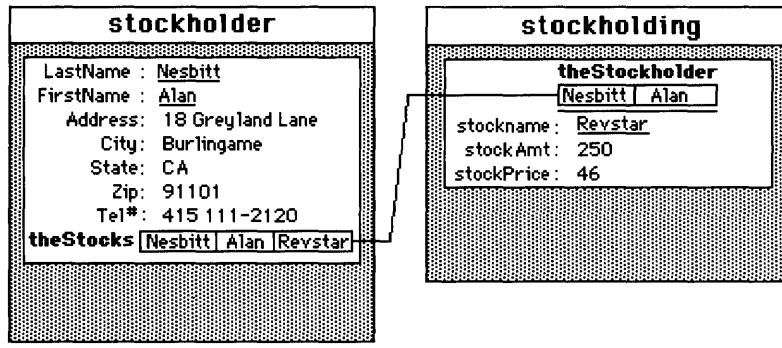
**Step 1:** Create a record in the stockholder file - notice that there is currently no associated record in the stockholding file.




**Part 2:** Enter a record for Alan Nesbitt in the stockholding file - Reflex will check to see if a stockholder record with the same Key - "Nesbitt, Alan" - exists.



**Part 3:** In this case the Key fields "LastName" and "FirstName" match, so Reflex will now copy over the complete Key (Nesbitt, Alan, Revstar) from the stockholding record to the Link called theStocks in the relevant stockholder record. This completes the record-to-record association.

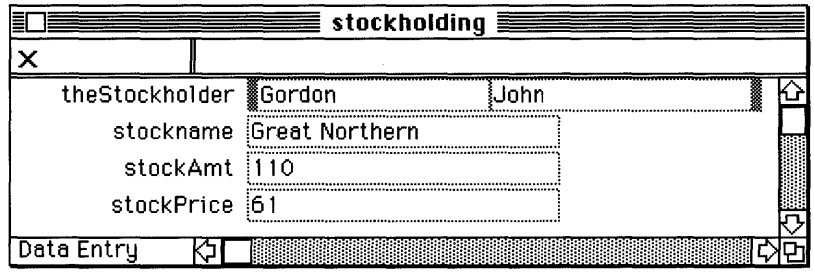



Reflex offers one more way of making sure that records are entered and linked correctly.

**Make the stockholding window active by clicking on it or selecting its name from the Window menu. Create a blank new record in the stockholding file by using the ⌘E shortcut.**

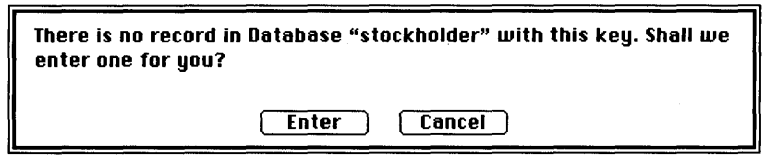
The first field in the new record will already be selected for you.

**Type in the new stockholding record as shown below:**



**When the record is completely filled out, select Enter Record from the Database menu to insert the record into the stockholding file.**

However, rather than entering the new record into the stockholding file, Reflex displays the following dialog:




To explain, this dialog is telling you that there is no record with the Key (Gordon, John) in the stockholder file.

- If you click on the Enter button, Reflex will create a stockholder record with the correct Key field entries (LastName will be "Gordon" and FirstName will be "John"), and the current stockholding record will be inserted into the database. The dialog will then go away.

- If you click on the Cancel button, the dialog will go away and Reflex will return you to the stockholding record that you just typed in. No associated record will be created in the stockholder file, and the current stockholding record will not be entered into the database.

**Click on the Enter button in the dialog.**

Reflex will now go ahead and create an associated record in the stockholder file.

**Check that a new record has indeed been entered by selecting a field in the Link called theStockholder in the stockholding window and choose Show Linked Record in the Database menu or use the ⌘G shortcut.**

This will display the relevant linked record in the stockholder window.

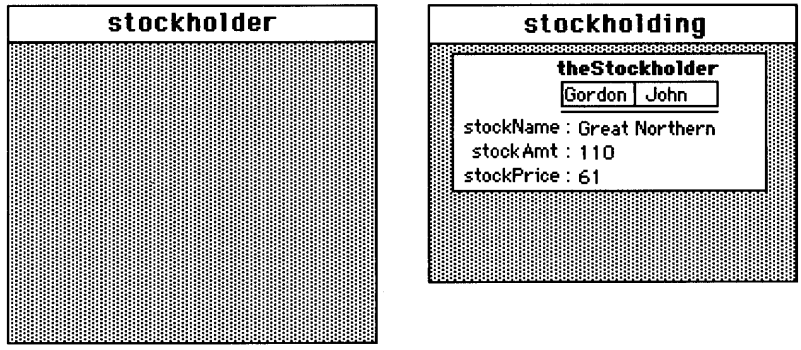
**Click on the stockholder window or select its name from the Window menu to make it active.**

The John Gordon record should now be visible. Notice that only the key fields of the John Gordon record have been copied over from the stockholding record by Reflex - you can now complete the rest of this record if you wish.

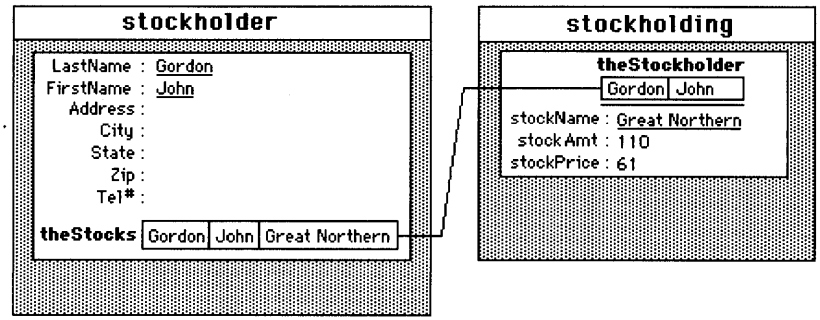
• You have now used Reflex's automatic record generation feature to enter a stockholder record based on the information supplied by you in a new record in the stockholding database.

Pictorially, we can show what has just happened.

**Step 1:** First, you filled in a new record (for John Gordon) in the stockholding file and then attempted to enter that record - Reflex did not immediately allow this since there was no record in the stockholder file with the Key "Gordon, John".




**Step 2:** A dialog appears asking if you wish to have Reflex automatically create a record in the stockholder file with the correct Key (Gordon, John). On clicking the Enter key on the dialog, Reflex then: creates the stockholder record, places the correct entries in the LastName and FirstName fields, and places copies of the current stockholding record's Key (the one you just entered for John Gordon) inside the Link called theStocks.




**To summarize, there are two main methods of entering information in the two connected files described above:**

• Enter the stockholder information first. Then move to the stockholding file and enter information there on the stocks and the people who own them.

• Alternatively, enter the stock information first and use Reflex's automatic record creation procedure to enter a linked record in the stockholder file.

For a more general discussion of how data may be entered when using multiple file databases, see the section entitled Details & Techniques.

The stockholdings database system described above has been presented more as an introductory design than one that you might use in real life. So instead of using it to demonstrate the advanced reporting features of Reflex, let's continue by looking at a more practical stock/stockholdings system that features three database files.

## A Three File Stocks Database

**Go to the Window menu and select Database Overview. When the Overview window appears, go to the File menu and select Close all Documents. Once all documents are closed, remove all file images from the Overview window by clicking on the status icon in each.**

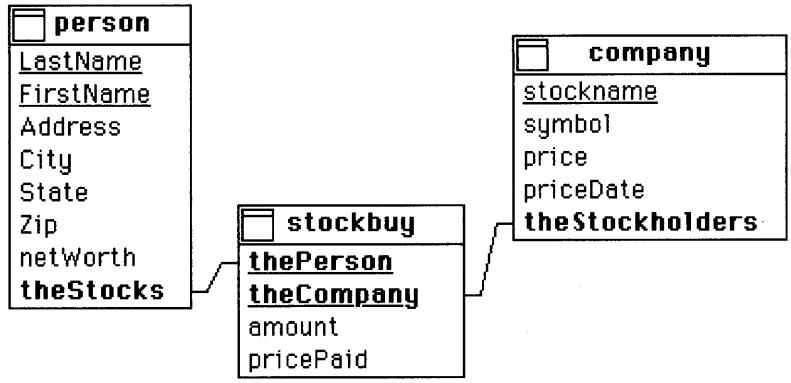
**Once the Overview is clear, go to the Overview menu once again and select Show Database File.**

A standard file dialog will appear asking for the name of the database you wish to see.

**Make sure that the Reflex Examples disk is selected (click on the button marked "Drive" if you need to switch drives) and locate a file called: person. With the person file name selected, click on the Show button.**

The person file will appear in the Overview window.

**Use the ⌘G shortcut to show the two linked files - they are called company and stockbuy (you will need to use the ⌘G key combination twice since there are two files).**




As you can see, this is a fairly sophisticated database system. It can store information on individual stockholders in the **person** file and it can store information on companies that have those individuals as stockholders in the **company** file. The **stockbuy** database file records each purchase of a stock by a stockholder.

It is important to note how the various Links have been set:

- **theStocks**: This is a Collection of Links to "stockbuy" Records since stockholders will typically hold more than one stock.

- **thePerson**: This is A Link to one "person" Record. In other words, each stockbuy record will be associated with at most one record in the person file.

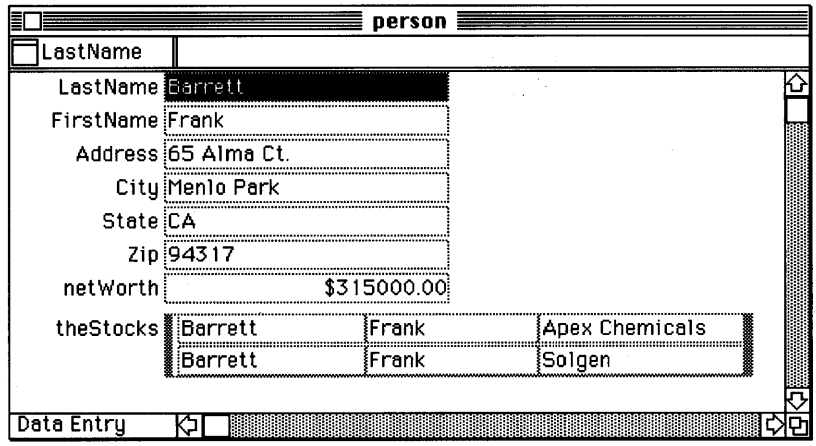
- **theCompany**: This is A Link to one "company" Record. In other words, each stockbuy record will be associated with at most one record in the company file.

- **theStockholders**: This is a Collection of Links to " stockbuy" Records since companies will typically have more than one stockholder.

Before we start producing reports on this database trio, you should open them up to see the information they contain.

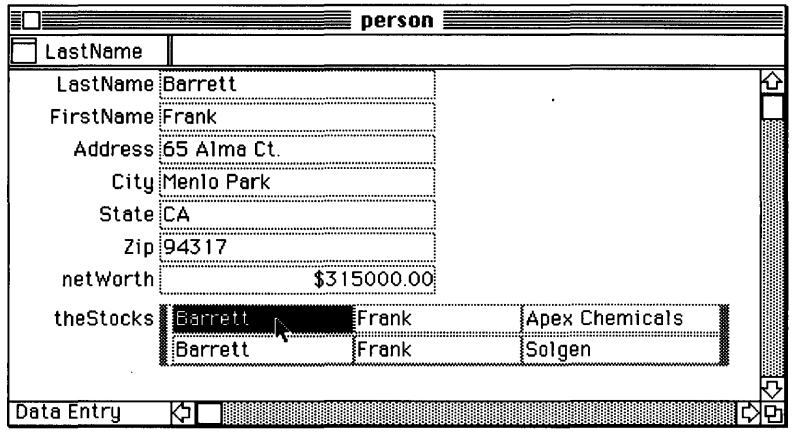
**Double click on the name bar of the person file.**

The person file window will appear and the first record will be displayed.




The Link Collection in this file contains information copied over from the key field in the stockbuy file (LastName, FirstName, stockName).

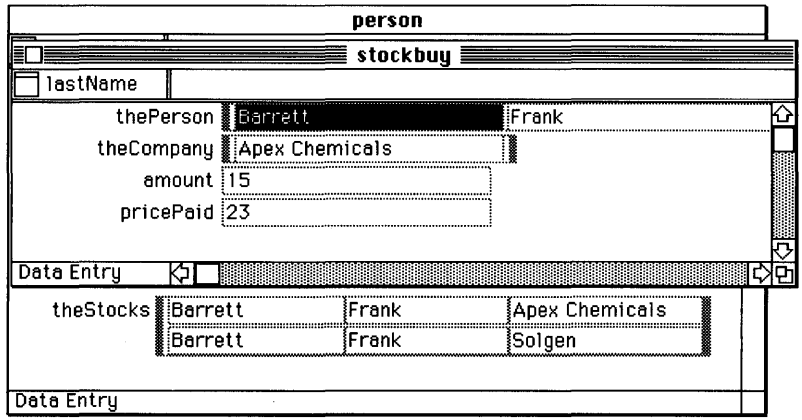
**Select the first LastName field inside the Link by clicking on it. Use the ⌘G shortcut to Show Linked Record.**




This will automatically open up the stockbuy file - however, the stockbuy data entry window will not become the active window.

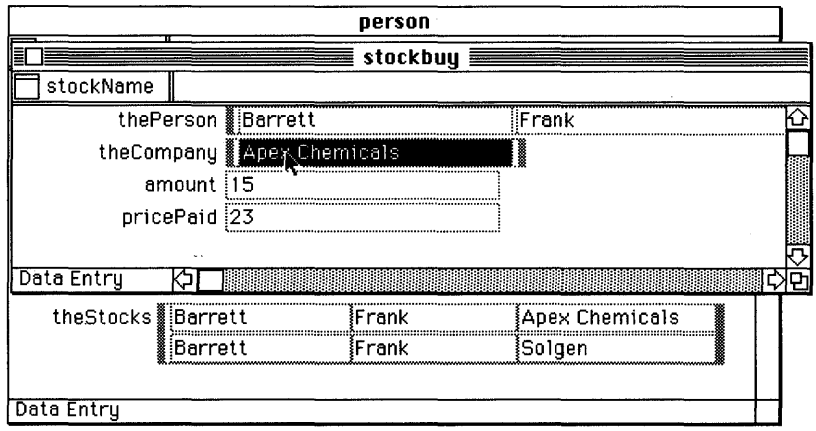
**To view the linked stockbuy record, go to the Window menu and select stockbuy.**

The stockbuy database window will move in front of the person database window.

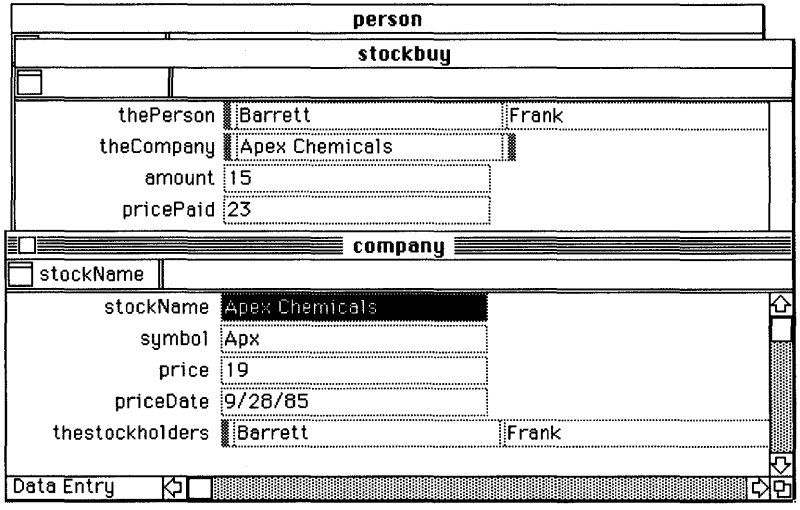


Notice that this data entry form has two separate Links. One, called thePerson, contains the Key of the person file (LastName and FirstName) and the second, called theCompany, contains the Key of the company file (stockName).

**To view the linked record in the company file, click on the field inside the Link called theCompany and use the ⌘G shortcut.**




**To make the company database window active, select its name from the Window menu.**



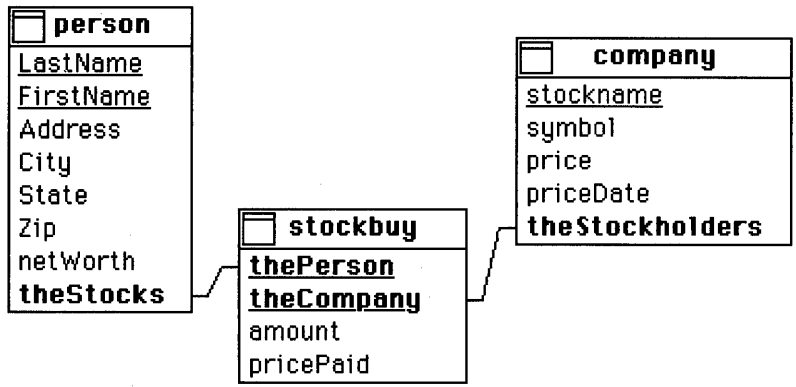
The Link Collection in the company file contains the key field values obtained from the stockbuy file (LastName, FirstName and stockName - click on them and look at their names in the name panel). Having seen how the records in this three file database are associated, you can now start to produce some reports.

## Reporting on the Stocks Database

A major feature of Reflex is that you may use familiar spreadsheet-like formulas to retrieve information from one or more sources.

The notion is that instead of working only within an onscreen matrix of spreadsheet cells, Reflex formulas are able to search single files, sets of files (a database), the Links in files, and Repeating Collections in Reports to find any valid value or set of values.

This section will acquaint you with the basic structure of Reflex Formulas by providing some relevant examples. All examples given here will refer to the database structure shown below. This is the same three-file database introduced previously under the title "A Three-File Stocks Database".




• The first file - called **person** - is designed to store information on each stockholder. The fields allow you to find out the name of a person, their address details, and their net worth. The Link called **theStocks** allows you to find out which stock purchases were made by a person (theStocks is a Collection of Links to "stockbuy" Records).

• A second file - called **company** - is designed to store information on the company that issues a stock. The fields it contains allow you to find out the name of the stock, its stock market symbol, its current market price, and the date of that price. The Link called **theStockholders** tells which purchases have been made of that company's stock (theStockholders is a Collection of Links to " stockbuy" Records).

• The third and last file - called **stockbuy** - represents the event when a stockholder buys some stock of a particular company. The fields it contains have to do with the amount of stock bought, and for what price. The two Links - called **thePerson** and **theCompany** - connect the records in the person file with records in the company file, and thus provide access to records in those files. The Link called thePerson tells which person bought stock and the Link called theCompany tells which company stock was bought (thePerson is A Link to one "person" Record and theCompany is A Link to one "company" Record).

Suppose that you were using this database and had to find out some basic information such as:

• What are all the names of all the stockholders and where do they live?

• What are the names of all the stockholders and what are their individual stockholdings worth?

• Which stockholders hold a specific stock?

How would you seek out the answers to these questions using Reflex? Let's first work with one of the problems mentioned above:

"Get the names of all stockholders and the cities and states in which they live".

**Important: Before starting to create any of the reports, you must make sure that the Examples disk is inserted in a disk drive and that the three files named person, stockbuy and company are displayed in the Overview window.**

This will ensure that Reflex automatically knows where to find these files.

**Once the file images are displayed, go to the File Menu and select New Report.**

A dialog will appear asking you to choose between a table-style report and a report you design yourself.

**Choose the last option - a report which you design yourself.**

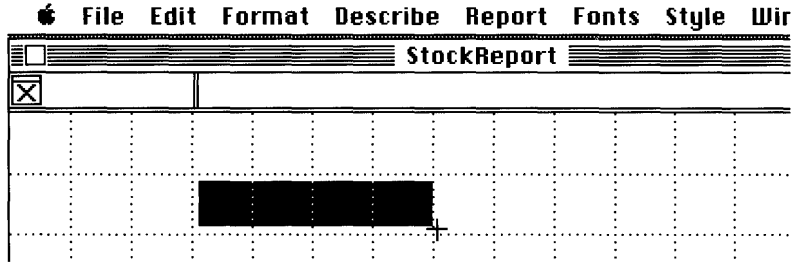
A standard file dialog will now appear asking that you name the report.

**Type: StockReport**

A new report window will appear; it will already be set for Report Design activities. Check the activity box at the lower left corner to make sure. Since you are attempting to show the first name, last name, city and state values of each person (and therefore of each record in the person file), you need to create the fields required to display those values.

**To create a field in a report: Place the cursor wherever you want the field to be located. With the mouse button depressed, drag the cursor downwards and to the right.**

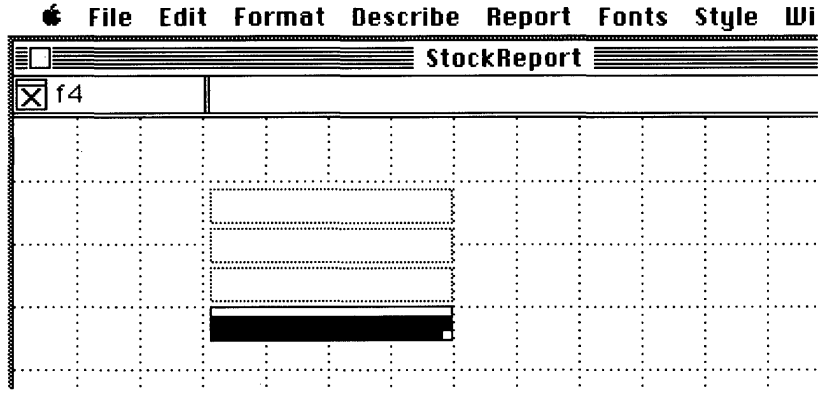
A black rectangle will appear, varying in dimensions as you move the cursor.



**When you have a black box of reasonable size, go to the Describe menu and select Text Field.**

The black box will take on the appearance of a field. You have just created the first of four fields that you will need. Rather than draw the other three manually, you can use the Duplicate option in the Edit menu or the ⌘D shortcut to make copies of the current field.

**With the text field selected, use the ⌘D shortcut to create the three remaining fields - each new field will appear underneath the previous one.**




To have the top-most field display the first name of each person we must supply it with the correct formula.

**Select the top-most field and then click in the formula panel. Type: FirstName**

In the correct circumstances, this field will now be able to display the FirstName value from each record in the person file.

**Select the other fields in order and give them the formulas:**

**LastName**

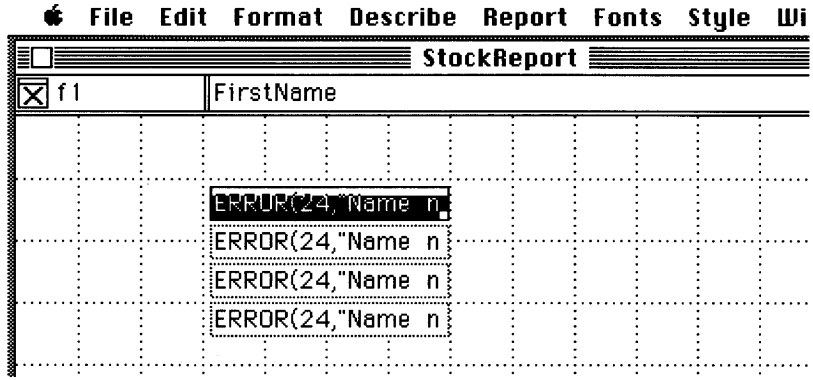
**City**

**State**

You've now told Reflex what information will be shown by all four fields. Go ahead and attempt to calculate the report.

**Go to the Report menu and select Calculate or use the ⌘= shortcut.**

Instead of producing the report for you, Reflex displays an error message in each field, as shown below:



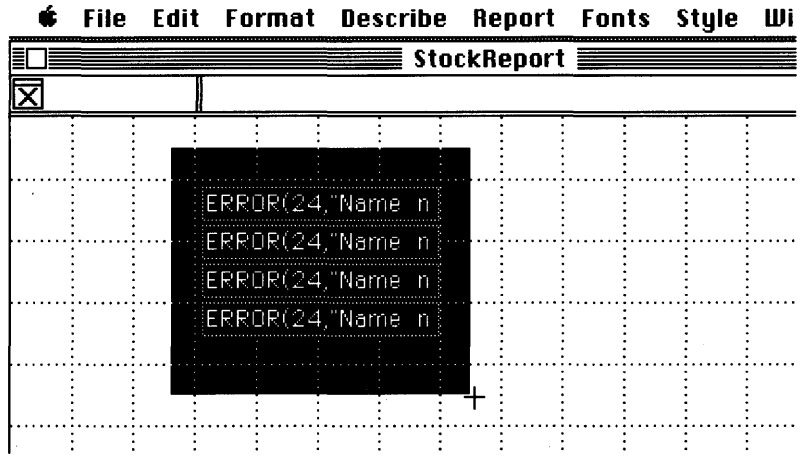

The problem is that although you have told Reflex which database fields you want to see - FirstName, LastName, City, and State — you have not told it which specific file contains these fields. The Error(24," Name not found") message appears in each field because Reflex has not been given the name of a **Source** in which to find the names that you supplied. A Source the name of a database file, a Link, or a Repeating Collection in a Report. To see the complete error message, just open up any of the fields or look in the section entitled "Error Messages" for an explanation of error Number 24.

To tell Reflex the name of the Source for the four fields, you'll need to create a **Repeating Collection.**

• A *Repeating Collection* is the mechanism by which you can obtain a particular view of a Source once you have provided a query for that Source. For every valid record in the query, the repeating collection will generate a report record. By itself, however, the repeating collection does not show field contents or values - this is the job of the fields within a repeating collection.

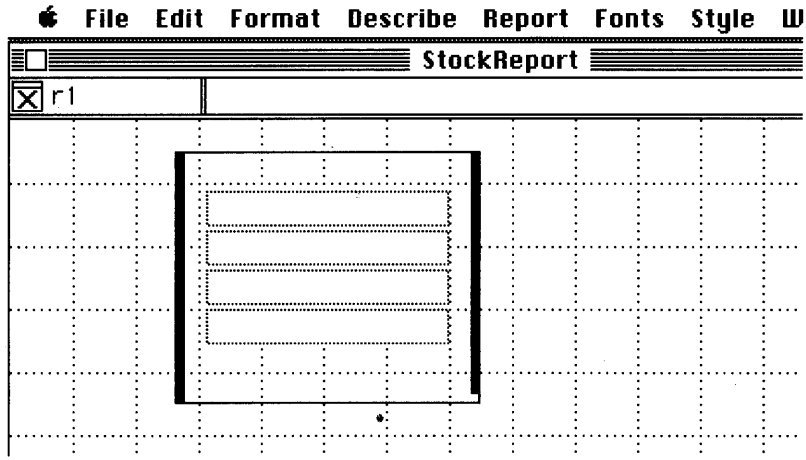
Right now, you have the fields, but no repeating collection. To create one:

**Draw a black rectangle over the fields as shown below:**




**Now go to the Describe menu and select Repeating Collection.**

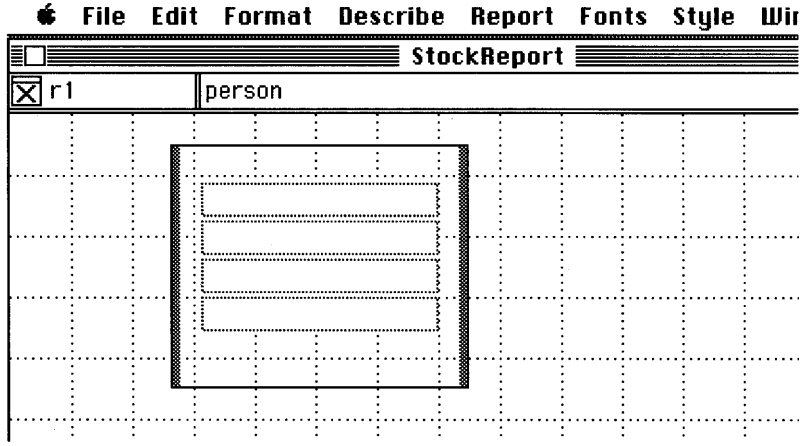
The black rectangle will take on the appearance of a repeating collection and it now surrounds the four fields. (If Reflex sounds a beep or displays a dialog which says: "Objects in a form may not overlap", the repeating collection was probably not big enough to contain the display fields. Just try again with a larger one).




The repeating collection is already selected for you (the outline is black, instead of gray). If it has somehow been deselected, simply click anywhere on the thick vertical **handlebars** to select it again.

You are now ready to provide this repeating collection with the nam of the file that you wish it to provide a view on (i.e. the query). Since we want to find some information on stockholders, the Source you must refer to is the person file (this is where the four values we seek are stored).

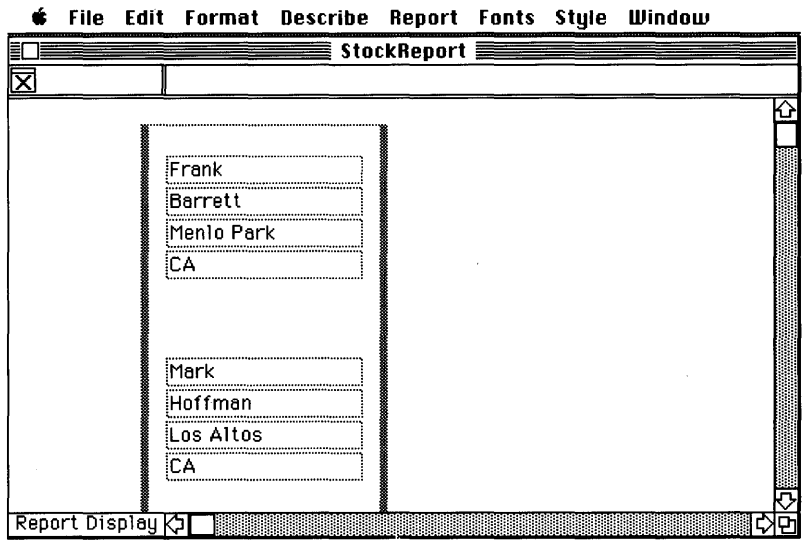
**With the repeating collection selected, click in the formula panel so that you may enter some text there. (Alternatively you could have used the Edit Formula option in the Report menu or the ⌘Q shortcut). Type the query as shown below:**



This is the simplest Reflex query - the name of a Source.

**Use the ⌘= shortcut to calculate the report.**

You should now have a listing of each stockholder and the city and state in which they live.

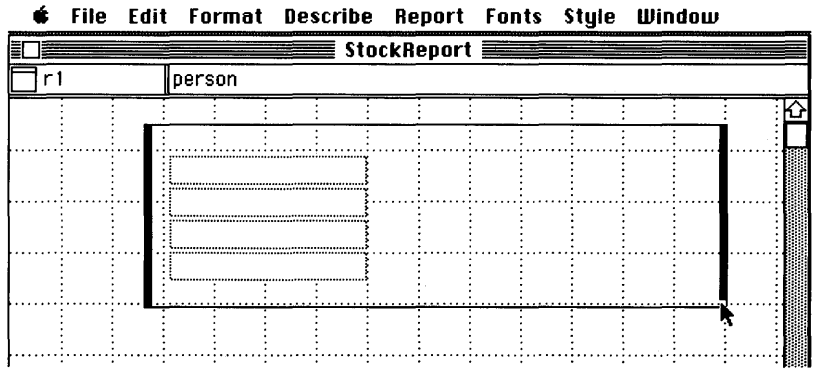



However, as you can see, the report is not really well designed in that only two complete records are visible on the screen at one time. To overcome this you may alter the design of the basic **Design Template** so that the records are presented more satisfactorily.

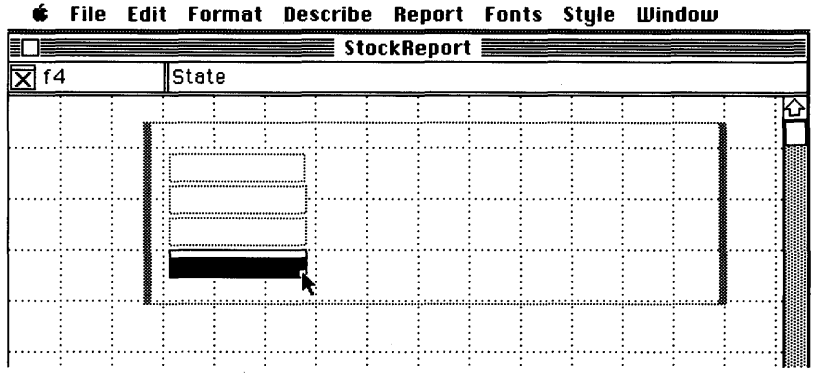
**Go to the Report menu and select the Design option.**

The report changes from its Display appearance to its Design appearance.

**Click on either of the repeating collection's handlebars. Notice the small white resize box that appears in the bottom right-hand corner. Place the cursor over this resize box - it should change into the shape of an arrow - and press the mouse button. With the mouse button still held down, move the cursor to the right. Stop when the repeating collection looks like the one shown below.**

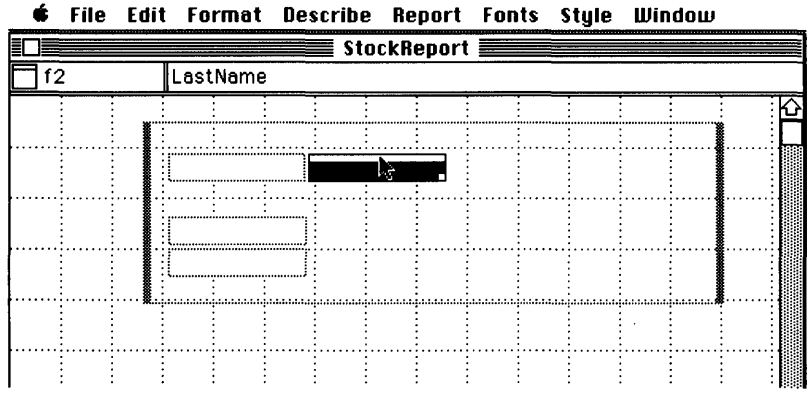



**Next, click on each field and, using the resize box that appears, make them narrower (we are going to fit them all in one line so they need to fit easily within the current repeating collection).**

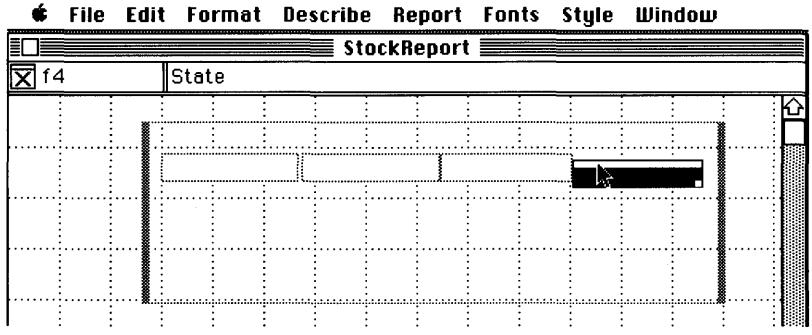



Now you have some space to move the fields around.

**Click on the second (LastName) field and move it alongside the top-most (FirstName) field.**

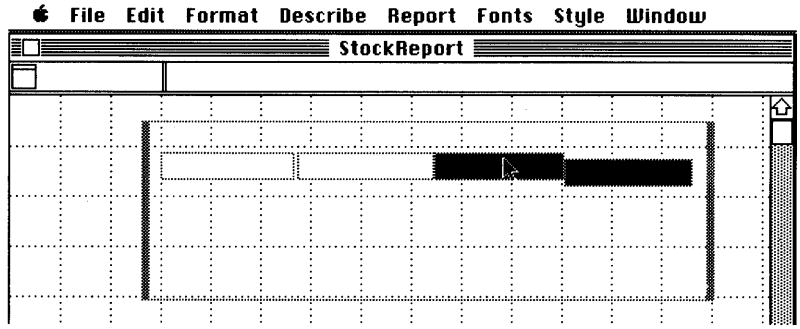



**Move the remaining two fields (City and State) so that you end up with a single row of fields.**



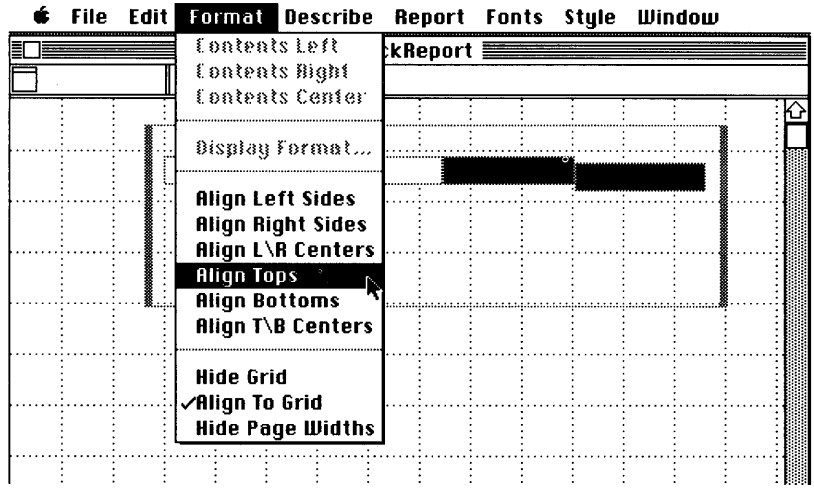

Notice that the last field was not positioned correctly in the image above. This is an easy problem to remedy.

**With the State field still selected, hold down the Shift key and then click on the City field, as shown below.**

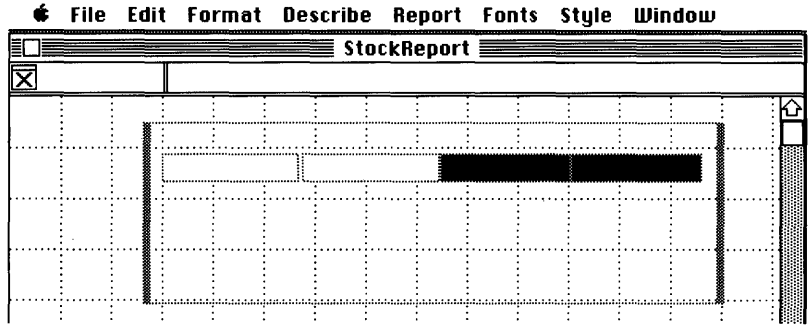



Both fields will now be selected.

**Go to the Format menu and select the Align Tops option.**

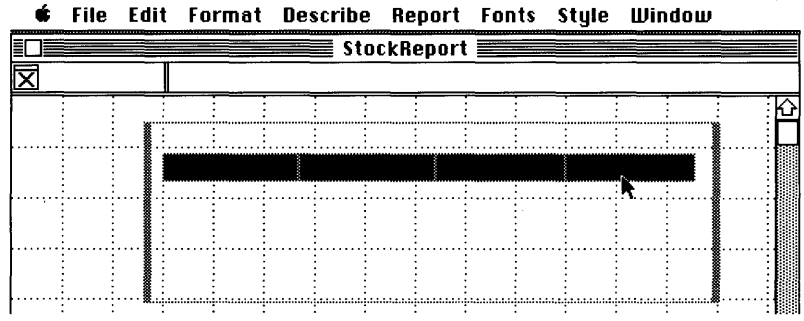


Reflex will now reposition the selected fields so that they are aligned correctly.

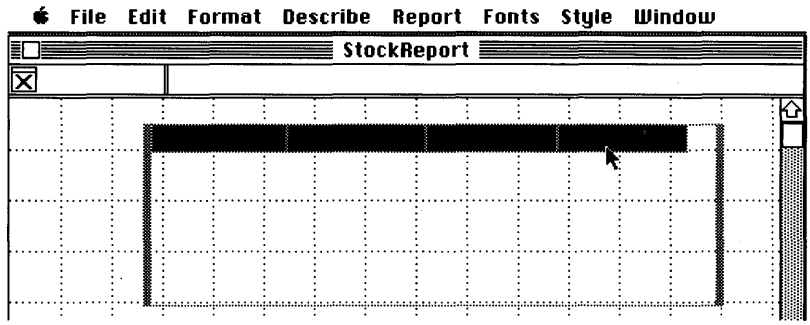



With all the fields in a single row, you can now make the final design adjustments until the template is just right.

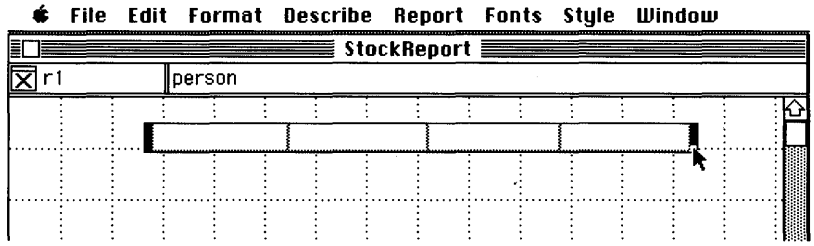
**Select all the fields by Shift-Clicking.**



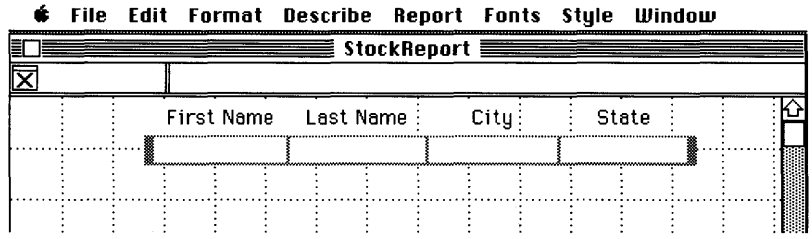
**Move the group of fields up to the top left corner of the repeating collection.**



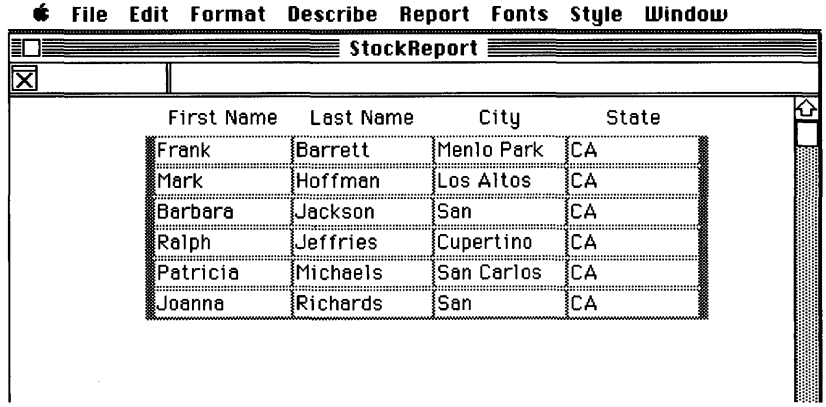

**Select the repeating collection and use the resize box to reduce its size until it just surrounds the fields.**




**Finally, add a label above each field, outside of the repeating collection (move the repeating collection down if you need more room above it). Just click down on the report space above the repeating collection to get a little black box. Type the label contents. Use the alignment options in the Format menu to arrange them neatly.**

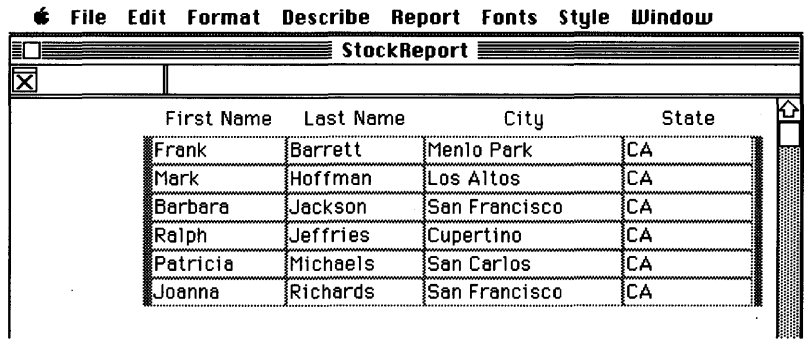


**Recalculate the report with the Ø= option to see how this new design template displays the records from the person file.**




Notice that the City fields for Barbara Jackson and Joanna Richards only have the word "San" inside them. This is because the City field is slightly too small to show the complete field value of "San Francisco". This is easily changed.

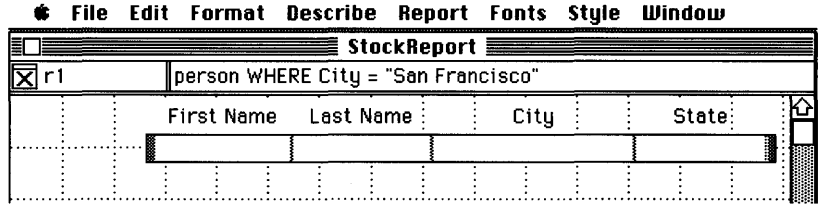
**Go to the Report menu and select the Design option. When the design window appears, open up the repeating collection and, using the methods described earlier, move the State field over to the right and make the City field wide enough to show the longest city field value. Reposition the labels correctly and then recalculate the report once again.**




You can now go on to modify the formulas that work with this basic template in order to produce more and more specific reports.

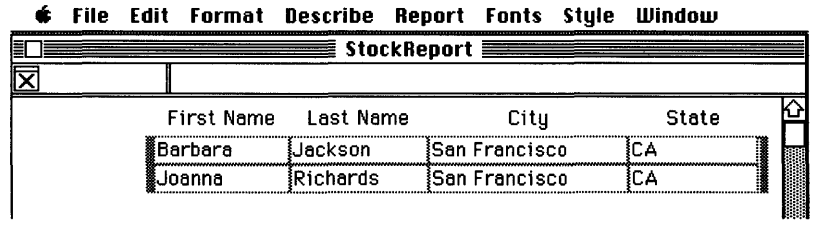
For example, with only a small change in the current query we can qualify the view we have of the Source to find out which stockholders live in a particular city - let's say San Francisco.

**Select the repeating collection by clicking on either of the vertical handlebars. Click in the formula panel and add a qualification to the text already there so that it reads as below:**




You have just made the original formula (person) more specific by adding a qualification to it (WHERE city = "San Francisco").

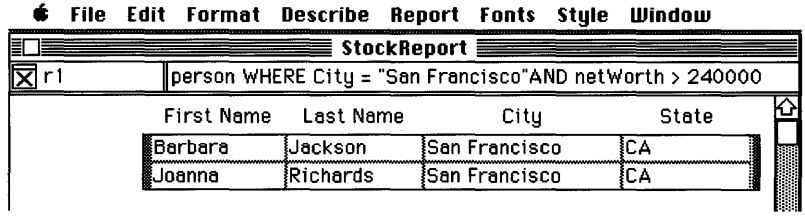
**Use the ⌘= shortcut to calculate the report.**



Only information on those stockholders that live in San Francisco are included in this report.

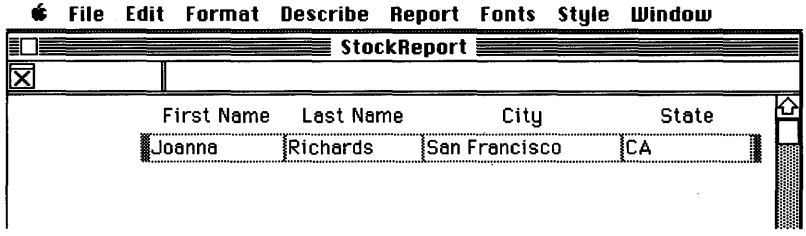
Let's try a few more queries with the single person file before moving on to more sophisticated reports involving the use of Links and multiple database files. This time, you will produce a report on all the stockholders in San Francisco that have a net worth exceeding a minimum level.

**Select the repeating collection and then click in the formula panel. Add text until it looks as below:**




The original simple formula (person) has now been constrained with a two-part qualification (WHERE City = "San Francisco" AND netWorth > 240000).

**Use the ⌘= shortcut to calculate the report once again.**




Information on those stockholders that live in San Francisco and which have a net worth over $240,000 is displayed (in this case there is only one).

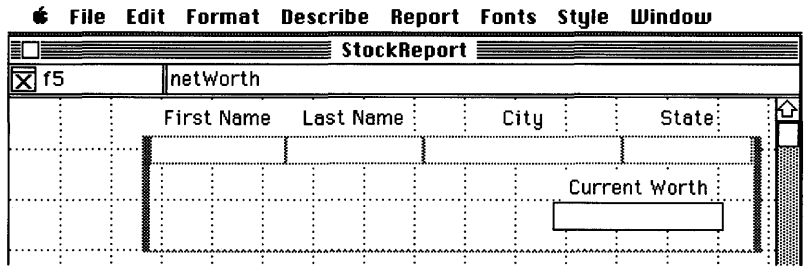
To actually find out the net worth of all stockholders:

**Select the repeating collection and make sure that the query reads: person. This ensures that all records in the person file will be represented in the report, as opposed to just those that live in San Francisco with a netWorth exceeding $240,000.**

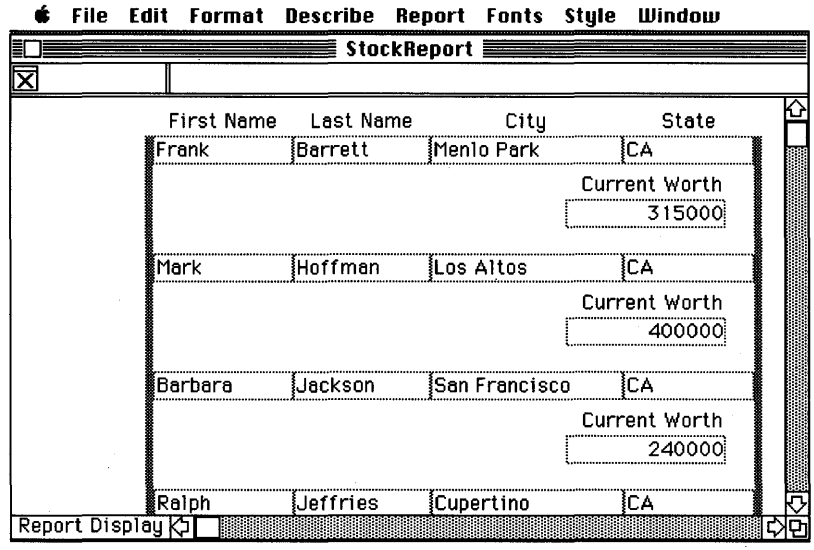
Now you have to include a new field to display the netWorth value.

**Modify the design template as shown below, giving the Current Worth field the formula "netWorth".**

Note that the Current Worth field is of the Number type since it is intended to display dollar and cent amounts.



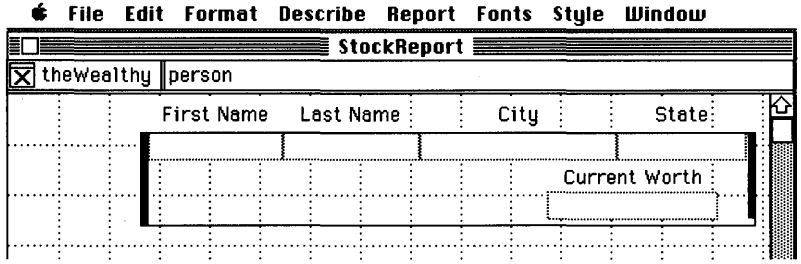

**Calculate the report with the ⌘= shortcut.**



Instead of just listing the networth of each individual, you might also want to sum the net worth of all stockholders as a group. This is very easy to do with a computed, or calculated field.

Up to now, we have let Reflex supply default names for each field and repeating collection created (fields start off at f1 and repeating collections start off at r1). While this is fine so long as a small number of fields and repeating collections are involved, things can get a bit confusing when there are many such objects to refer to. For the next report, it will be helpful if the current repeating collection (called r1) is renamed to theWealthy.

**Select the repeating collection and select the text (r1) that appears in the Name Panel at the top left corner of the window. Type: theWealthy.**



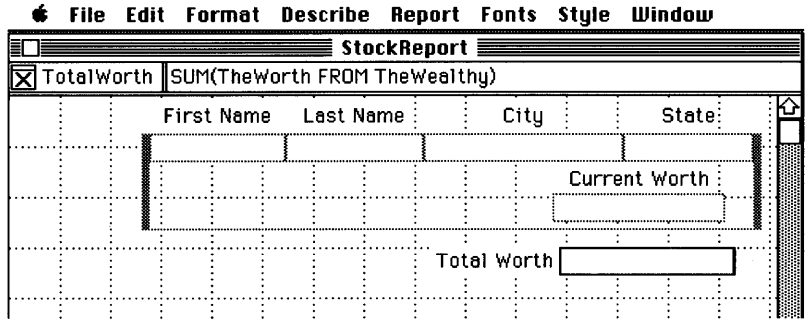

Reflex is now aware that you wish to refer to this repeating collection as theWealthy instead of simply r1.

**Select the netWorth field and rename it to theWorth in the same manner.**

Reflex is now aware that you wish to refer to this field as theWorth instead of f5.

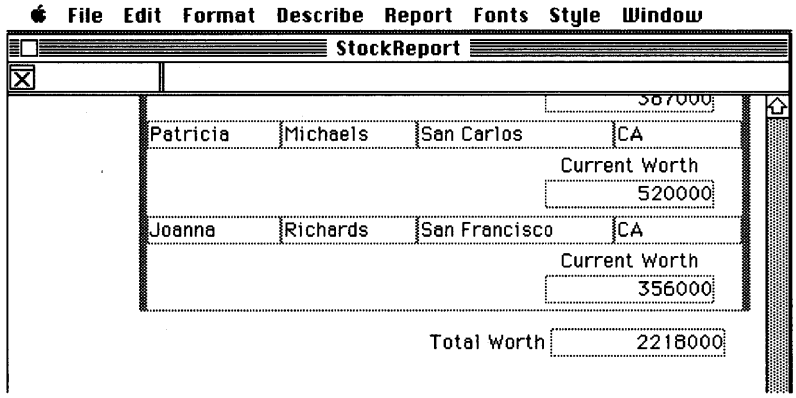
• It is a good practice to give fields and repeating collections meaningful names instead of simply using the defaults automatically supplied by Reflex.

**Create a new number field and a label outside of the repeating collection as shown below. Select the field and click in the formula panel. Enter the formula: SUM(theWorth from theWealthy).**



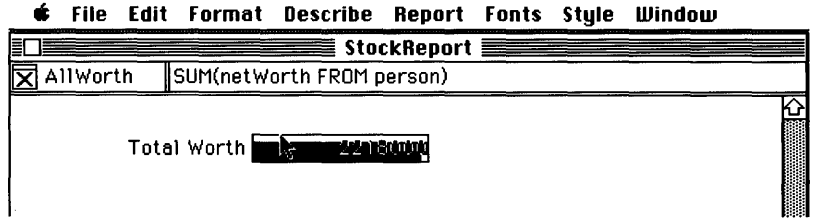

Note that this field has also been renamed TotalWorth.

**Go ahead and recalculate this report with the ⌘= shortcut. Use the scroll bar to move to the end of the report and see the value in the field labelled Total Worth.**

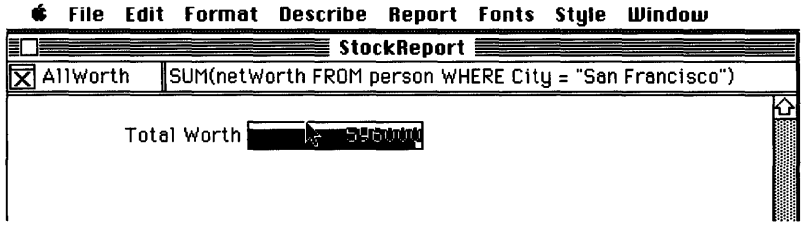



The figure of $2,218,000 represents the sum of the net worth of all stockholders that appear within the repeating collection you renamed as TheWealthy. If the repeating collection were only displaying records for those stockholders living in San Francisco, the Total Worth field would provide only the sum of those qualified records displayed.

• Another way of obtaining the total worth of all stockholders is by creating a single field and giving it the formula: SUM(netWorth FROM person).




You can even add a qualification to the single field formula so that you can obtain the total net worth of specific stockholders.




Using a formula with a single field differs from the use of a repeating collection in that the single field can only supply a single summary value - it cannot produce a sequence of records as does a repeating collection. Also, this field obtains the values it requires directly from the person database file. The computed field that works with a repeating collection instead obtains its values from the relevant fields inside that repeating collection.

## Using Formulas with Links & Multiple Files

In the previous examples, you simply created a set of fields and placed them inside a repeating collection in order to report on some values from a single file. What happens when the values you want to report on are located in more than one file?

Just as spreadsheet programs can work with information located in any cell of a matrix, Reflex can work with information located in one or more Sources.

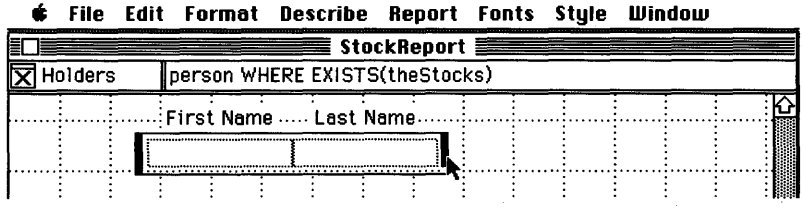
To demonstrate this, let's list all the people that own stocks. This may seem trivial, but it will provide a good starting point for understanding how you can use the Links between database records to search for information.

For this task you are going to need two fields and one repeating collection. You may redesign any current template in the report or you can add a completely new one below it - just ensure that it is exactly the same design as that given below.

**Create two text fields in the usual manner. Select the first one, click in the formula panel and type: FirstName. Select the second text field, click in the formula panel and type: Lastname**

You now have two fields - with the formulas FirstName and LastName - that will actually display values from each record in the person file. Now you must use a query, along with a repeating collection, to tell Reflex which particular set of records in the person file you are interested in viewing.

**Create a repeating collection around the two fields in the usual manner. With the repeating collection selected, click in the formula panel. Add text so that it reads as shown below. Then click in the name panel and add text so that also reads as shown.**

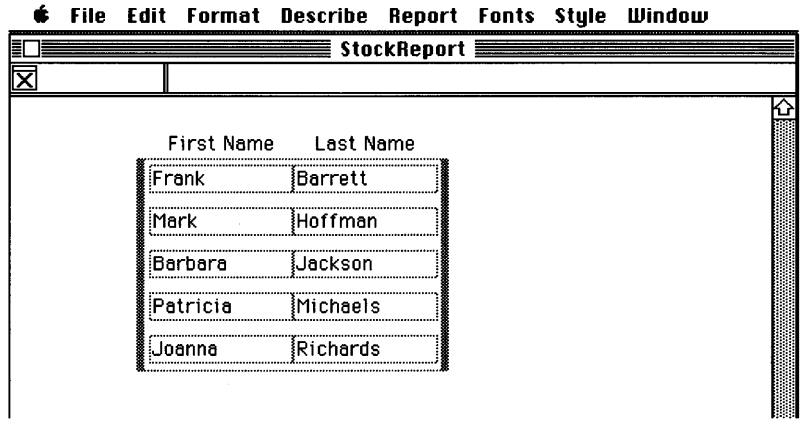


Let's take a moment to explain what's going on here.

Earlier, when you wanted to get a view on all records in the person file, the repeating collection was simply given the Source name "person". Now that you want to see records that meet some specific criteria (all those people that own at least one stock) you must qualify the reference to the person file.

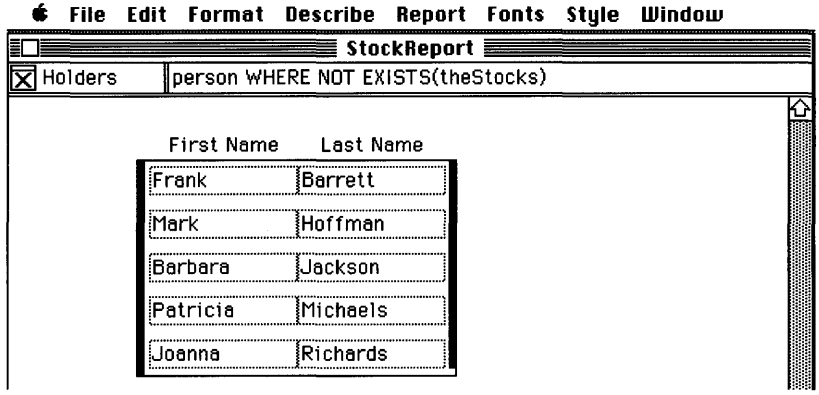
In this instance, the qualification refers to the Collection of Links called **theStocks** which connects a person file record to associated stockbuy records. Therefore, the repeating collection will produce a record for each person showing first and last name values only if the Collection of Links called theStocks contains at least one stock value for that person.

**Check on this by using the ⌘= shortcut to calculate the report.**



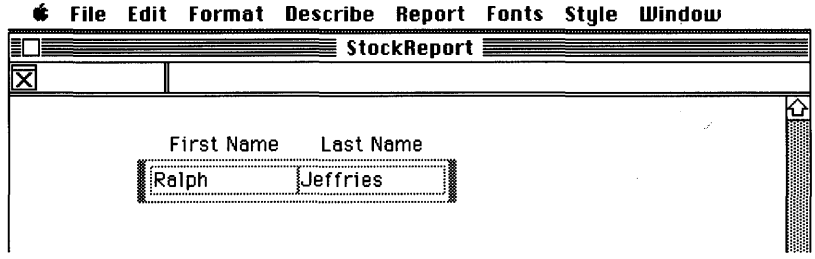

You will find that this template will produce a total of 5 names, but there are in fact 6 records in the person file. In other words, one person does not currently own any stocks. You can find out the name of this person by making a small change to the current repeating collection formula.

**Select the repeating collection by clicking on it. Click in the formula panel and alter the text to read as shown below:**



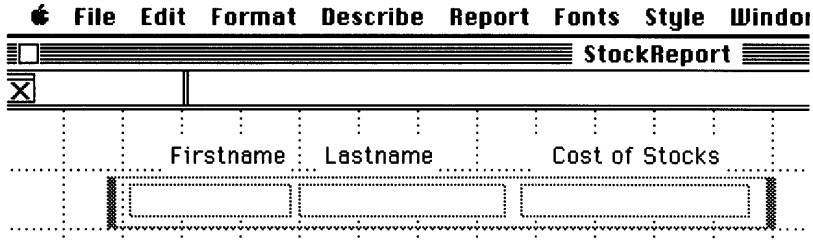

The simple addition of the "NOT" in the formula will have a dramatic effect on this template; instead of producing a record for each person that owns at least one stock, the template will now produce only one record - it will be for the individual who does not currently own any stocks.

**Discover the name of this individual by calculating the report with the ⌘= shortcut.**




You can now use variations of this template to see how some of Reflex's special functions can be used with formulas to compute desired report values.

To find out the names of all stockholders and the cost of their individual stockholdings create the design template shown below (you can use the current report or open up another if you wish):




Note that the two name fields are Text fields and that the field labelled "Cost of Stocks" is a Number field and must be set as such via the relevant option in the Describe menu.

**Select the repeating collection and then click in the formula panel. Type: person**

The only thing left to do is tell Reflex where to go and look for the stock cost. Check the database image given at the beginning of this section. You'll see that the total cost of a each stock that a person owns is equal to the amount of that stock multiplied by the price they paid for each share of it.

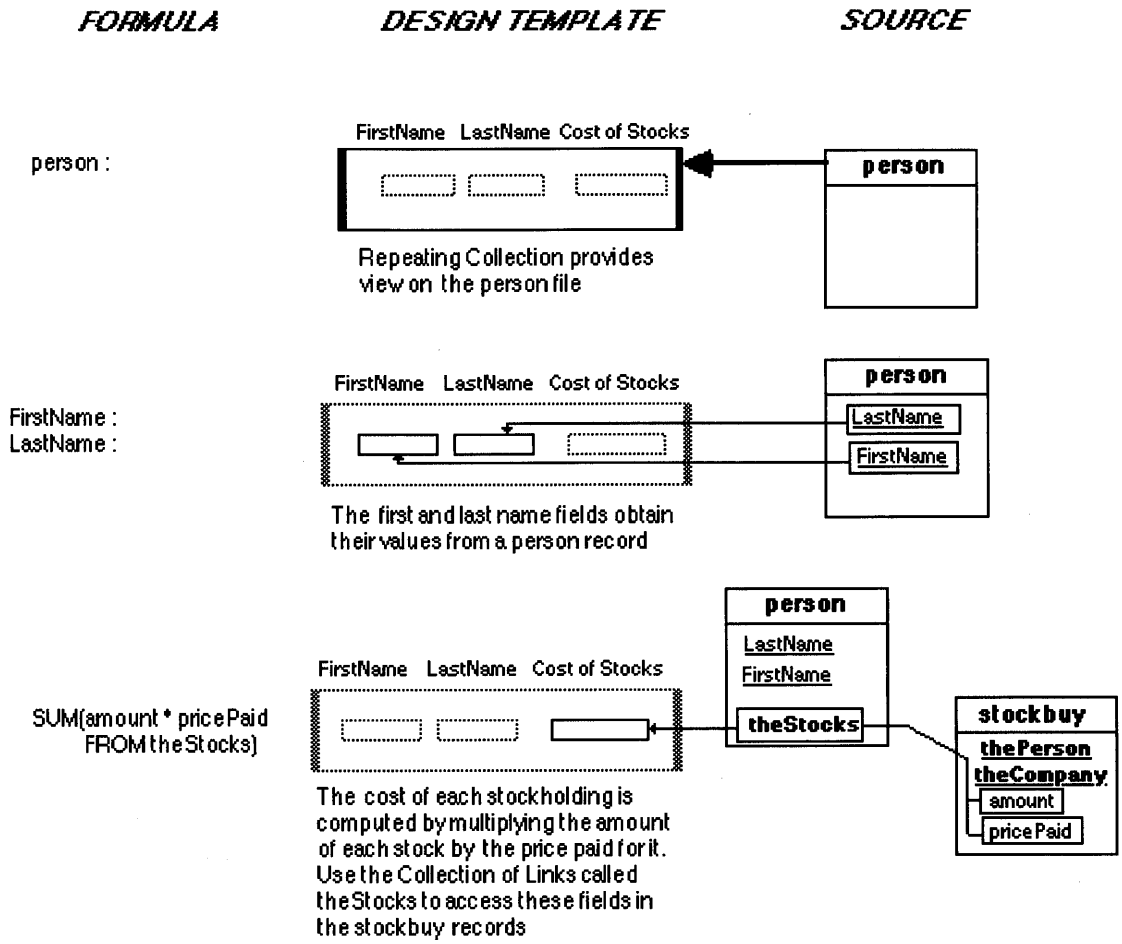
The values you want are stored in the **amount** and **pricePaid** fields in the stockbuy file.

**Select the field labelled Cost of Stocks. Click in the formula panel and type: SUM(amount*pricePaid FROM theStocks)**

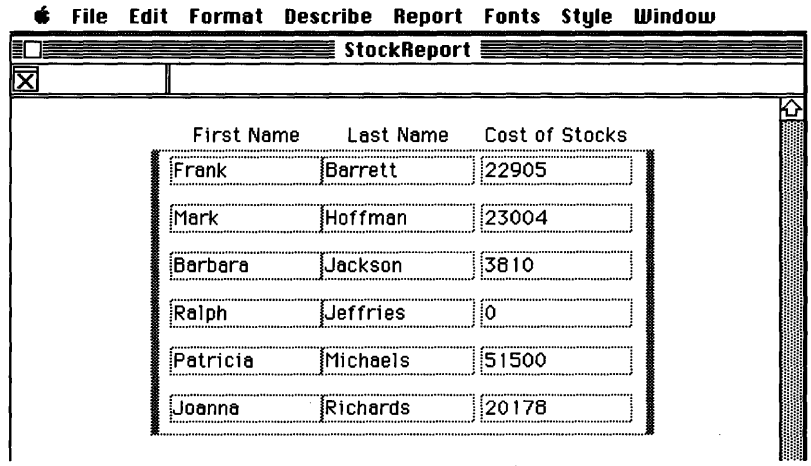
This essentially says: "Compute the cost of each stockholding for a person by multiplying the amount of stock held by the price paid for it. Do this for each of the stocks that this person holds and then sum all these costs to get the total cost. You can get the values you need from the Collection of Links in the person record called theStocks".

- The general form for this is SUM(formula FROM Query)

We can pictorially show what is happening here:



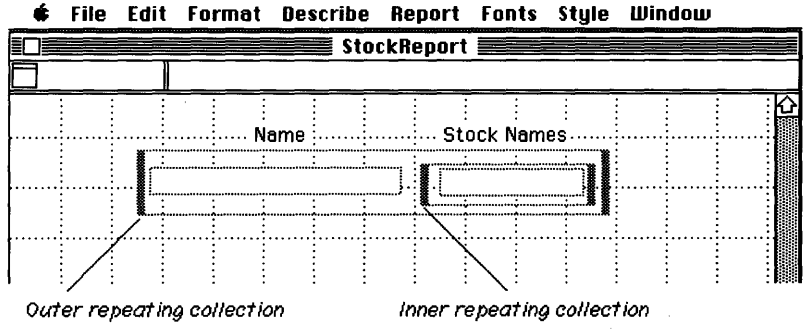

**Use the ⌘= shortcut to calculate the report.**




Although the previous examples show how to use Links to check whether a person has at least one stock, and how to use functions to compute desired values, they did not allow you to see the actual names of the stocks. To get this kind of information you need to display field contents from the person and stockbuy files at the same time. In the following example we will also show how to produce a concatenated field (a single text field which contains values from more than one field).

**Go to the Report menu and select Design.**

For the new template you will need two text fields and two repeating collections as shown below:

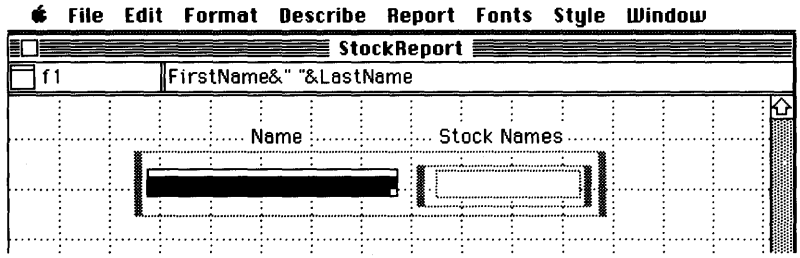


• The outer repeating collection will obtain the FirstName and LastName values from the person file. We will now arrange it so that these two field values are displayed in the single field below the label Name.

**Select the outer repeating collection and click in the formula panel. Type: person.**

This tells Reflex that this repeating collection will provide a view on the person file.

**Select the field below the label Name and click in the formula panel. To produce a concatenated field type: FirstName&" "&LastName.**




Note the two ampersand ("&") characters - these are the operators that will join the two values into a single string in the field labelled Name. Also, there must be a space between the double quote marks otherwise the the first and last name values will be displayed as one long string of characters instead of a first name, a space, and then a last name.

What about the stockname value? It does not reside in the person database file, so where exactly do you look for this information?

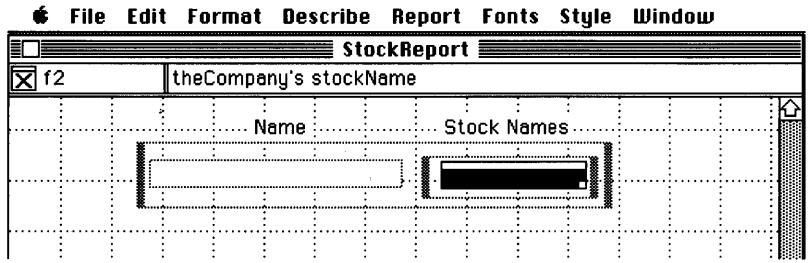
Remember that in one previous example you used the Collection of Links called theStocks to give the cost of each person's stockholding. Can you use the same Collection of Links to obtain the actual names of each stock that a person owns? Yes, partially.

• The inner repeating collection will obtain the names of the stocks that each person owns by providing a view on the Link called theStocks.

**Select the inner repeating collection and then click in the formula panel. Type: theStocks**

This inner repeating collection will now provide a view of each individual's stockholdings for the field placed inside it. What values should this field actually display? Check the file images given at the beginning of this section. Note that you can get the stock name values from the Link called theCompany and then the field called stockName. To get access to the stock name information, just supply the field name you wish to display and the location of that field.

**Select the field inside the inner repeating collection. Click in the formula panel and add the text shown below:**



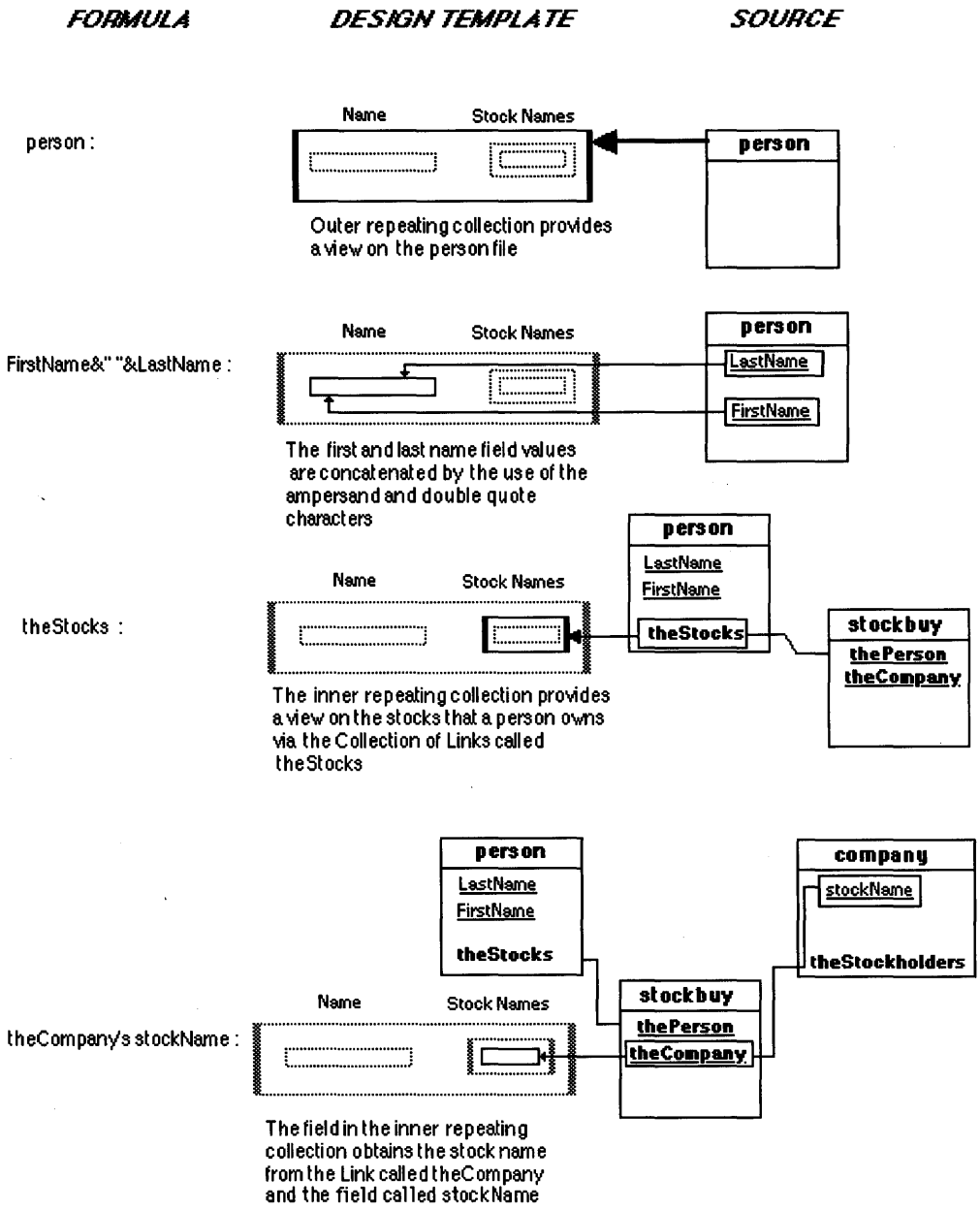

Essentially, this reference to the Link called theCompany says:

"For the current person and his current stockbuy, get the name of the stock via the Link called theCompany".

Nested repeating collections, such as in this example, are used for producing lists of lists, or in other words, for producing a list of objects and for each such object, a list of additional objects.

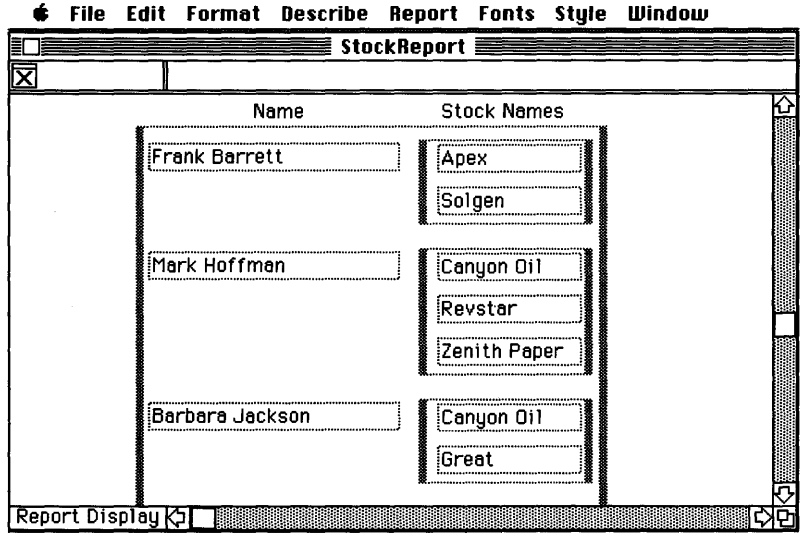
In this example, we are producing a list of people, and for each such person a list of the stocks that person owns.

We can pictorially show how this template works:



**To see the results of the design template calculate the report with the ⌘= shortcut.**

A report listing all stockholders and the stocks that they currently own will appear. Use the scroll bar to see more of the report than can be seen in the window at one time. Note that there is an empty space next to the name Ralph Jeffries since he does not currently own any stocks.




The above example shows how you can use a sequence of names (eg: theCompany's stockName) to refer to Sources and the values their fields contain. Refer to the sections on Functions and Formulas and the next section - Details and Techniques - for further hints and guidance on creating databases and reports.

# Section Three
# Details and Techniques

## Reflex Icons

There are a number of Reflex icons you will encounter:


**The Reflex program icon:** There are a number of ways of starting Reflex from the Finder. You may select the icon and then choose the Open option in the Macintosh File menu or you may simply double click on the icon. Alternatively, select the icon and then choose the Startup option located in the Special menu - the next time you use the disk the Finder will automatically start Reflex for you. For more information on this latter topic, refer to the Macintosh owners guide.

**The Database Document Icon**: All database document icons take the form of a group of file cabinets. Can be opened from the Finder by first selecting it and then using the Open option in the File


**The Report Icon:** All Report document icons take the form of a stylized print-out. Can be opened via the Open option in the File menu or by a double-click.


**The Damaged database icon:** Although it will rarely be seen, there is a special "damaged database" icon that appears when you create a new file and, before it is completely saved, the Reflex program terminates because of a system or program error.

**The !sortscratch file icon:** From time to time a generic icon with the name **!sortscratch** may appear on the desktop. This is the sort scratch file; it takes up no space on disk and helps speed

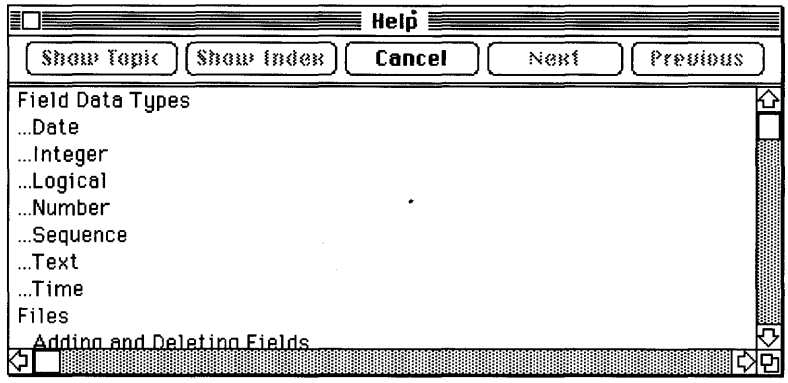
up each sort operation since the file does not need to be created during sort operations. If !sortscratch is deleted for any reason, it will be recreated as needed.

**The !sorttemp file icon**: Temp files with this name - plus a version number - will only appear when there has been a system crash. They should be deleted since they serve no useful purpose and take up disk space.

## Obtaining Help

**Reflex's major help function is available in one of two ways:**

> Select the Help option from the  menu. A Help window will appear which contains a range of choice buttons and a list of topics on which Help is available. Select the topic you need help on and click on the Show Topic button.




**Show Topic** will display relevant Help text.

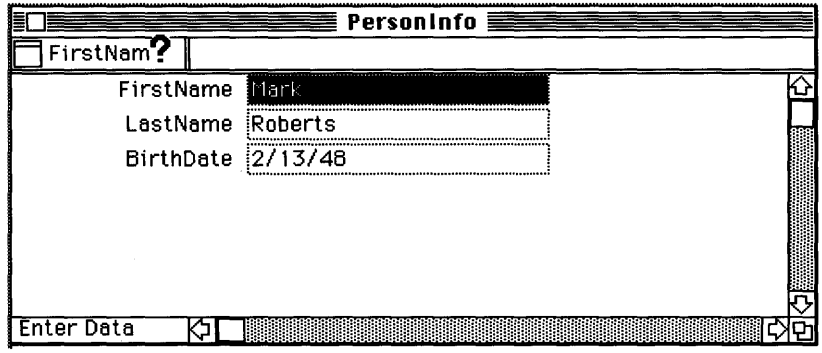
**Show Index** will return you from within a particular topic to the main Help Index to make another choice.

**Next** and **Previous** move you from within a particular topic to the next or previous Help topic.

**Cancel** returns you to Reflex.

**To get an explanation of almost any item on the screen or any menu command:**

> Hold down the ⌘ key and then press the question-mark ("?") key; it doesn't matter if you use the Shift key or not. The arrow cursor will turn into a large question mark. A description of almost any item or menu command can be obtained by placing the question mark cursor over the particular item and clicking the mouse button once. The Help window, as described previously, will appear and




display the explanation you seek.

Note that this latter form of Help cannot be used with dialog boxes - they are either self-explanatory or have their own Help feature (as with the QueryBuild dialog).

## Designing & Creating Database Files

There are two very similar methods of creating a new database file: the first is available anywhere while the second is only available when the Overview window is active.

**To create a new database file:**

> Go to the File menu and select the New Database File option. Reflex will display a standard file dialog box requesting that you supply a name for the new file. Enter the chosen name and click on the Create button or press the Return or Enter key. Reflex will then place a file image for the new file underneath the last file image in the Overview window.

> Place the cursor at the position where you wish the new database file image to appear. Hold down the mouse button and move the cursor to the right - a black box will appear. When the box has been drawn, go to the File Menu and select the New Database File option. Reflex will display a standard file dialog box requesting that you supply a name for the new file. Enter the chosen name and click on the Create button or press the Return or Enter key. Reflex will then place a file image for the new file at the position you indicated with the black box.

*Note:* If you attempt to give a new database file the same name as an existing file a dialog box will appear asking if you wish to replace the old with the new. If you click on the Yes button you will lose all data stored in the existing file and a new, empty, database of the same name will be displayed in the Overview window. If you click on the No button, you will be able to enter another, unused, file name.

## Moving and Resizing File Images

Database file images may be moved and/or resized whenever the Overview window is active.

**To move a file image:**

> Click once on the name bar and then, with the mouse button still held down, move the file image to its new location. Moving the file image down to the bottom edge of the Overview window will cause the contents of the window to scroll. Reflex always saves the location of a file image when you hide it or quit from the program so that it will appear in the same place the next time you call it up.

**To resize a file image:**

> Click once on the file image name bar ( avoid clicking on the status icon at the top left corner, however, since this will "Hide" the file image). Resize the image by dragging on the small white box that appears at the lower right-hand corner. If a file image contains empty space (where a field was deleted, or you just made it too big), Reflex will automatically discard the unused space when the file is removed from the Overview and then called up again.

*Note:* File images cannot be overlapped like windows. If you attempt to Show a file image and there is not enough room left in the current Overview window display area, Reflex will scroll the window upwards and place the requested file image below all others. The same goes for any situations where you try to overlap one file image with another.

## Entering Field Names in File Images

Once a new file image has been created in the Overview window you can then start entering field names. Reflex allows up to 255 fields per record provided their combined size does not exceed 1002 bytes. The maximum field name length is 32 characters.

**To enter fields in a file image:**

> When a new file image is created, the first field space is already selected for you so you can type in the first field name straight away. Subsequent fields may be entered by going to the Overview menu and selecting the Insert Field option or by pressing the Return key.

> To add fields to the end of a group of field names, just click once on the last field name and use the Insert field option or press the Return key. Enter the new field name.

> To add fields within an existing group of field names, just click on the field name above where you want the new field to be positioned and then use the Insert Field menu option. A new field space will appear where you can enter the new field name.

## Editing & Deleting Field Names in File Images

**To select an existing field name:**

> Click on the field name once - the whole field will be selected. You cannot edit the field name text at this point, but you can move the field up and down in the file image and you may use any of the valid options in the Overview window menus.

## Deleting an Existing Field

> Specifically, a field name selected in this way can be deleted from a file image by using the Clear option in the Edit menu. If you attempt to do this with a database file that contains data, Reflex will first display a dialog warning you that you will "lose all data for that field " if you proceed. If you ever delete a field in error, you may undo the action by immediately using the Revert to Old Design option in the File menu.

**To edit field name text:**

> Click on the field name twice. This will place a text insertion point at the current mouse cursor location. Use standard Macintosh text editing techniques to edit the existing text. Fields can be renamed in this manner. You cannot move a field name in a file image when it is selected as text. Nor can you draw a Link line from a field selected as text.

## Setting Field Types

Reflex provides seven field data types: Text, Number, Integer, Date, Time, Logical, and Sequence Number. Each time a new field is created its default type is Text.

**To create other field types:**

> Select a field name. Go to the Describe menu and choose the field type you require. A check mark will appear alongside the relevant Describe menu option whenever that field is selected.

You may change the field type of an unsaved database file whenever you wish. Use this feature with caution on an existing database since it can lead to errors once a file contains data. An example might be when you attempt to change a date field to a Number field; this will result in an error dialog informing you that "A value was not valid for field "X" of File "XXX". In other words, you cannot change a Date field (which contains values in the format Month/Day/Year) to a Number field (which expects values in the form of Integers with an optional fractional part). On the other hand, it is possible to change a Date field to a Text field without any problem since the Text data type can handle all other data type formats and values. However, you will not be able to do every operation with a Text field value that you can with the other types. If you do ever encounter the error dialog mentioned above while trying to save a file modification, Reflex will halt the save procedure and recommend that you revert your database file design to the last saved version. The database design cannot be saved while invalid values exist in file records.

A special case is the Sequence Field type. This field type can be used to automatically tag records with record numbers as they are entered or to provide a numbering system for employees, customer orders, checks, or whatever. There may be only one Sequence field per file (the Sequence field option will be deactivated if the currently selected database file already contains a Sequence field).

*Note:* More specific information on data types and their range of valid values is provided in the section entitled **Reflex Formulas and Queries** in the Reference Section.

## Creating Key fields

Record Keys are required so that every record in a database file can be uniquely identified (a Key is composed of one or more Key fields). You can only set or modify Key fields in file images displayed in the Overview window. All fields set as part of the Key are clearly identified by means of an underline.

**To create Key fields:**

> Select a field name in a file image that you wish to make a Key field (the whole field or just the field text may be selected). Go to the Describe menu and select the Key Field option or, alternatively, use the ⌘K shortcut. If there are no other Key fields, the first field you make a Key field will move up to the top of the file image. If other Key fields exist, subsequent Key fields are positioned immediately below the last Key field and immediately above the first non-key field.

> Alternatively, a non-key field can be automatically converted into a Key field by clicking on it once, and then dragging it among a group of Key fields. You cannot move a field name while its text is selected.

> A Key field can be made a non-key field by selecting it and then choosing the Non-Key field option in the Describe menu.

> Alternatively, a Key field can be automatically converted into a non-key field by selecting it and then dragging it among a group of non-key fields. You cannot move a field name while its text is selected.

Since Reflex automatically sorts database file records by the existing Key, any changes you make to the Key will affect the order in which records are displayed in the relevant data entry window. Reflex will not allow you to open or save a file design which does not include at least one Key field.

*Note:* When you reposition fields in a file image, this does not automatically reorder the fields in the file's data entry form. Also, all position changes made to non-key fields in file images are not saved - file image field names will appear in the data entry form order the next time the file image is shown or opened. You can, however, use the Reflex Form Layout option to modify the data entry form as desired. If you modify a data entry form, the order of field names in the associated file image is not updated until you remove it from the Overview window and call it up again.

See Example 1 at the end of this section for a description of how to convert a database Key from one type to another. See Example 2 for a description of how to convert a single name field (firstname and lastname in one field) to two fields (lastname and then firstname).

## Setting the Justification of Field Contents

Reflex allows you to arrange the format of individual field contents while a file image is displayed in the Overview (also see the sections on Form Layout and Reports). The default format is to have field contents left justified.

**To set field contents in a file image:**

> Select the field by clicking on it (the whole field or just the text may be selected). Go to the Format menu and choose from among the Contents Left, Contents Right, and Contents Center options. New values entered in the associated data entry form will be justified as specified. Existing record values will be reset as specified.

## Setting Field Display Formats

Reflex provides default display formats for Number, Integer, and Date fields. You may alter these display formats as you wish.

**To change a Number or Integer field display format:**

> Select a field of type Number. Go to the Format menu and select the Display Format option. Choose the format you desire from the possibilities presented in the dialog box that appears.

**To change a Date field display format:**

> Select a field of type Date. Go to the Format menu and select the Display Format option. Choose the format you desire from the possibilities presented in the dialog box.

**Fixed/Variable Text display format:**

The Text field display format dialog is only available when the selected text field is in a Report. A Fixed Height text field is of constant size, regardless. During report design activity a variable height text field will always appear as big as you initially made it. During report display, a variable height text field will shrink to the minimum height allowed by the text it contains (this may be zero to n lines).

*Note:* Reflex expects to be given plain Number and Integer values which it then converts into any specified display format. For example, entering the number "1" in a Number field set to the Percent display format will result in the value "100%" being displayed. Reflex will generate an error message if you attempt to enter "100%" directly since this is not a valid Number value. The same is true for Date fields. Just enter the date in the standard Month/Day/Year format and let Reflex convert the value into any specified display format.

## Creating Links Between File Images

The Reflex method of linking the records in multiple files is based on the notion of drawing a line - called a Link line - between names in file images displayed in the Overview window. Only a single Link line is drawn between two names, but a single file image may have more than one Link line between it and other file images.

**An example of creating a Link line in new or existing database files:**

> Insert a name which will act as the Link in file Alpha. Insert a name which will act as the Link in file Beta. Select the whole name in either file image by clicking on it once - you cannot draw a Link line while a field is selected as text. With the mouse button held down, move the cursor over to the name in file Beta. A line will

appear between the name in Alpha and the cursor tip. When the cursor tip is over the name in file Beta, let go of the mouse button. A Link line will bridge the two names which now appear in bold type and are referred to as Links. You may confirm the design by using the Save Design option in the File menu.

***Important :*** You cannot draw Link lines between existing field names (field names of database files that have previously been saved). Any attempt to do this will result in an error dialog box. Refer to Example 3 to see how the records in existing independent files can be linked. This technique can be used to convert files from other applications into Reflex files with Links.

## Deleting Links Between File Images

Links may only be deleted in the Overview window; the exact procedure depends on whether you are working with new, unsaved database files or existing files.

***Important:*** Be aware that because Links always come in pairs (there are always two Links connected by a single Link line), you cannot delete only one of them. Selecting and deleting one Link will automatically delete the other Link.

**To delete Links from an unsaved database:**

> Select either Link by clicking on it once. Go to the Edit menu and select the Clear option. The two Links and the connecting Link line will be removed.

**To delete newly inserted (and unsaved) Links in an existing database:**

> Same procedure as above.

**To delete Links from an existing database:**

> Select either Link by clicking on it once. Go to the Edit menu and select the Clear option. A dialog box will appear informing you:

"If you delete this field you will lose all the data for that field. You can choose Revert to Old Design in the File menu to undo all changes to the design."

Click on the OK button to continue with the Link delete. Click on the Cancel button to halt the Link delete.

## Setting Record Links

Reflex allows the Links between the records in files to be one-to-one, one-to-many, and many-to-many. Links may only be set when the relevant file image is displayed in the Overview window. When a Link line is drawn between two Link names, both the names are Links to one ".." Record (one-to-one) by default.

**To create a one-to-many record Link arrangement:**

> Select the Link you wish to be the "many" side. Go to the Describe menu and select the A Collection of Links to "..." Records option. You do not need to alter the setting of the other end of the Link line since it is already a Link to one "..." Record.

**To create a many-to-many record Link arrangement:**

> Select a Link. Go to the Describe menu and select the A Collection of Links to "..." Records option. Select the other Link. Go to the Describe menu and again select the A Collection of Links to "..." Records option.

*Note:* Links may be all or part of a record Key so long as they are not A Collection of Links to ".." Records. This is because you cannot have an object containing one or more (multiple) values as part of Key.

## Saving File Designs

You may save a file design provided that it contains one or more fields, at least one field set as the Key, and it does not contain any invalid field values (see Setting Field Types, above).

**A new file design may be saved by:**

> Going to the File menu and selecting the Save Design option or by using the ⌘S shortcut. After a short time the X mark in the status icon will disappear, signifying that the database file is ready to be opened. Alternatively, new files only may be both saved and opened in one procedure when you double-click on the name bar (not the status icon) of the file image.

**An existing file that has been modified may be saved by:**

> Going to the File menu and selecting the Save Design option or by using the ⌘S shortcut. Alternatively, you may double-click on the relevant file's name bar whereupon a dialog appears asking you if the modifications should be saved or if you wish to cancel the database file open.

*Note:* If any problems are encountered by Reflex during a save (the file has no Key field, for example), a dialog will be displayed informing you of the probable cause.

## Showing Database File Images

When file images are displayed in the Overview window they are not opened - the image simply provides you with an overall view of a file's design and provides a focus for modifications to that design.

**To Show a single file image:**

> Go to the Overview menu and select the Show Database File option. A standard file dialog will appear asking that you indicate the name of the file to be shown. Select the name from the file list and click on the Show button. The file image will appear at its last saved position unless another file image blocks the way.

**To Show the file(s) linked to the currently displayed file:**

> Make sure that the currently displayed file is selected. Go to the Overview menu and select the Show Linked file option or use the ⌘G shortcut. Any linked file(s) will be displayed.

*Note:* If you have renamed or deleted a linked file at the Finder level, Reflex will not be aware of this. Refer to Example 4 on how to deal with this situation.

## Hiding File Images

When file images are removed from the Overview window they are not affected in any way - they are simply no longer displayed.

**To Hide a file image:**

> Select a file image. Go to the Overview menu and select the Hide Database File "..." option.

**Or, to remove an image more rapidly:**

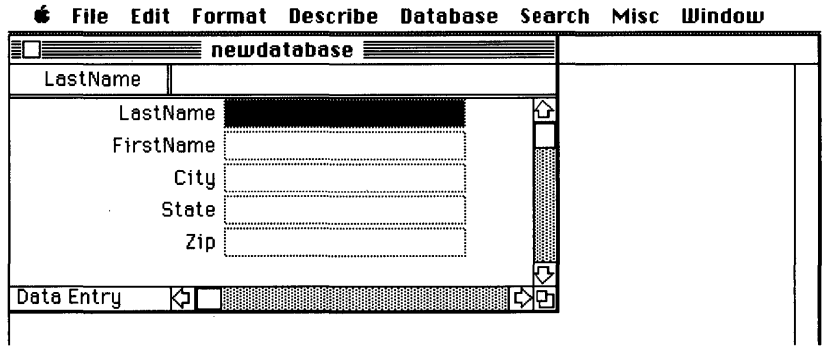
> Click once on the status icon located at the top left corner of the file image.

***Note:*** File images cannot be hidden if they have been modified or there is some outstanding error. First save the modifications, or revert to the last saved version, and then try to hide the file image once again. Also, file images cannot be hidden while their associated window is open. In this situation simply close the window and try to hide the file image again.

## DATA ENTRY

### The Data Entry Form Window

After you have successfully created a Reflex file you can then open it for data entry. Reflex data entry forms are initially presented in the default format shown below:




This standard form allows you to immediately start entering data without having to worry about field layout. If you wish to change the default form layout to something of your own choosing, you can do this by selecting the Form Layout option from the Database menu.

**All data entry windows feature:**

> A name panel and a formula panel at the top.

> The Name Panel displays the name of the currently selected field. The name panel can be resized horizontally to accommodate longer field names (up to 32 characters).

> The Formula Panel is where you directly type in formulas and queries to find records that meet certain qualifications. Alternatively, the QueryBuild option will automatically construct a formula or query based on information that you supply and then paste the result directly into the formula panel. The formula panel can be resized vertically to accommodate long formulas.

A data entry window will always have the message "Data Entry" showing in the activity indicator at bottom left of the window.

## Validation of Field Entries

To enter information in a database file record you simply type valid values into the fields that a record contains. There are a two criteria that define whether a field entry is "valid".

**Field Types:**

> The first test of whether an entry is valid is dependent on a field's type. Date fields expect to see information in a date format (month/day/year), Integer fields only expect to see whole number entries, and so on for the other five data types. Invalid entries will result in a dialog which offers field specific advice on remedying the error.

**Field Qualifications:**

> Reflex allows you to set up entry qualifications for each field in a record so that only values within an acceptable range may be typed in ( dates and times within a particular period, employee numbers above a certain level, part numbers starting with a particular character, etc..).

**Creating Field Qualifications:**

> You may only enter field qualifications during Form Layout activity. Simply select the relevant field and click in the formula panel. Enter the qualification you require.

***Note:*** Records that contain invalid field entries cannot be inserted into the database. The first time you attempt to save the unacceptable record Reflex will display a dialog telling you of the problem and offering some samples of valid field entries. If you try to close the data entry window, Reflex will then display another dialog which says:

"In spite of the preceding problem, do you want to close this document anyway? You will lose your changes to the last record modified".

Clicking on the Don't Close button will return you to the data entry form. Clicking on the Close Anyway button will close the form and discard changes in the problem record.

It is important to ensure that a field qualification does not conflict with the type of field it is associated with. For example, creating a qualification that requires a specific text character to be entered at the beginning of a Number field will: A) Result in a field type error dialog if you do enter the text character in the number field during data entry; B) Result in a field qualification error dialog if you do not enter the text character during data entry. If this situation ever occurs, simply select Revert to Old Record and then choose the Form Layout option from the Database menu. When the Form Layout window appears select and change the field qualification. It is up to you to make sure that field qualifications are appropriate.

For a fuller description of field types and the scope of acceptable values for each, see **Interlace Formulas & Queries** in the Reference section. See Example 5 for a description of how to create field qualifications.

## Entering Records Into a Database

**Entering information into a blank new record:**

> Prior to typing the first character into a record field, there is no status icon in the top left corner of the data entry window next to the name panel. When the first character is entered, Reflex displays an "X" mark next to the name panel signifying that the record has been modified. Saving the new record replaces the X mark with a document shaped icon signifying that the record is now part of the database.

**Modifying an existing record:**

> Prior to modifying the existing record, there is a document-shaped status icon at the top left corner of the data entry window. When the record is modified, an "X" mark appears in the document-shaped icon signifying that the displayed copy of the record no longer matches the version saved on disk. Saving the modified record will remove the X mark from the status icon.

*Note:* The tab order in data entry forms is always left to right/top to bottom (i.e. the order of fields in the Overview file image is not used). When you reach the last field of a record, pressing the Tab or Return key wraps the field selection back to the first field. The Return Key works just like the Tab key except within Link Collections where pressing Return will produce a blank new Link. Pressing the Shift key along with the Return key while in a text field will enter a carriage return in that field. The Shift-Return character in text fields appears in export/import files as the Line-Feed character (Control-J).

## Record Validation & Saving Records

Reflex checks all aspects of a new record before it inserts it into a database file.

**Selecting the Enter Record option in the Database Menu or pressing the Enter key:**

> This action causes Reflex to: A) Make sure that field values meet any existing field specifications; B) That there is at least one Key field that is not empty; C) That the new Key field values are not a duplicate of an existing record Key; D) That the fields inside any Links are the Key of some linked record (if Link checking is turned on). If the record passes these tests, it is then inserted into the database. If the Enter key was pressed, a new blank record is displayed in the data entry window.

**Selecting the Save Record option in the File menu:**

> This places the current record into the file to which it belongs provided it has passed all the validation tests. This command also writes all record changes made to disk so that the disk copy of the file is as accurate as possible.

*Note:* It is possible that you may encounter an error dialog when saving a record to disk - the disk may be full, for example. If the disk is full, simply return to Reflex by clicking on the OK button of the dialog that appears and then use the Save As option located in the File menu to place the unsaved file on another disk.

A single database file may not span disk volumes, but the individual members in a multiple file database may exist on totally separate disks. However, be aware that with the Hierarchical Filing System (HFS) by Apple, Reflex will not automatically find the member files of a multiple file database if they are stored in separate folders. If you cannot store related databases in one folder on a single disk, you must: A) Make sure that you have displayed the relevant file images in the Reflex Overview window; B) Open the files.

## The Auto-Save Feature

Reflex incorporates an auto-save feature which ensures that changes to database records are saved at regular intervals.

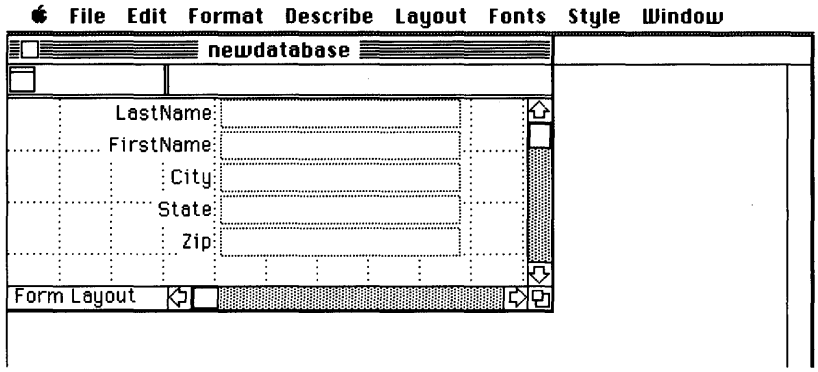
> If there is no activity within Reflex for approximately two minutes all changes made to all open database files are automatically saved to disk.

*Note:* As with other data saving procedures, problems (such as disk full errors) can occur during an auto-save. An informative dialog will be displayed on these occasions.

## Data Entry Form Layout

To change the design of a data entry form you must select the Form Layout option from the Database menu.

The switch into Form Layout is clearly indicated by three visual clues:




> The most obvious change is that a design grid appears behind the fields and field labels. The grid aids in field and label positioning (it can be turned off if you wish) and there are a range of formatting options available in the Format menu that make accurate positioning very simple.

> The data entry form activity indicator contains the message "Form Layout" instead of "Data Entry".

> The Database menu is replaced by the Layout menu.

**You modify data entry form designs by:**

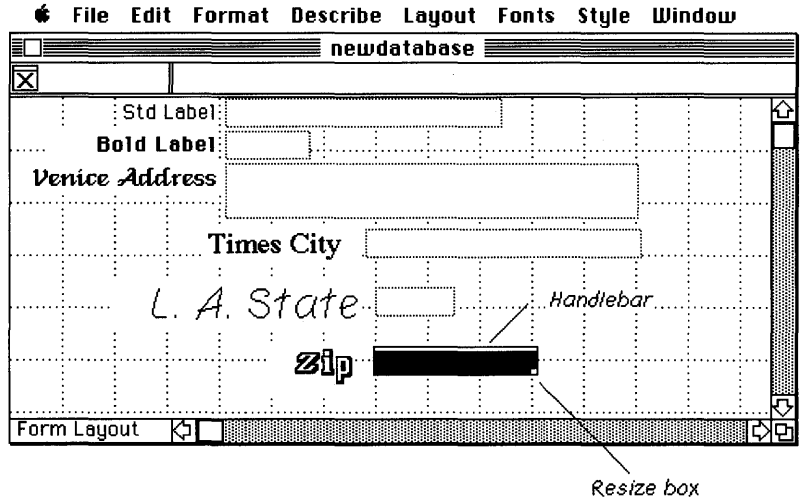
> Selecting a label and changing the default name supplied by Reflex. The font and style of labels and field contents may be specified by selecting the object and then selecting the appropriate option from the Fonts and Style menus. The default font/style for all newly created objects can be preset to a particular font and style. To do this, click down on blank space in a design window and select the relevant menu options. All installed Macintosh fonts and styles are supported.

> Selecting a field or label and changing its position and/or size. When you click once on a label or field you will select the whole field and this will display the object's handlebar (for moving the object) and its resize box (used to make the object larger or smaller). You cannot move/resize a label or field when its contents are selected (you have clicked twice on the object).

> Multiple objects (labels, fields and pictures) may be moved as a group by using the Shift-Click technique. First select one object in the group to be moved. Then, with the Shift key held down, click on all the remaining members of the group. You can now let go of the Shift key and move the objects. If you change your mind and do not wish to move all the selected objects, you may deselect specific members of the group by clicking on them once again with the Shift key held down.

***Note:*** Selected objects may be manipulated by any valid Reflex menu option (you may use the Duplicate option in the Edit menu, for example). Be aware that Reflex will not allow you to overlap objects in data entry forms (or reports) so all object manipulations must take account of this fact.

Data entry forms (and reports) are "infinite" in size to the right and down. However, the window elevator boxes will only take you as far as the last object in the right/down direction. If you wish to move beyond the last object(s), just use the window scroll arrows.



## Pictures in Data Entry Forms

Pictures can be added to data entry forms to improve their appearance or to match some existing form that you use.

**To add pictures to data entry forms:**

> Copy the desired picture to the Macintosh clipboard from whatever graphics program you are using. Open up the data entry form that is to receive the picture and then choose Form Layout fron the Database menu. When the Form Layout window appears click down on blank form space to obtain a small black box. Select the Paste option from the Edit menu to insert the picture into the form. The picture will appear as part of each record in a file.

*Note:* Fields may be embedded (placed within) pictures that are pasted into data entry forms. An example of this is given in Example 6 at the end of this section. Make sure that you only paste in final versions of pictures since you cannot edit pictures within Reflex.

## Creating Reports

When you select the New Report option from the File menu, a dialog appears asking you to make a choice between a table-style report on a file and a report which you design yourself. There is no fundamental difference between these two report options, it is just that Interlace provides you with a basic report framework - the table-style option - which can be modified as desired.

**The Table-Style Report:**

> This report format will display file records as rows across the screen; as many fields as can fit will be shown, but you can always scroll to the right to view those fields beyond the right window boundary.

**To create a Table-Style Report:**

> Select the New Report option from the File menu. You will be given the choice of a report on any currently selected database ; a report on another database; or a report you design yourself. Selecting the first option will then display a dialog which asks which fields you want to include in the report. Secondly, you are presented

with the QueryBuild dialog which allows you to tell Reflex which records from the file you want to view. If you want to see all records, just click on the Find All button. A complete listing of the file records will appear (you will have to use the window scroll bars to see those records outside of the window display area).

The second report dialog option - a report on another database - allows you to specify which file you wish to produce a report on - it does not differ from the first option other than that.

If you wish to set up a record qualification with the aid of QueryBuild, specify the field names to search, the operator to use, and the value to find. Only those records that meet the qualification will be listed. They can then be printed via the Print option in the file menu.

**Custom Reports:**

If you want to produce an Reflex report from scratch you will select "A Report you Design yourself". Here, you do not initially specify which file will be reported on since you will probably want your report to obtain information from many Sources. (Of course, any new or existing table-style report may be altered to do this). The process of creating a custom report is essentially freeform and, as such, can involve many actions. You are able to search one or more files for highly specific values, you can specify the way that report data will appear, you can include computed fields, and you can set up repeating collections. (See *Repeating Collections* below for further information on this topic.)

**To create a custom report:**

> Select the New Report option from the File menu. Select the last option that appears on the report dialog - A report that you design yourself. Reflex will then open up a blank report window for you. After specifying where report data will be obtained from (by means of formulas and queries), you calculate the report just as you might calculate a spreadsheet file with the Calculate option in the Report menu or the ⌘= command shortcut). On calculation, a well-designed report will display actual values in field positions according to the formulas you entered. If Reflex is unable to successfully produce a report field value, the report calculation procedure ends and either an error message will appear in the affected field or an error dialog appears telling you the type of problem that has occurred.

The contents of reports can be printed, referenced by other reports, and exported as a mail merge text file. Repeating collections within one report may be referenced by repeating collections in other reports exactly as database files are referenced.

*Note:* An additional feature is that report contents can actually be converted into Reflex database files by exporting them to a text file and then importing them back into a database. See **Importing/Exporting Data**, below, for more information on this topic.

## Names

A Database file, a report, fields in database files and reports, Links and Link collections, and Repeating Collections can all have names. A name is starts with either an alphabetic character, an underbar or a number sign followed by up to 31 alphabetic characters, underbars, number signs, or digits.

**To name an Object:**

> Files and reports are given names when you invoke NewDatabase File or New Report in the File menu and enter a name into the standard file dialog box that appears. Database fields are created and given names in file images displayed in the Overview window. To name all remaining objects simply select the object, then either select the text in the Name Panel or select Edit Name from the Report menu.

**Names in Reports:**

> In reports, all fields are given default names starting with f1. Repeating collections are given default names starting with r1. It is a good practice to change these defaults to something more meaningful.

**Name uniqueness:**

> Report and database file names must be unique within the disk volume (if you have Apple's new HFS system, they must be unique within the Finder folder). Database field and Link names must be unique within a single file (you cannot have two fields with the same name in that file, but you may have two fields in different files with the same name).

> Directly within the bounds of a report or repeating collection names must be unique. In other words you cannot two fields with the same name in a given report or repeating collection, but you may have two fields of the same name provided one is within an inner repeating collection.

**Referencing objects by name:**

> To reference a database file or report simply supply its name in a formula. If you wish to refer to an object inside a database file or report, you can supply a sequence of names that leads to that object. At the simplest level, a name sequence could specify a field name in a report. At a more complex level you may: A) Refer to a field in a database file by the Link names that lead to it; B) Refer to a field within a single repeating collection or nested repeating collections by the name of the report and the repeating collection(s) that enclose the field.

> Within repeating collections, you can refer to objects in the associated Source just by using their name in a formula. If an object with that name is not found, Reflex then looks to see if there is a "CALLED" synonym for that name (see Reflex Formulas & Queries for more information on Called). Otherwise, Reflex looks to see if there is an object within the repeating collection with the specified name. If none of these searches succeed, Reflex goes to the outer repeating collection (if any) and once more attempts to search for the name. Names on the left-hand side of a FROM operator are treated in a similar manner. Reflex will first attempt to find the name within the Source specified on the right-hand side of the FROM operator.

*Note:* Case is not significant in names. Also, space characters are not changed to the underbar ("_") character within the formula panel. Be aware that the spelling (upper/lower or upper and lower) of a given name is shared within a report or database file and that the most recent spelling entered becomes the model for future entries of that name. For example, if you had a field in one repeating collection called JobStatus and you added a field called jobstatus in another repeating collection, both would then appear as jobstatus.

## Repeating Collections

A Repeating Collection is the report mechanism which provides a view on the records in a database file or even in another repeating collection. Repeating Collections may be nested (placed within each other) so that you can produce lists of lists.

**To create a Repeating Collection:**

> Draw a generic black box anywhere in a report window. Go to the Describe menu and select Repeating Collection option. A repeating collection, recognizable by its two vertical handlebars, will appear.

**To nest repeating collections:**

> Simply create or place them within each other. Be aware that repeating collections may not overlap each other - as with all Reflex objects except pictures.

*Note:* It is important that you always change a Repeating Collection's default name to something more meaningful - see **Names**, above. Be aware that when a report is closed only the Design Template of a repeating collection is saved to disk - the data it displays is not.

## Importing/ Exporting Data

Data may be exported/imported from/to databases and reports. There are three data transport methods that are supported.

**The Clipboard format:**

> This option allows you to export qualified records to or import suitably formatted information from the standard Macintosh clipboard. The data format is the same as for Text files, only the data is held in the clipboard.

### The Text File format:

> This option allows you to export/import records in text file format. Reflex separates each field in any text file with a tab character and ends a record with a carriage return. In the case of records which contain a Link, both the single-valued fields and the Key field copies inside the Link are separated by tabs - a single carriage return character marks the end of each record.

For example:

**Field**(tab)**Field**(tab)**Link Key field**(tab)**Link Key field**(tab)**Field**(cr)

In the case of records which contain both single value fields and Link Collections, the format is a little different. Single-valued fields are separated by tabs and the last one is followed by a carriage return; each Link within a Link Collection is placed on a separate line with tabs separating Key field values and a carriage return at the end of each Link. The last Link of a Link Collection is ended with two carriage returns.

The example below shows how a record that contains three single-valued fields and a Collection of Links containing three Links might be exported:

**Field**(tab)**Field**(tab)**Field**(cr)
**Link Key field**(tab)**Link Key field**(tab)**Link Key field**(cr)
**Link Key field**(tab)**Link Key field**(tab)**Link Key field**(cr)
**Link Key field**(tab)**Link Key field**(tab)**Link Key field**(cr)(cr)
**Field**(cr)

### The Mail Merge format:

This option allows you to export/import records to or from a text file in a mail merge format. You will then be able to use the mail merge file with word processing programs such as Microsoft Word™ to produce personalized letters, circulars, etc. The only difference between this format and the standard text file format is that there is a header at the beginning of the file which lists the names of the fields that make up each record and certain text strings are delimited with quotes (eg: empty fields, and fields with embedded commas). Refer to the Microsoft Word user manual for more specific information on how to make best use of this feature.

**To export all database file records:**

All or just some records may be exported from a database file.

> Open the relevant database file and select Export Records from the Misc menu making sure that there is no Record Qualification in the formula panel. A dialog will appear asking that you specify the export format. You may choose from the three options described above. Next, another dialog appears requesting that you specify the fields from which to export data. Select each relevant field and click on the Include button (to include all fields, just click on the Include All button). If you are exporting to the clipboard, Reflex will proceed with the export procedure. If you are exporting to a text or mail merge file, you will be asked to provide the file name.

**Exporting Information from a subset of a Database:**

> Open the relevant database file. Enter a Record Qualification in the formula panel (you may use the First, Last, Next, Prior Record commands to verify your record selection). Then proceed with the record export as detailed above.

**Exporting Information from Report Fields (outside of all repeating collections):**

> Make sure that no repeating collection is selected. Invoke the Export Data option in the Report menu and a dialog will appear asking that you specify the export format. You may choose from the three options described above. Next, another dialog appears requesting that you specify the fields from which to export data (the list will only contain the names of fields not contained in any repeating collection). Select each relevant field and click on the Include button (to include all fields, just click on the Include All button). If you are exporting to the clipboard, Reflex will proceed with the export procedure. If you are exporting to a text or mail merge file, you will be asked to provide the file name.

**Exporting Information from Repeating Collections:**

> Select the relevant repeating collection by clicking on it. Proceed as above, but be aware that the export field list will only contain the names of the fields contained within the selected repeating collection.

In other words, you may only export data from the fields within a single repeating collection at a time. The chosen fields will be exported for all records in that repeating collection, no matter if they are nested under different repeating collections.

*Note:* A useful feature of Reflex is that report data may be used to create new database files or update the information in existing database files. See Example 7 for a description of how to use report data to update the records information in an existing file.

## Printing

**The Overview:**

> You may produce a hard-copy version of a database design (for documentation purposes or whatever) by printing the file images displayed in the Overview window. Simply make the Overview window active and select the Print option from the File menu. Be aware that all file images available in the Overview window (not just those visible) will be printed.

**Database Records:**

> You may obtain copies of individual database records by selecting the Print option from the File menu when the relevant record is displayed in the active data entry window.

**To print Report designs:**

> Open a report window and make sure that the activity indicator reads "Report Design". Select the Print option in the File menu. Fields and repeating collections will be printed in their box-like design appearance. You will only be able to obtain a print-out of the design template and not the data produced by a repeating collection. Special objects such as Page Break icons are also printed.

**To print Report data:**

> Open a report window and make sure that the activity indicator reads "Report Display". Select the Print option in the File menu. The data contained within a repeating collection will be printed as appears on the screen. Although repeating collections and field boxes are visible on the screen in display mode, their box-like borders will not be printed.

*Note:* Objects (a label a picture, for example) below a repeating collection in a report design float down in the report display to maintain the same distance beneath that repeating collection. Objects below multiple repeating collections float down to keep the same distance from the longest repeating collection (the repeating collection that reaches farthest down the report).

## Headers & Footers

Headers and Footers are printed only for reports printed in display mode. Headers are printed at the top of every page except the first page (so that the header does not conflict with column headings, for example). Footers are printed at the bottom of every page.

Before printing, the heights of all headers and footers are inspected and enough space is reserved at the top and bottom of all pages top accommodate the largest header and footer. The report as a whole and any repeating collection can have a header and/or a footer.

When a page break occurs, the top or bottom page break line can cut across repeating collections. If the top/bottom page break line does not cut a repeating collection, then any existing header/footer of the report is used. If the top/bottom page break line cuts across one or more repeating collections, the header/footer of the innermost repeating collection(s) that define a header is used. With side-by-side repeating collections, two or more headers/footers may be printed.

**To create a overall Report Header/Footer:**

> Make sure no repeating collection is selected. Select the Show Header or Show Footer option from the Report menu. An empty header/footer box will appear. Only one header or footer can be displayed at one time.

While a header or footer is displayed the report undeneath it cannot be edited. A header can only contain labels and pictures and these are created in the same way as in the rest of a report. However, if the special strings "[page]" and "[date]" (without quotes) are included in a label, all occurences of these strings will be replaced by the current page and date in the printout. (These values are obtained from the Macintosh clock/calendar). When a header is printed, its top edge is placed up against the top of the page and the height of the header is measured from its top edge. When a footer is printed, its bottom edge is placed up against the bottom of the page and the height of the footer is measured from its bottom edge.

The Show Header option in the Report menu changes to Hide Header when it is selected. The same goes for Show Footer.

**To create a Header/Footer for a Repeating Collection :**

> Select the relevant repeating collection and then follow the same procedure as above.

**To select a Header/Footer:**

> Select the Show Header/Footer option from the Report menu. When the object appears, move the cursor close to its top or bottom edge - notice that the crosshair cursor changes to an arrow shape when correctly positioned. Press the mouse button and move the object up or down as desired. Note that the location of a header has no effect on where the header will be printed.

**To remove a Header/Footer:**

> To remove a header/footer from a report or repeating collection simply show the header/footer (it will automatically be selected) and use the Clear option in the Edit menu. Alternatively, just select the current header/footer as described above and use the Clear option.

## Keeping Objects Together On the Printed Page

> **The No Page Breaks icon:** To create a No Page Breaks icon: Make sure the report window activity indicator reads "Report Design". Draw a thin vertical black box as high as the object(s) you wish to keep together and then select the No Page Breaks option from the Describe menu. This icon attempts to keep the objects to its left/right together on the same printed page.

*Note:* The No Page Breaks icon expands in report display to keep its top and bottom aligned with the tops and bottoms of the objects to its left and right. Remember that Page Break icons are not printed in report display.

## Specifying Page Breaks On Printed Pages

> **Page Break Before Icon:** To create a Page Break Before Icon: Make sure the report window activity indicator reads "Report Design". Click down on the report to create a small black box. Select the Page Break Before option from the Describe menu. This icon ensures that a page break occurs at the top edge of the icon in the printed report.

> **Page Break After Icon:** To create a Page Break After Icon: Make sure the report window activity indicator reads "Report Design". Click down on the report to create a small black box. Select the Page Break After option from the Describe menu. This icon ensures that a page break occurs at the bottom edge of the icon in the printed report.

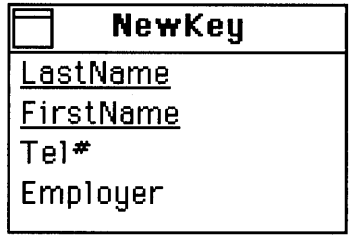
***Note:*** Page Break icons float down in report display to keep both below anything that was above them in the design and aligned with anything that was to the left and right.

## Halting Reflex Operations

> To halt a range of time-consuming operations (searching for database file records, calculating reports, exporting/importing information, printing, etc...) simply hold down the "⌘" key and then press the period (".") key.

**EXAMPLE 1: Changing The Key Type of a Database File.**

This example shows you a simple method of converting the key of a database file from one design (lastname and firstname) to another (employee number). The database shown below is used.



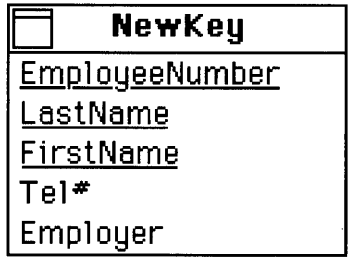

**To Change from the LastName/FirstName key to an Employee Number Key:**

> Select the complete file image or the last field in the file image.

> Go to the Overview menu and select the Insert Field option.

> Enter a new field called EmployeeNumber and use the relevant Describe menu option to make it a Sequence or Integer field.

> Save the modified database file design (shown below) and then open it by double-clicking on its name bar.




> Enter employee numbers for each existing employee record.

> Close the database and return to the file image in the Overview window.

> Select the EmployeeNumber field by clicking on it and move it above all other fields - it will automatically become a Key field. Select the LastName and FirstName fields in turn and use the Non-Key Field option in the Describe menu to make them non-key fields.

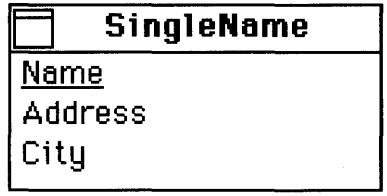
*Note:* If you use an Integer field for the Key, you will have to manually enter employee number values for each existing record and for each new record as it is filled out. On the other hand, if you use a Sequence field, you will only have to provide values for those records that already exist - new records will be automatically given a "highest existing number plus 1" value.

Reordering field names in the file image does not automatically reorder the fields in the associated data entry form. Use the Form Layout option in the Database menu to modify the data entry form as you wish.

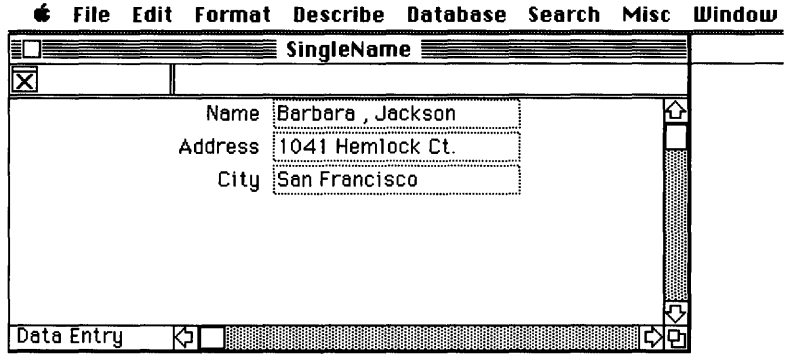
---

**EXAMPLE 2: Converting a Single Field into Two Fields.**

This example shows you how to split the contents of a single database file field (eg: "Barbara , Jackson") into two separate fields (Lastname = "Barbara" and FirstName = "Jackson").The database file shown below is used.



A record from this database would appear as:




**To split the Name field into a LastName and a FirstName field:**

> Select the SingleName file image.

> Go to the File menu and select the New Report option.

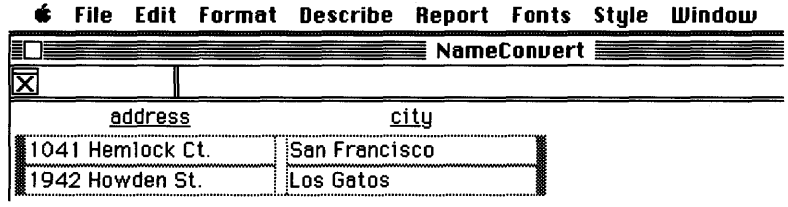
> When the report dialog appears asking you which type of report you wish to create, select the first option - a Table-Style report on "SingleName".

> When the fields to report on dialog appears, select and include all the fields except for the Name field.

> Next, the QueryBuild dialog will appear. Click on the Find All button since you want to modify the contents of all existing fields.

> Provide a name for the new report - let's call it NameConvert.

> When the report appears, it should appear something like the one below (of course the data will differ, depending on the records in your database file):



> Next, add two fields called LastName and FirstName inside the repeating collection.

> For the LastName field enter the following formula in the formula panel:

MID(Name,LOCATE(Name,", ")+2,LENGTH(Name))

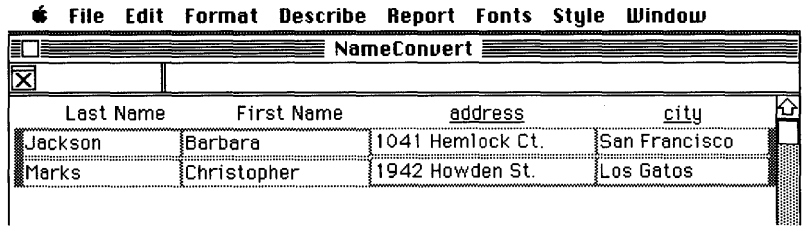
This formula uses the MID and LOCATE functions to "strip out" all the text that appears after the comma that separates the first name and last name in the single Name field.

> For the FirstName field enter the following formula:

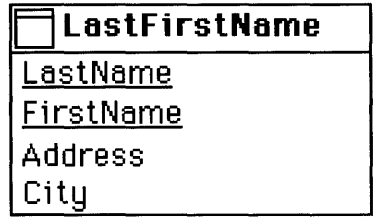
MID(Name,1,LOCATE(Name,", ")-1)

This formula uses the MID and LOCATE functions to "strip out" all the text that appears before the comma in the single Name field.

> Calculate the new report with the ⌘= shortcut.




> Now you'll need to create a New DataBase File in the Overview window that has the desired LastName/FirstName Key fields, as shown below:

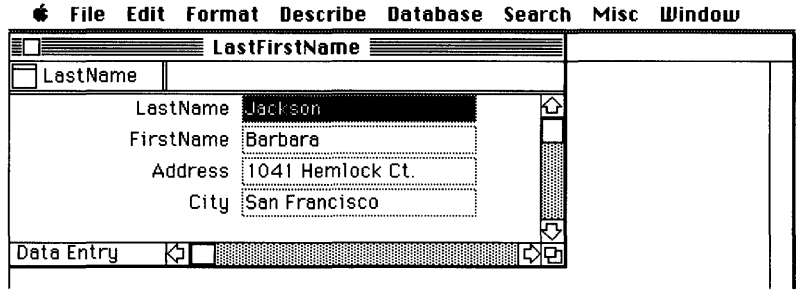


> Return to the NameConvert report and select the repeating collection and then select the Export Data... option from the Report menu. Decide whether you want to export the data to the clipboard or a text file (you will be asked to provide a name for the text file).

> After selecting the Export format, you will then have to specify the order in which the fields should be exported from the report. Inlcude LastName, FirstName, Address, and City .

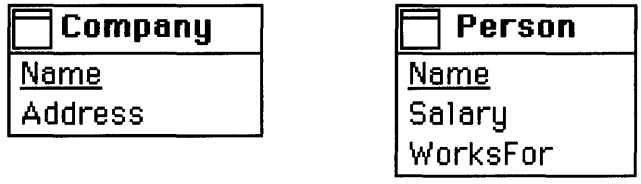
> Open up the new LastFirstName database file. Go to the Misc menu and select the Import Records option and then indicate where the records to be imported can be found (the clipboard or a text file in this case).

> Finally, select the order in which the import fields should be entered into the LastFirstName database file (LastName, FirstName, Address and City). Reflex will now import all the records and you will have a new database with records that appear as below:

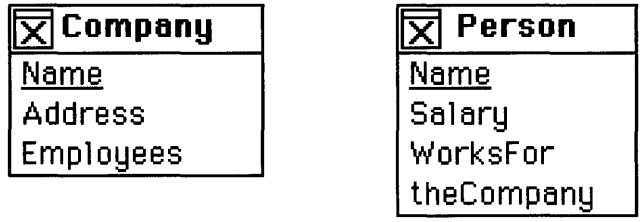


**EXAMPLE 3: Linking Single Reflex or "Foreign" Database Files**

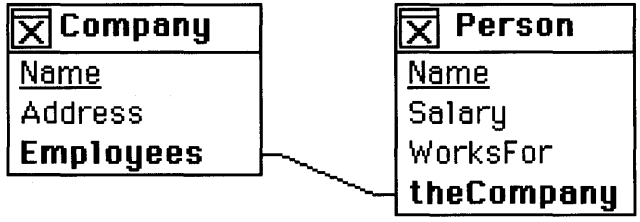
It is very easy to link the records in two independent database whether they were created within Reflex or imported from another application. The two database files shown below are used for this example.




> The first thing you have to do is enter a Link name in each file image and draw a Link line between them. Insert the Link names shown below:



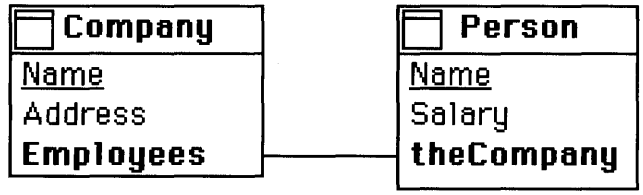

> Next, draw a Link line between the two Link names. Set the Employees as A Collection of Links to "Person" Records. Ensure that theCompany remains A Link to One "Company" Record.




> Open up the Person database file and export the Key field (Name) and the "linkage" field called WorksFor.

> Reimport the data back into the Person file, only this time import the WorksFor values into the new Link field called theCompany. Interlace will automatically copy the Name Key and the new values in theCompany over to the Collection of Links in the relevant Company records.

> The records in these two files are now linked and you can delete the original WorksFor field since its values exist in the Employee/theCompany Link pair.

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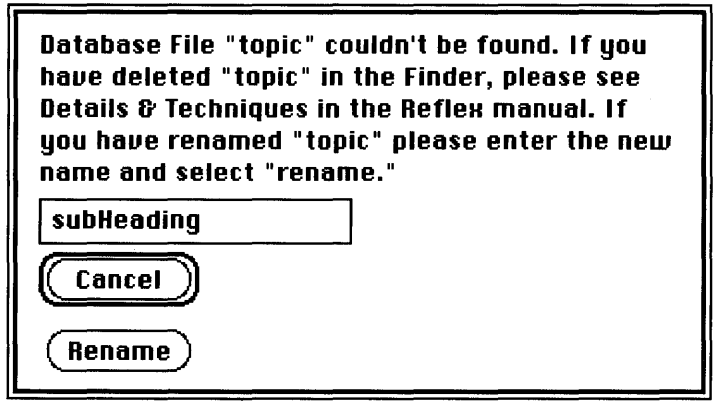
## EXAMPLE 4: Renaming & Deleting Database Files in the Finder

If you rename a database file at the Finder level, Reflex will not be aware of this. This can lead to problems when you try use a file or a set of files that used to be linked with the renamed file.

**To make Reflex aware of a renamed file:**

> When you try and Show Linked File (or make changes to a database file that has Links to other files) and Reflex cannot find the previously linked file, it will display the following dialog:



In the previous example, Reflex could not find a file called "topic" which was part of a linked set . If the file has been renamed at the Finder level, simply enter the new name (subHeading) in the text box provided and click on the Rename button.

**To "clean up" after deleting a database file with Links to other files:**

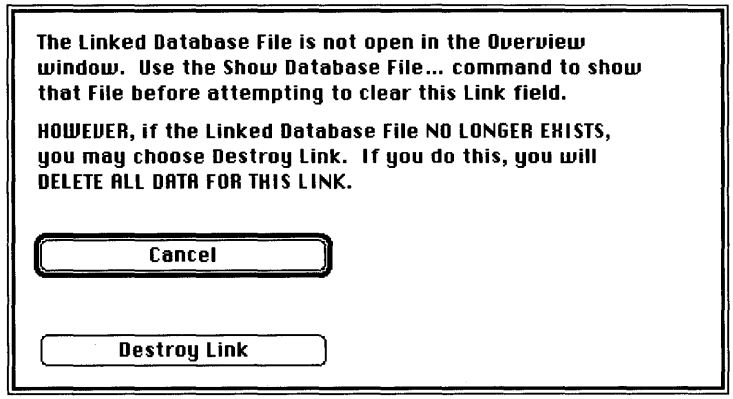
If you have deleted a database file with Links in the Finder you must remove any Link "remnants" that exist in the remaining database files. To do this:

> Show the image of each file that contained Links to the deleted file.

> Select the now useless Link names (they will still be in bold type) and select the Clear option in the Edit menu.

> Reflex will display the Rename dialog box. Just click on the Cancel button.

> Now, Reflex will display the following dialog box:




*Note:* If this Link is also a key, this dialog box won't appear, and it won't be possible to destroy the unconnected Link.

Read the dialog text carefully, then click on the appropriate button.

> If you click on the Destroy Link button, Reflex will delete the Link and the data it contains. You must then save the modified file design(s).

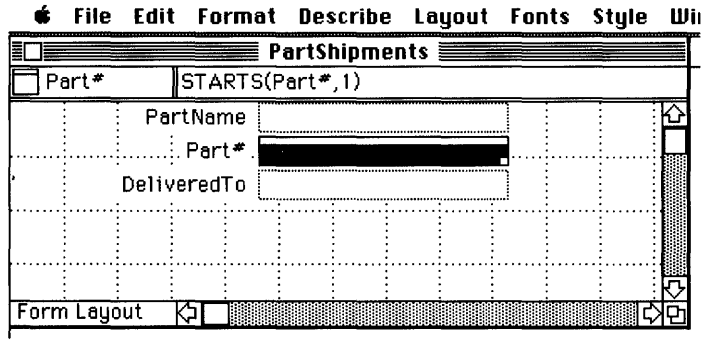
## EXAMPLE 5: Creating Field Qualifications

To create a field qualification, the active window must be a data entry Form Layout window.

> Select the field you wish to enter a qualification for.

> Enter the qualification formula - this qualification may be as simple or as complex as you wish.

The example shown below will only allow part numbers beginning with the number "1" to be entered in the Part# data entry field.

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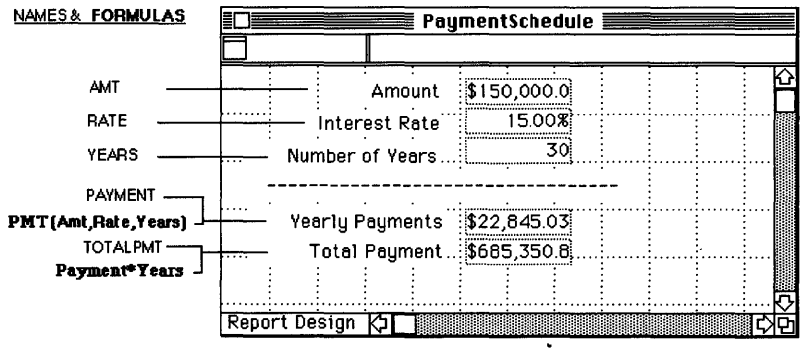
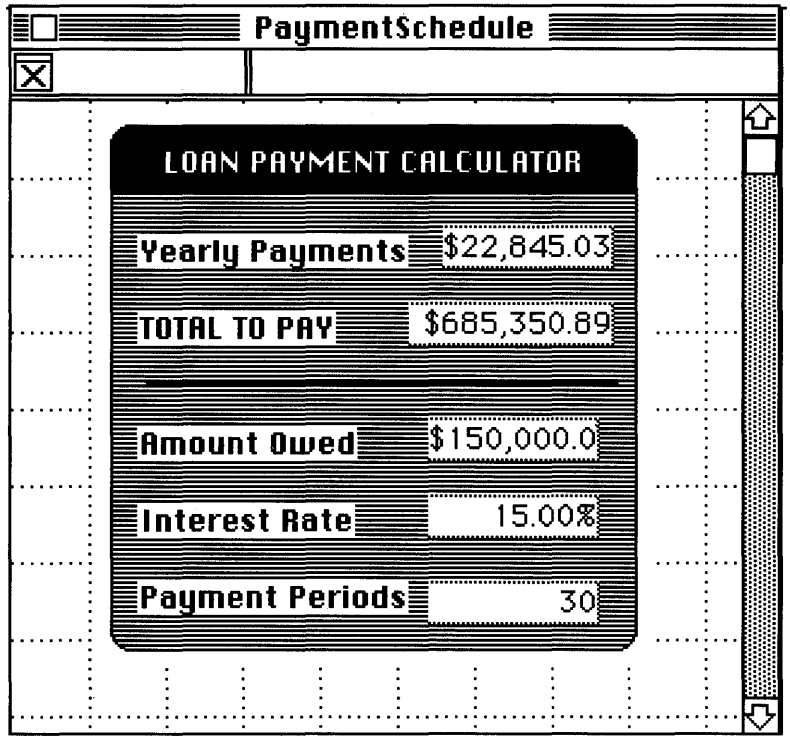
## EXAMPLE 6: Placing Pictures In Data Entry Forms & Reports

Placing pictures in Reflex data entry forms and reports can greatly enhance their appearance and usability.

We start off, below, with a straightforward spreadsheet-style report that uses Reflex's PMT (payment) function to calculate the payments that have to be made on any loan. The parameters are: the amount owed, the annual interest rate, and the payment periods.



By placing a picture into the report (as described in this section under **Placing Pictures in Data Entry Forms/ Reports**) and moving the fields around a little, a completely different visual effect can be given.



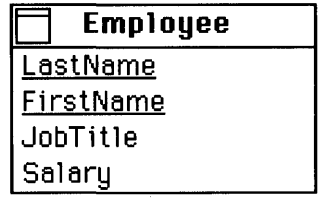

This is a simple graphic placed into a report. You can, of course, create pictures of the documents that you already use and paste them into data entry forms.

---

## EXAMPLE 7: Bulk Updates of Database File Records

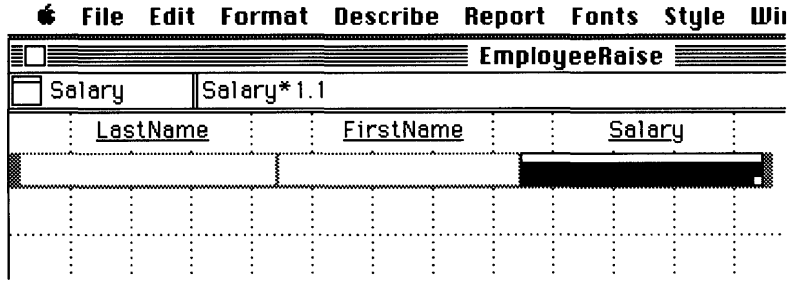
Rather than browsing through a whole database and changing every record (to give everyone a 10% raise, for example), you may create a report on a database that modifies one or more record values. These new values can then be exported from the report and then imported into the original database or a completely new database. By only reporting on a subset of a database file (producing a report only on those people with a particular job title, for example) you may do selective bulk updates of record information.

**To give everyone in the employee database shown below a 10% raise:**




> Create a table-style report on the Employee database - including only the LastName, FirstName and Salary fields.

> Give the Salary field the formula shown below:




When the report is recalculated all salary field values will be increased by 10%.

> Export the values from the modified report in the same LastName, FirstName, Salary order.

> Import the updated values into the original database file - Reflex will replace the old values with the new.

*Note:* If Reflex comes across a Key that does not already exist in the database file it will create a new record with that Key and associated fields.

# Section Four: Reference

# REFLEX FORMULAS & QUERIES

## DATA TYPES

Reflex fields may one of seven distinct data types - **Text, Number, Integer, Date, Time, Logical and Sequence**. **Label** and **Picture** objects are used strictly for decoration. The user typically specifies the type of each object at the time of its creation via the Describe menu options.

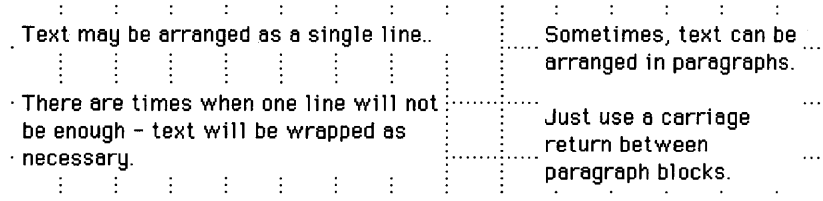
The two data types, **Error** and **NA** are used to indicate anomalous conditions; these are typically, but not always, generated by Reflex (see section on Functions).

In addition to the range of values defined below, each of the seven major data types can have a defined blank (empty) value. The blank value for each type is used when no value is desired for a field.

### Text

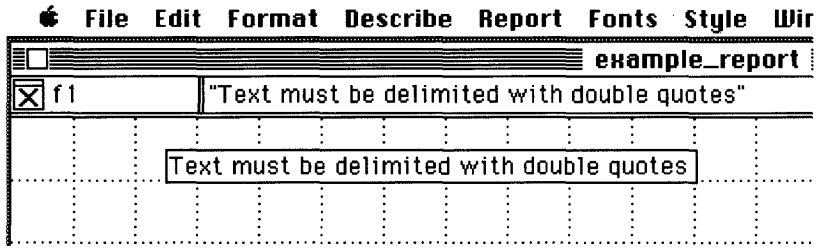
The Text data type consists of a variable number of characters from the Macintosh character set. This includes letters, numbers, symbols, and special foreign language characters.

In Reflex, text that does not fit on a single line will be word-wrapped according to the standard Macintosh definition of a word boundary. Long text strings placed in multi-line text fields will therefore appear as paragraphs; these paragraphs can be separated by the use of carriage returns placed between them. Text that is wrapped beyond the last line of a text field - and can therefore not be seen - is still counted as part of the current text object. To view the hidden text, simply make the text field larger using its resize box.

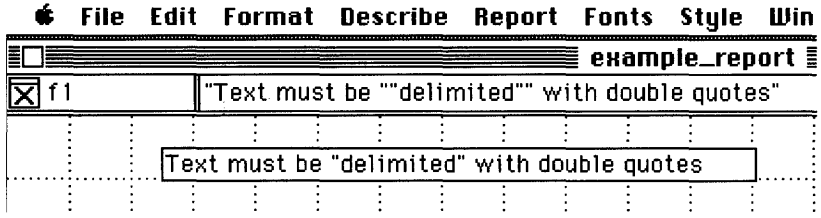


Any text included in formulas must be contained (delimited) within double quotes. Any double quotes in the text itself must be repeated twice to distinguish it from the actual text delimiters.

*Example 1:*




*Example 2:*



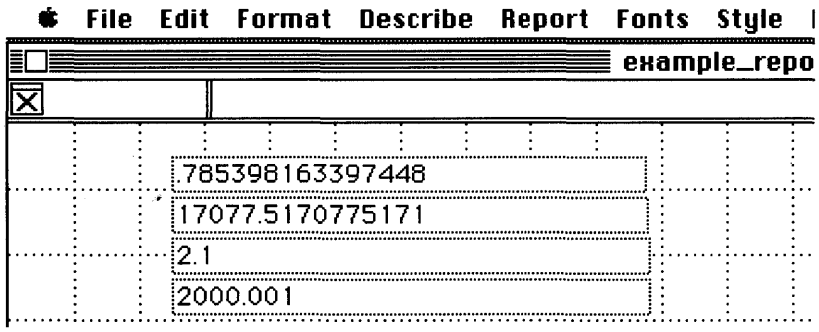

The **Text Sort order** is: A a B b C c.....Z z

**Number**

The Number data type consists of whole and fractional numbers represented in floating point format.

- Reflex provides up to 15 decimal digits of precision.

*Example:*




- Exponents in the range +308 to -324 may be used. Exponents are indicated by following a number with the letter "E" or "e" and the exponent value.

The **Number Sort order** is: -1, 0, 1, 2, 3...9

---

**Integer**

The Integer data type is actually a subset of the Number data type. An Integer is a positive or negative whole number up to 2 billion (2,147,483,647 to -2,147,483,647 inclusive, to be precise). This data type exists because such values are used frequently and can be stored more compactly and computed more quickly than Numbers. Also, Integer fields will not accept entry of values that contain a decimal point - this can be used to prevent entry of fractions where it makes no sense (i.e. ".3 children").

The **Integer Sort order** is the same as the Number Sort Order

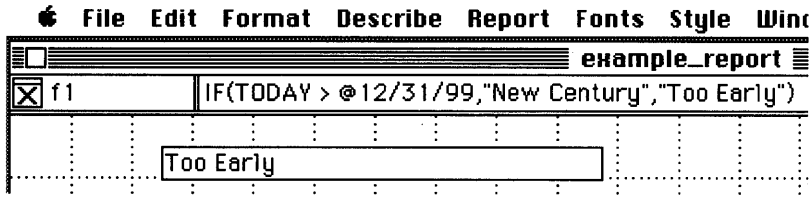
---

**Date**

The Date data type consists of the month, the day, and the year expressed as integers and separated by the slash character ("/").

- The Month is from 1 to 12 for January through December.
- The Day is from 1 to 31 as allowed by the corresponding Month.
- The Year is either expressed as from 04 to 99 for the years 1904 to 1999, or as from 1904 to 2039.
- Note that dates may be used in formulas, but only if they are preceded with the @ symbol (this makes them a date constant an thus distinguishes them from the division of three numbers).

*Example:*




(Note: The field in which the result of the above formula will appear must be a text field, not a date field since we are asking for one of two text strings to be displayed).

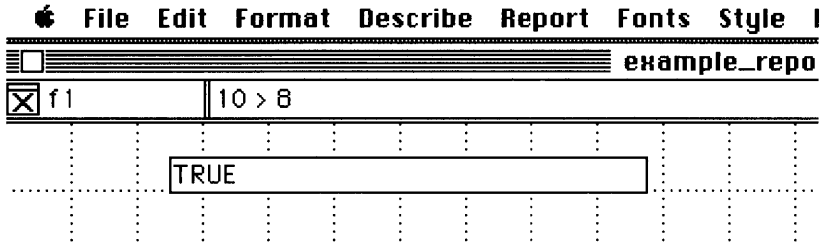
**Date Sort order** examples are: 8/20/47, 2/13/48, 2/16/48, 7/12/58, 12/16/58....

**Logical**

The Logical data type consists of a TRUE or a FALSE value or a YES or a NO value.

YES is functionally equivalent to TRUE and NO is functionally equivalent to FALSE.

*Example:*




The **Logical Sort order** is: Blank, NO, FALSE, TRUE, YES

---

**Time**

The Time data type follows the 24-hour format and consists of hours minutes and seconds separated by the colon character (":").

- The Hour value may be between 0 to 24.
- The Minute value may be between 0 and 59.
- The Second value may be between 0 and 59 and is optional, with zero as the default.
- Time values may be used in data entry and report formulas provided they, like Date values, are preceded by the @ symbol.

The **Time Sort order** is: 01:00:00, 02:00:00 .....24:00:00

---

**Sequence**

The Sequence data type consists of an integer value that, for data entry, can be set automatically by Reflex to a unique value, or as desired by the user.

- The first record in a database file will be given the default Sequence value of 1; the second record will be given the default value of 2, etc...

- The user may change a record Sequence field to any value they wish provided it has not already been taken by another record. Reflex will then ensure that the next record Sequence field will have a value of the largest Sequence value in the file + 1.

- In reports, a Sequence field is just like an Integer field.

The **Sequence Sort order** is the same as the Number and Integer Sort order.

---

**FORMULAS & NAMES**

A Name consists of a leading letter character followed by zero or more letters, digits, underbar characters ("_"), or number sign characters ("#"). Reflex does not allow spaces in names that consist of more than one word. (The underbar character will automatically be substituted if you inadvertently enter any spaces in names while defining the name of a database file, a report, a field, a repeating collection, or a Link. Although Reflex allows you to use long, descriptive names they cannot be more than 32 characters in length.

The name of a field is a simple formula that refers to the value of that field. The name of a **Database file**, a **Link**, or a **Repeating Collection** are collectively referred to as **Sources**.

- You cannot use Reflex keywords - such as AND, OR, NOT, FROM, WHERE, and CALLED - as names.

- You cannot use Reflex function names that have no arguments - such as TRUE, FALSE, INFINITY, TODAY, PI, NOW, NA and PREVIOUS - as names.

---

## NAME SEQUENCE FORMATS

To refer to information in linked database files or reports other than the one you are working with, a single name reference is not adequate. Instead, you must use a **Sequence of Names**. A sequence of names can use one of three equivalent formats.

### The 'OF' Format

The word 'OF' can be used to separate the sequence of Names.

*Examples:*

netWorth OF thePerson

symbol OF theCompany

### The Possessive Format

This Name format requires that you place the possessive fragment - apostrophe S ('S) - at the end of all but the last of a sequence of names - spaces are also still required between the words. Note that this format requires that you put the names in the opposite order to that of the OF format.

*Examples:*

thePerson's netWorth

theCompany's symbol

The apostrophe S is still required even if the name being referenced is plural and therefore already ends with an S.

*Example:*

theStocks's amount

**The Dot Format**

The third Name format allows the user to simply use the dot character (".") instead of the apostrophe S.

*Examples:*

thePerson.netWorth
theCompany.symbol

Possessive format and dot format references are functionally equivalent in terms of the sequence in which names appear ; they may be freely intermixed.

The "OF" Name format can only be mixed with the the latter two formats where the Name sequence begins with OF and then switches either to the possessive or the dot format. Once the possessive format or the dot format has been used in a Name Reference, you cannot switch back to the OF format.

*Example:*

MAX(netWorth of theStockholders.thePerson FROM company WHERE stockName = "Revstar")

---

**QUERIES**

At its simplest, a query is just the name of a Source.

*Examples:*

Employee
netWorth
theStocks

However, more selective views of Sources are made possible by providing a query that features the Source name, followed by a "WHERE", which in turn is followed by a **Qualification.** A qualification is just a formula that returns either TRUE or FALSE. The qualification can refer to the various data fields of a record by name and can include some comparisons.

*Example:*

Person WHERE netWorth < 200000

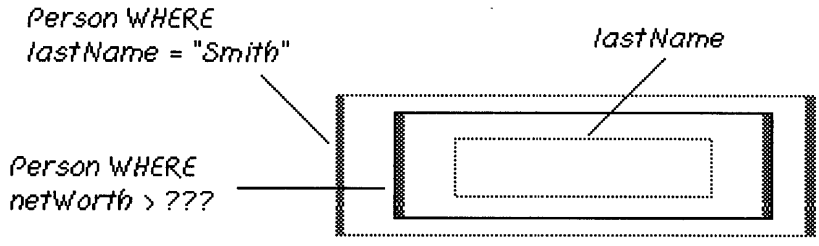
---

**The "Called" Option**

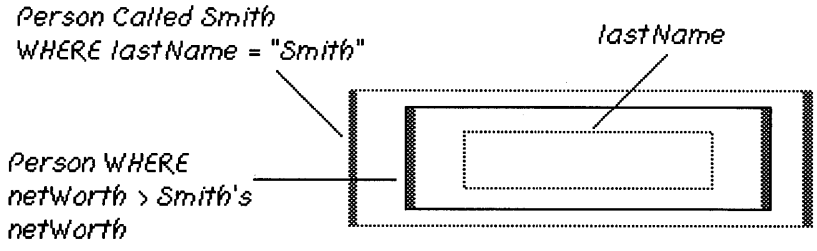
In queries involving more than one file, you will sometimes find that a field name in one file is the same as that of a field in another file. This is always the case when the query has to use the same file twice.

*Example:*

If the problem is to find the name of every stockholder that has a greater net worth than somebody called Smith, you can use the following design template.




But what do you actually put in place of the ??? to refer to Smith's net worth? The answer is provided by the "Called" option which can be used to supply a synonym for the name Smith, as shown in the completed design template.




The Called option can be used with any Source, not just a database file as in this example.

A Function call typically consists of the name of a function followed by one or more parameters contained in parentheses and separated by commas. Some Functions - including PI, TODAY, NOW, and FALSE - do not require parameters (See the section on Functions for more specific information).

- A function parameter is a formula.

*Example:*

ROUND(netWorth)

- Some functions - including SUM, MAX, COUNT, and AVERAGE - accept an indeterminate number of parameters.

*In general the format is:*

AVERAGE(formula FROM query)

*A specific example is:*

AVERAGE(netWorth FROM person)

This function will obtain the netWorth value from every person record and then compute the average of these values.

- The COUNT function is a special case in that it can take a query as a parameter.

*The general format is:*

COUNT(query)

*A specific example is:*

COUNT(person WHERE city = "San Francisco")

This example COUNTs the number of Person records that meet the qualification.

---

## FORMULA COMPONENTS

### Expressions

An Expression is the combination of some basic elements - a text, a number, a reference Source name, a function or a parenthesized formula - and one or more operators.

The arithmetic operators are:

| | |
|---|---|
| + | **Addition** |
| - | **Subtraction or Negation** |
| * | **Multiplication** |
| / | **Division** |
| ^ | **Exponentiation** |

All arithmetic calculations in Reflex can use either Numbers or Integers or both. Integers are automatically converted to Numbers when necessary.

---

### Order of Evaluation

If several arithmetic operators are used in a single expression, the calculations are performed in the order:

| | |
|---|---|
| - | **Negation** |
| ^ | **Exponentiation** |
| * or / | **Multiplication or Division** |
| + or - | **Addition or Subtraction** |

If you wish, a different order of calculation can be produced by using parentheses to group sub-expressions that are to be calculated first.

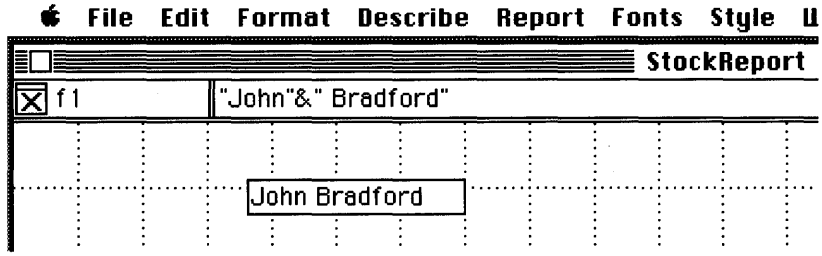
---

**The Text Operator**

There is one textual operator - the ampersand character ("&"). The ampersand can be used to concatenate text values, or text values and a number values. Reflex can convert dates, numbers and other data types to text as needed.

For text to text concatenation the format is: **"Text" & "Text"**

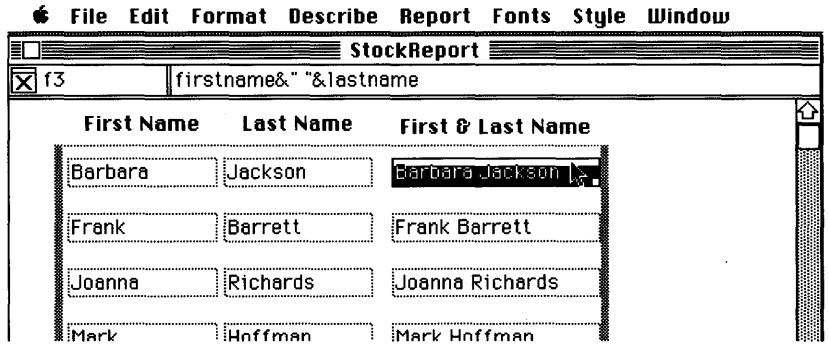
*Example:*




Database file fields may be concatenated in reports so that multiple fields appear as one field. The format is:
**Fieldname&" "&Fieldname...**

*Example:*

In this example, the values of the separate first and lastname fields (which have the formulas firstname and lastname, respectively) are concatenated in the field labelled "First & Last Name". The repeating collection is providing a view of the Person file.



**Comparison Operators**

A Comparison consists of one of the six following operators:

| | |
|---|---|
| = | **Equal** |
| < > | **Not Equal** |
| < | **Less Than** |
| > | **Greater Than** |
| <= | **Less Than or Equal** |
| => | **Greater Than or Equal** |

Numbers and Integers may be compared. Text objects may be compared using the standard Macintosh primary ordering of the character set. Dates and Times may also be compared.

*Examples:*

```
10 < > 50
5 < 12
IF(10*10 = 100, "Equal", "Not equal")
```

---

**Logical Operators**

Reflex provides support for the standard Logical operators AND, OR, NOT.

*Examples:*

amount >100 AND pricepaid <50

netWorth >100000 OR age >50

---

# Reflex Formula Syntax

**Formula** ::= { Query FROM } Query

**Query** ::= Qualification [ CALLED Name ] [ WHERE Qualification ]

**Qualification** ::= Negation { ( AND | OR ) Negation }
**Negation** ::= [ NOT ] Comparison

**Comparison** ::= Compound [ ( '=' | '<>' | '<' | '>' | '<=' | '>=') Compound ]

**Compound** ::= Expression { '&' Expression }
**Expression** ::= Term { ( '+' | '-' ) Term }
**Term** ::= Power { ( '*' | '/' ) Power }
**Power** ::= Factor { '^' Factor }

**Factor** ::= '"' Text '"' | Number | '@' ( Date | Time ) |
Logical | [ '+' | '-' ] ( Reference | Function | '('Qualification ')' )

**Function** ::= FunctionName [ '(' [ Formula { ',' Formula }] ')' ]
**FunctionName** ::= ABS | ATAN | AVERAGE | CHAR | COS |COUNT | DATE | DAY | ERROR | EXISTS | EXP | FV |HOUR | IF | INCLUDES | INFINITY | INT | ISERROR |ISNA | LENGTH | LN | LOCATE | LOG | LOOKUP | MAXI MID | MIN | MINUTE | MOD | MONTH | NA | NOW | PV | PI | PMT | PREVIOUS | PV | REPEAT | ROUND |SECOND | SIN | SQRT | STARTS | STDEV | SUM | TAN |TIME | TODAY | YEAR

**Reference** ::= Name [ OF Reference | { ( 's' | '.' ) Name} ]

**Name** ::= ( letter | '_' | '#' ) { letter | '_' | '#' | digit }

**Date** ::= Integer '/' Integer '/' Integer

**Time** ::= Integer [ ':' Integer [ ':' Integer ] ]

**Logical** ::= TRUE | FALSE | YES | NO

**Number** ::= ( Integer [ '.' { digit } ] | '.' digit { digit } )
[ ('E' | 'e' ) Integer ]

**Integer** ::= [ '+' | '-' ] digit { digit }

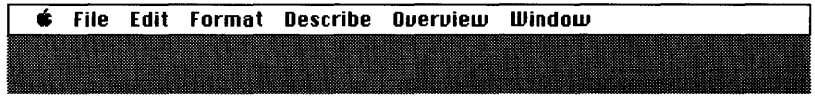
**Text** ::= { character }

| | |
|---|---|
| :: | Consists of |
| { } | Repeat as many times as |
| [ ] | Optional |
| \| | Or |

## REFLEX MENUS

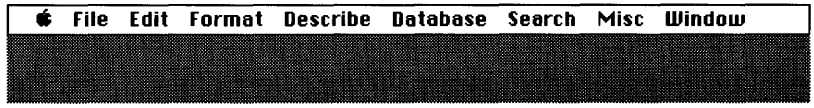
In addition to the standard Apple (🍎) menu, Reflex provides a range of main menus and menu options which change (are updated) according to the type of activity you are doing. Reflex menus are used in the standard Macintosh manner. Menu options that are not appropriate for the current activity will be dimmed (gray) and you will not be able to select them.

### The Overview Menu bar



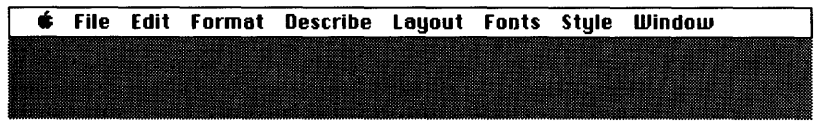

The **Database Overview menu bar** is the first that appears after you load the Reflex program. It contains everything you will need to create new database files, show the images of existing database files, and modify existing database files. Reflex program information and Reflex's Help system can be obtained via the relevant options contained in the 🍎 menu.

### The Data Entry Menu bar



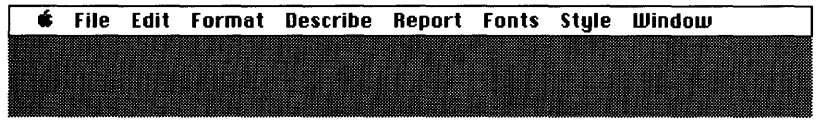

The **Data Entry menu bar** appears when you open a database file for data entry. This menu bar contains everything you will need to enter, modify, and delete records. Records may be exported and imported with options in the Misc menu.

## The Form Layout Menu bar




The **Form Layout menu bar** appears when you choose the Form Layout option from the Database menu in the Data Entry menu bar. This menu bar contains everything you will need to customize your data entry forms.

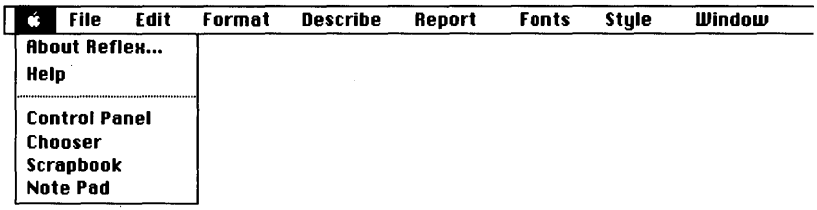
## The Report menu bar




The **Report menu bar** appears when you create a new report or open an existing report. This menu bar contains everything you will need to design, display and modify reports.

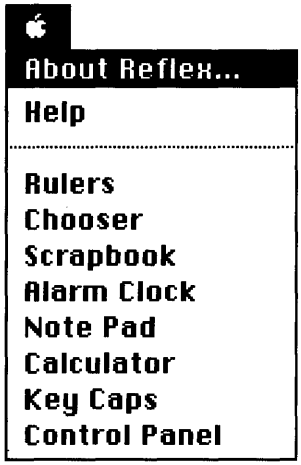
The rest of this menu reference section is devoted to brief descriptions of the options found within each menu heading.

## APPLE MENU



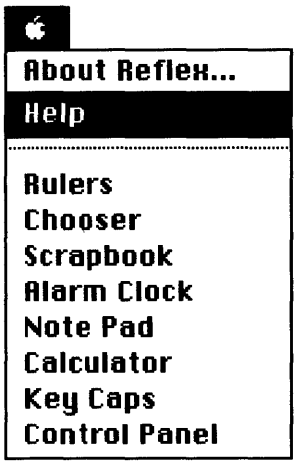

The  (apple) menu contains two Reflex specific options and a list of all available desk accessories. The list of desk accessories will vary depending on the number currently installed. (Use Apple's Font/DA Mover™ utility program to install or remove desk accessories.) The two Reflex options - which provide program version information and access to Reflex's main Help facility - cannot be changed by the user.

---



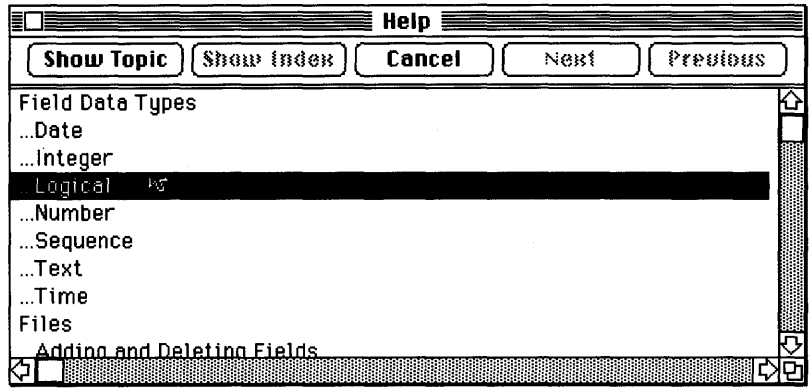

The **About Reflex** option produces a dialog box giving copyright and program version information. Click the OK button to send the dialog away.

---




Reflex's major **Help** function is available in one of two ways:

- Select the Help option from the  menu: A Help window will appear which contains a range of choice buttons and an index of topics on which Help is available. Select the topic you need help on and click on the Show Topic button.



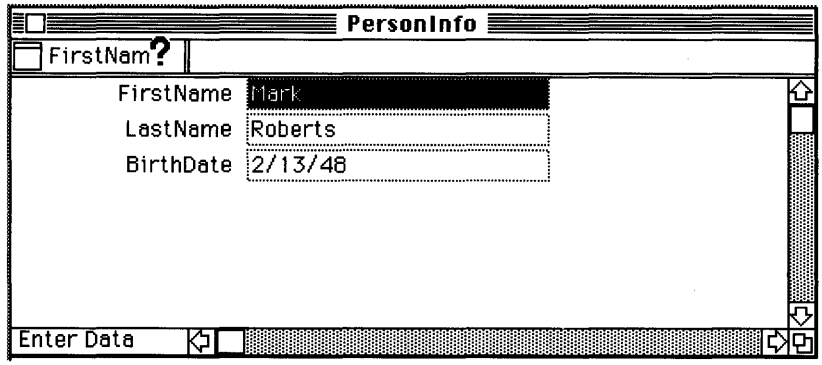

**Show Topic** will display relevant Help text.

**Show Index** will return you from within a particular topic to the main Help Index to make another choice.

**Next** and **Previous** move you within individual Help topics.

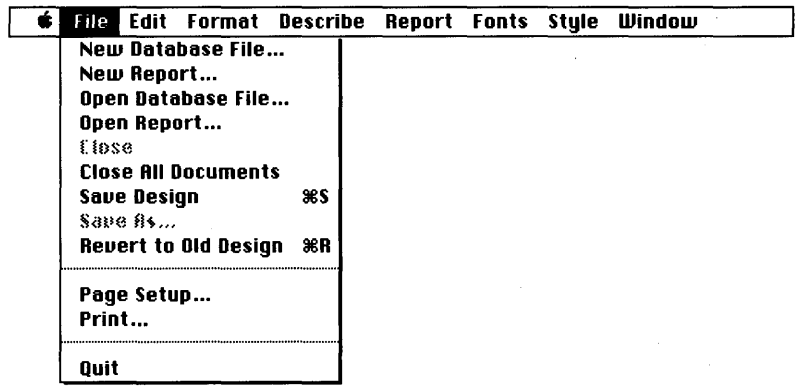
**Cancel** returns you to Reflex.

• To get an explanation of almost any item on the screen or any menu command, simply hold down the ⌘ key and press the question-mark ("?") key (it doesn't matter if you use the Shift key or not).The arrow cursor will turn into a large question mark. A description of almost any item or menu command can be obtained by placing the question mark cursor over the particular item and clicking the mouse button once. The Help window, as described previously, will appear and display the explanation you seek.



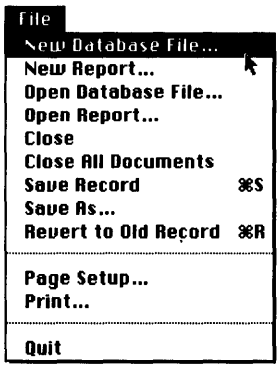

Note that this latter form of Help cannot be used with dialog boxes - they are either self-explanatory or have their own Help feature (as with the QueryBuild dialog).

# FILE MENU




The **File** menu is where you design, save, open and close the various types of Reflex documents that you will create. This menu also has an option that allows you to revert the design of database files and reports, and the contents of database records, if for any reason you do not wish to keep the modifications you have made.

Standard Macintosh **Page Setup** and **Print** options are included. The last menu option - **Quit** - returns you to the Finder.




The **New Database File** option is selected when you want to design a new database file. Reflex responds by displaying a standard file dialog requesting that you name the new file.

- Entering a name and clicking on the Create button causes a blank file image to appear in the Overview window. Its name bar contains the name you supplied. If the name has already been taken, Reflex will ask you if you wish to replace the existing file. Make a decision and click the required button.

- If you change your mind and decide not to go ahead with building a new database file just click on the Cancel button and the standard file dialog will disappear.

You may preselect where Reflex will place a new file by dragging diagonally in the Overview window with the mouse button depressed. A black box will appear as a location marker. If you do not preselect a spot, Reflex automatically places the new file in the Overview window along the left margin, below the lowest file currently visible.

The New Database File option is always available from the File menu regardless of what you are doing within Reflex.


The **New Report** option is selected when you want to design a new report. Selecting this option produces a dialog box which offers a selection between a ready-made table-style report and a report which you design yourself.

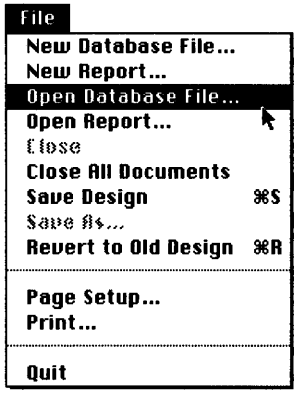
- Table Style Report on the currently selected database or another database you choose: This is the quickest way to produce a simple columns and row style report on a single database. You can customize both the layout and the contents of the record list via the Design Report menu option in the Report menu. Record qualifications entered directly into the formula panel or via QueryBuild can be used to restrict the records that are displayed. All table-style reports can be redesigned to work with multiple files.

- A report which you design yourself: Custom reports may be as simple or as complex as you wish - there is no initial default format as with table-style reports. Report form layout is entirely up to the individual user's taste or requirements.

In all reports: Fields can be created, positioned and repositioned, text labels may be created and displayed in different fonts and font styles, and pictures can be pasted in via the clipboard.

A most powerful feature of reports is Reflex's formulas and queries which can be used to produce reports of an unusually complex nature.

---



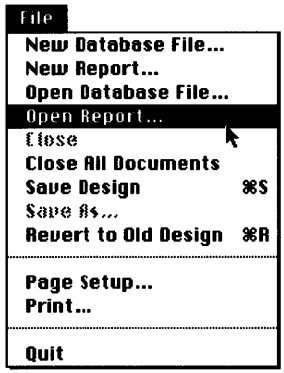

The **Open Database File** option is used to open up a data entry form for an existing file. The file may already contain data or it may have just been created and must now be opened for initial data input.

There are two methods of opening an Reflex file:

- If the Overview window is not active, go to the File menu and select the Open Database File option. When the standard file dialog appears, select the file name that you wish to open and click on the Open button. The data entry form will open for that database and you may add, edit or view the records it contains.

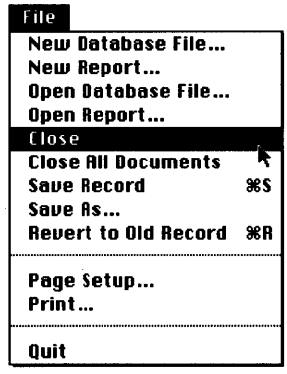
- The fastest way to open a database is to double-click on its name bar (but not its status icon) just as you would open a program or document from the Finder.

The first option allows you to stop the open database file procedure with a Cancel button, the second clearly does not. Many database files can be open at one time.



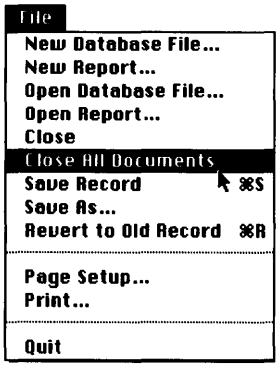

The **Open Report** option allows you to open up an existing report form for calculation or modification. This is the only way you can do this since report forms do not appear in the Overview window and can therefore cannot be double-clicked. Many reports can be open at one time. Note that calculating a specific report will open any reports that it refers to and will show the images of all database files referenced in the Overview window.

---




If you are working anywhere other than in the Overview window, the **Close** option closes the currently active window. If changes have been made to the current database file or report, the Close function saves them to disk automatically. Close is not available (it is grayed) when the Overview window is active. You can, of course, use the close box on each window to remove an active window.

---




The **Close All Documents** option closes all active database file and report windows and saves any unsaved changes. This is a useful feature if you have to close a number of database documents in order to make modifications to their structure in the Overview window or you just want to clear everything away quickly. Close All Documents does not have any effect on the Overview window.

---


The **Save Design** option reads differently (it is updated) depending on the activity you are doing. It can be one of four possibilities: **Save Design**, **Save Report**, **Save Record**, and **Save Form**.

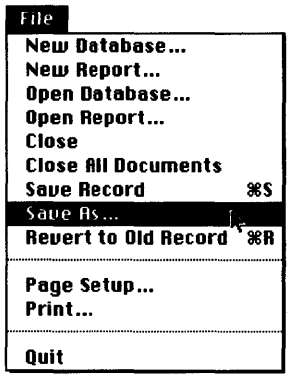
- Save Design is used to save the design of new database files or to save changes to existing files. This option may be selected at any time to save changes to files. New database file designs are automatically saved when you try to open them the first time. Save Design must be used to save all changes to an existing database file structure before it can be opened.

- Save Report is used to save the design of a report you have just created or the modified design of an existing report.

- Save Record places the current record into the file to which it belongs. This command also writes all changes made to disk so that the disk copy of the file is as accurate as possible.

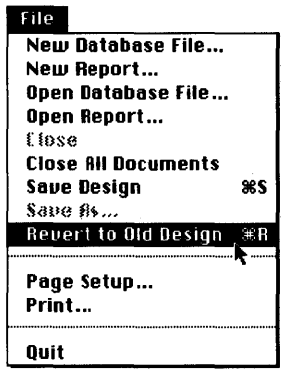
- Save Form is used to save the design of a Data Entry Form you have just customized.

---




The **Save As** option is used to make copies of existing database files or reports under another name on the current or some other disk. The original file is left untouched, but its design and contents are duplicated and saved under the new name. This is useful if you run out of disk space since you can use the standard file dialog Eject button to remove the current full disk and replace it with a blank (formatted or unformatted) one. You cannot copy a file from the Overview window - its database window must first be opened. It is important to note that it is not good practice to make multiple copies of the same database other than for backup purposes since this can lead to inconsistent data. Reflex will display an error message if you try to open more than one version of a file at the same time and the original file contains Links.

---




Often, you will wish to undo changes you have made to a database or report - this is where the **Revert** option comes in really handy. This menu option changes to keep track of whatever activity you are doing. There are four possibilities: **Revert to Old Design**; **Revert to Old Report**; **Revert to Old Record**, and **Revert to Old Form**.

- Revert to Old Design: This option will discard all changes you have made to the current database file image and reload the last saved version. Be careful, if you save any changes to disk and then change your mind, Revert to Old Design will not be able to help you at all and you'll have to manually recreate the desired file or structure.

- Revert to Old Report: This option will discard all changes you have made to the current report and reload the last saved version of the report.

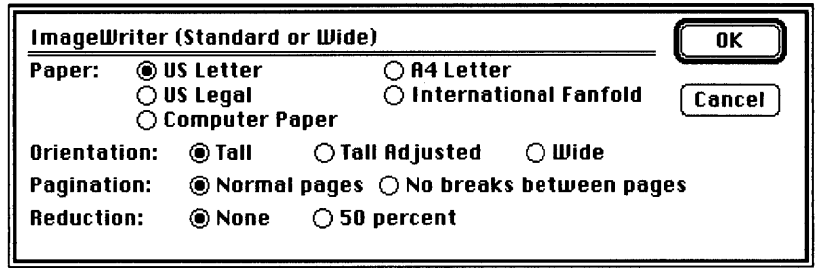
- Revert to Old Record: This option will discard all changes to the current database file record and redisplay the last version inserted into the file. If the record is new (unsaved), using the revert command will return the record to its original blank state.

- Revert to Old Form: This option will discard all changes to the current data entry form and redisplay the last saved version of the form.

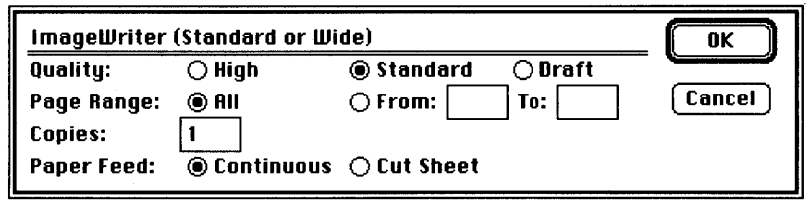
---


The **Page Setup** and **Print** options provide access to standard Macintosh page size/orientation and printing dialogs as shown below:

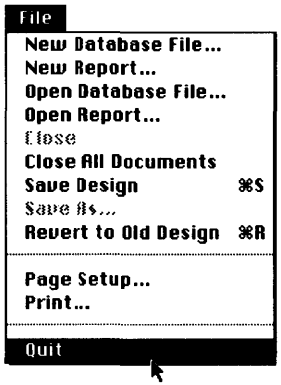
When the Page Setup dialog appears, just select the options you wish by clicking on the relevant button(s).




The Print dialog allows you to select the quality of printed output, the specific pages to print, the number of copies of the document, and the type of paper (continuous or cut-sheet) that will be used. Both the Apple Imagewriter and LaserWriter are supported.




For a more detailed explanation on these two menu options refer to Macintosh™, the owner's manual.

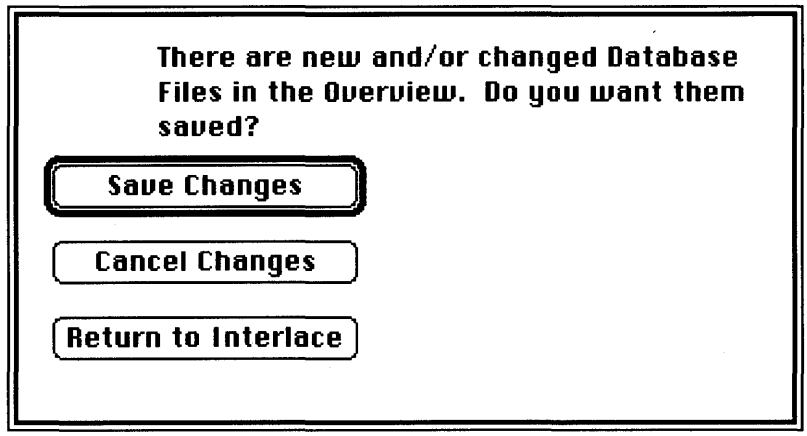



The **Quit** option is used to exit from Reflex.

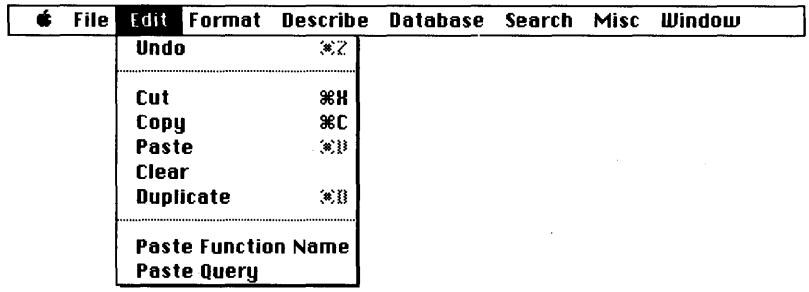
- If there are no unsaved changes to database files in the Overview or any open documents, this option simply returns the user to the Finder.

- If there are unsaved changes to documents the Quit option saves them, if possible, and then exits to the Finder.

- If there are unsaved changes to file images in the Overview, you are asked whether you want to save them. You may save the changes and continue with the Quit. You may cancel the changes you have made in the Overview and continue with the Quit. Lastly, you may opt to return to Reflex.



## EDIT MENU




The **Edit** menu contains all those options you will need to manipulate objects while using Reflex. There are options to **Cut**, **Copy**, **Paste**, **Clear**, and **Duplicate** objects. The last two options, **Paste Function Name** and **Paste Query**, are used to place functions and queries in the formula panel of the active window.

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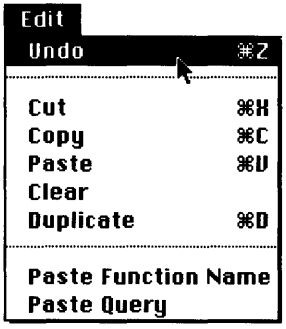


The **Undo** option is used to discard all changes made as a result of choosing the cut and paste options listed below it in the Edit menu (or when you select objects and then use the Backspace key shortcut). If you enter text in a database file or report field or formula/name panel, and then wish to remove that text, you may choose the Undo option. If the text area in question was previously empty, it will become empty once again. If the text area already contained text which you overwrote or edited, that text will reappear.

Be careful, Undo will only reverse the last action you did - you cannot rely on it to bring back items modified or deleted early in a work session.

If Undo is not applicable or not available for some reason the option will appear gray and you will not be able to select it.

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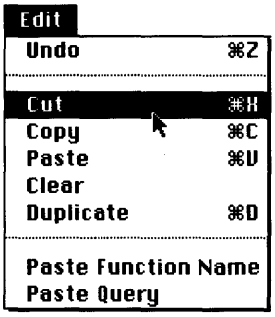


The **Cut** option is used to delete what is currently selected from the current database or report and place it in the Macintosh Clipboard - anything already in the clipboard will be discarded.

- In a data entry form or report, you can select a single object, or multiple objects, to cut and paste. The contents of any field that is Cut (its value, formula, name, type, formatting, current font and style), are included in the Cut.

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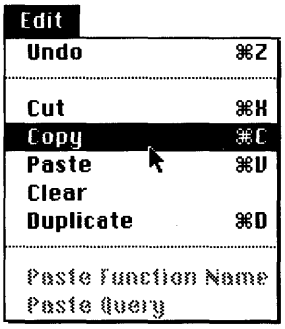


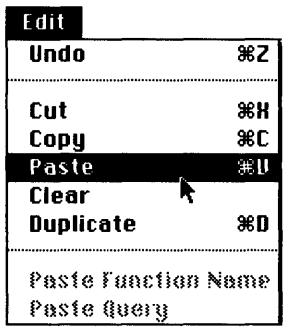

The **Copy** option makes a duplicate of any currently selected object or group of objects and places the duplicate in the clipboard. Anything placed in the clipboard in this way can be pasted into any other Interlace document.

The Copy feature is useful when transferring items between the various Interlace documents you will be working with.

- Copying fields copies everything about that field, enabling you to save development time when designing very similar forms.

- Copying formulas, especially long and complex ones, is a much safer way of transporting them between documents than retyping.

---




The **Paste** option can be viewed as the companion option to Cut and Copy. It is used to insert the contents of the clipboard into the currently selected target. The clipboard contents may orginate from within Reflex itself or from other applications or desk accessories such as the Scrapbook.

- Text can be pasted into name and formula panels when those panels can be edited.

- Text can be pasted into fields and labels when these objects can be edited.

- Text and Picture objects (and multiple selections of these objects) can be pasted into Headers, Footers, and Data Entry Forms.

- All objects, and multiple selections of them, can be pasted into Reports.

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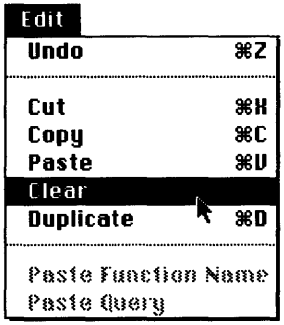
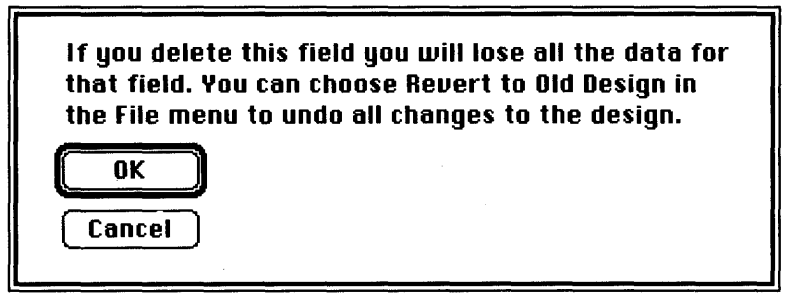


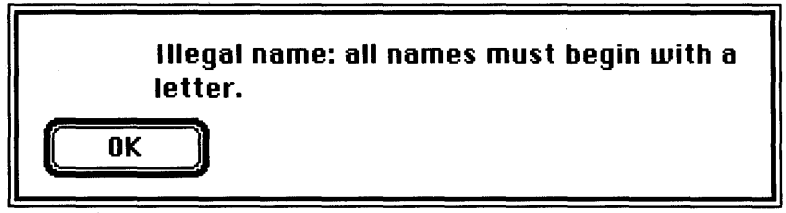

The **Clear** option, while similar to the Cut option, does not place any selected items into the clipboard - it simply discards them.

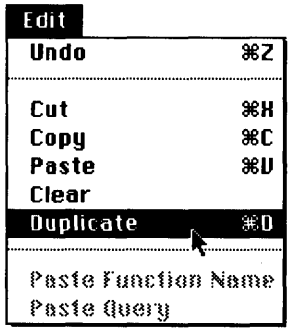
• In the Overview window you can use Clear to discard a new database file image that has not yet been saved and to remove new or existing file image fields. Removing an existing file image field would be a major change to a design and would therefore require that you save the changes before opening that file once again. The contents of any field that is deleted via the Clear option in the Overview window are lost, as indicated by the dialog:




• In Form Layout windows you can remove labels, pictures, and the contents of the formula panel (or multiple selections of these objects), by clicking on them and choosing the Clear option.

• In report windows you can remove fields, labels, pictures, repeating collections, and the contents of the formula panel (or multiple selections of these objects) by clicking on them and choosing the Clear option. You can also use Clear to remove the contents of the name panel in a Report window, but you cannot then leave the name panel empty. If you attempt to do this, you will see the following dialog:

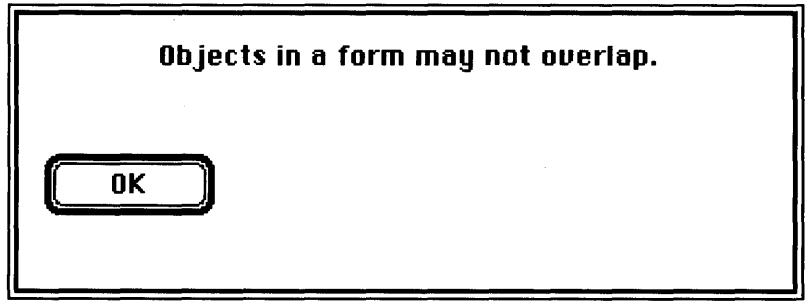




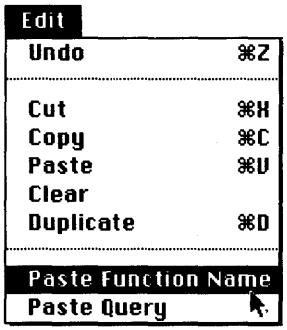

The **Duplicate** option is used to copy a selected item, or group of items, without placing the object(s) in the clipboard. Use it to create multiple fields of the same size and type within reports or to customize reports with labels and graphic images. First, select the field, repeating collection, label or graphic image and then choose Duplicate.

- Database fields cannot be duplicated with this option.

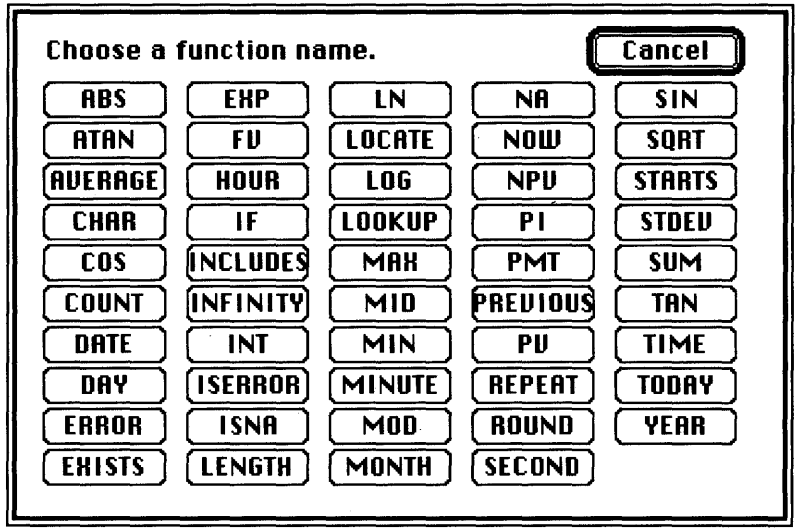
- Duplicates are placed immediately below the original item. If ther is no space to do this (other fields are too close, for example), Reflex will first sound a beep. On a second attempt to use the same command Reflex will respond with the dialog:




If you still wish to duplicate the item in question, move it to where there is more space or reposition the object that blocks the way.




The **Paste Function Name** option allows you to obtain a dialog box listing all the possible functions that can be used to construct formulas. Each function appears within a standard dialog box button - to select a function you simply click on the relevant button.




• After making a choice, the dialog disappears and the function is automatically pasted for you into the formula panel of a data entry form or a report. The precise format of a function depends on its type, but Reflex provides you with visual help in completing a formula that requires parameters by including a description of the valid or necessary parameters in an English-like format. For example:

LENGTH("Text_String")

This function computes the LENGTH of the Text String in the parentheses. For more specific information on functions see the section on Functions.

• If you do not wish to select a function, simply click on the Cancel button.

The Paste Function Name option is available whenever the formula panel in a report or database window is selected.

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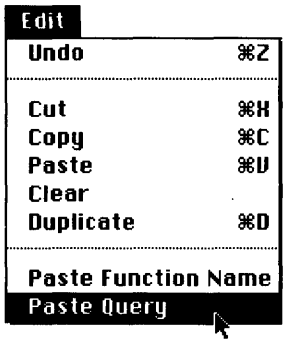
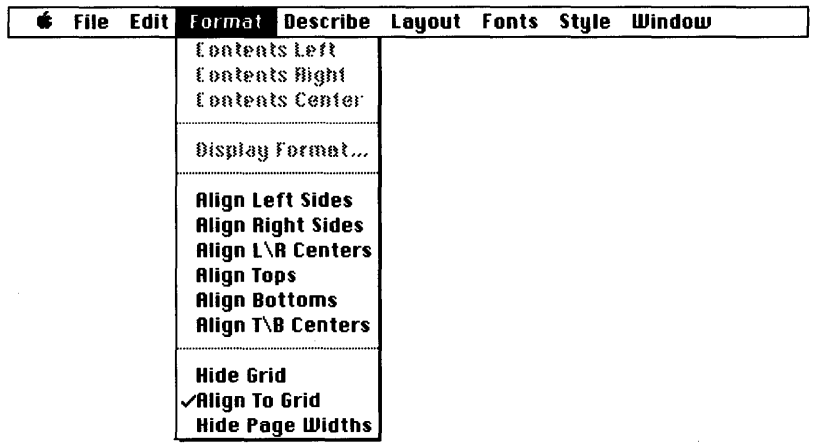
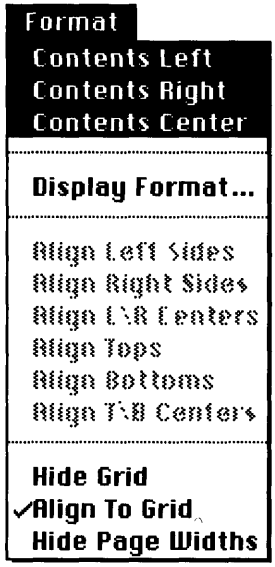



The **Paste Query** option is the equivalent of the Search On option available with data entry forms in that it brings up the QueryBuild dialog. QueryBuild provides an automated method of creating accurate database or report queries. Whenever QueryBuild is invoked via this menu option, a standard file dialog will appear first, asking you to indicate the database file with which you wish to work. Paste Query is available in all the same situations as Paste Function Name.

## FORMAT MENU




The Format menu contains all the options you will need to format objects while designing data entry forms and reports. Special dialogs for Number, Date and Text field/label formats are accessed via the **Display Format** option.



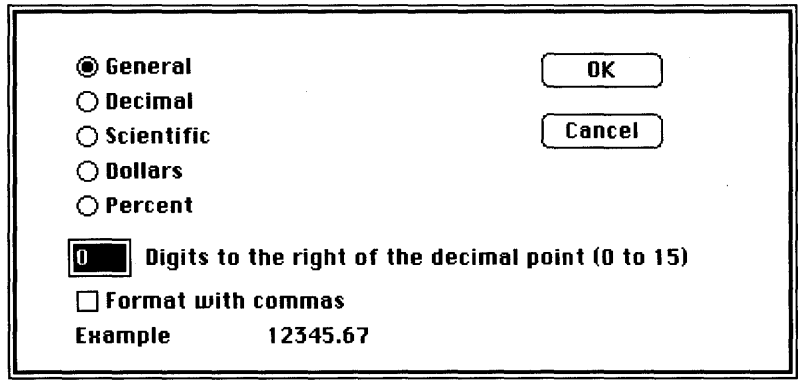

There are three very similar options that help you arrange the way in which field and label contents are displayed: **Contents Left**, **Contents Right**, and **Contents Center**. They all work in the same fashion: select one field or label and choose the relevant option. Fields may be selected within database file images in the Database Overview window to set content positions.

- Contents Left: This left justifies the contents of a field.
- Contents Right: This right justifies the contents of a field.
- Contents Center: This centers the contents of a field.

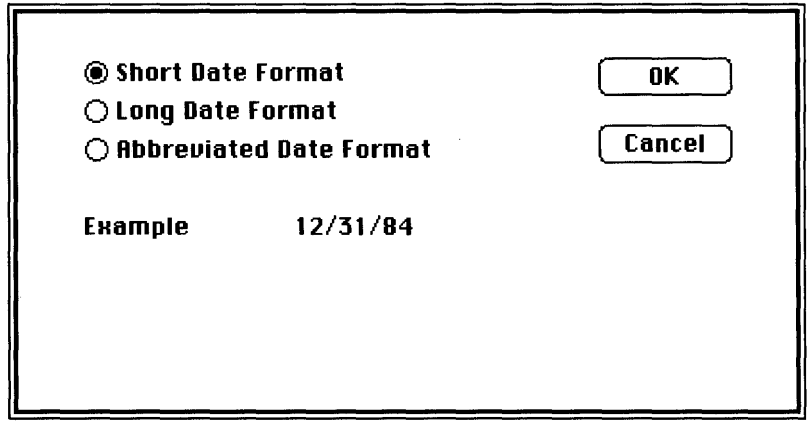
---


The **Display Format** option allows you to customize the way in which the contents of number, integer, sequence, date field or text field types will be displayed in data entry forms and reports. Using this feature on a field name in a file image presets that field's format for data entry and layout. Select a field and then choose the option. A dialog will appear showing the range of formats available; an example of each format will appear as you click on the relevant radio button.

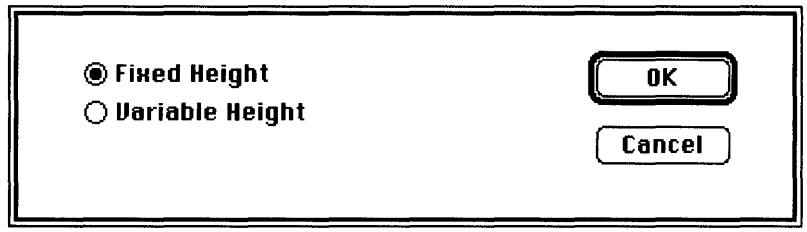
**Number, Integer, Sequence field dialog:**




**Date format dialog:**



**Report Text field dialog:**



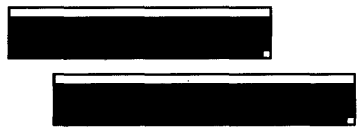

The Text field display format dialog is only available when the selected text is in a **Report**.

- A Fixed Height text field is of constant size, regardless.
- During Report Design activity a Variable Height text field will always appear as big as you initially made it.
- During Report Display, a Variable Height text field will shrink to the minimum height allowed by the text it contains (this may be zero to n lines).

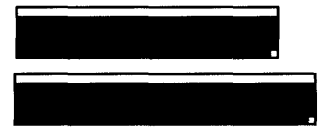

Since Reflex's data entry forms and reports can be highly customized, you will need to have some facility that does not rely solely on hand-eye coordination to position items accurately. The alignment options provide a range of ways in which fields, repeating collections, labels or pictures may be positioned relative to one another with great speed.

Multliple objects are selected in data entry forms and reports by Shift Clicking. This technique involves: first selecting an object by clicking on it; then pressing the Shift key while clicking on as many other objects you wish. Each object selected in this manner will turn black to confirm that it has been selected. You can then use the standard Edit menu options (cut, paste, etc..), move the objects around manually, or select one of the options described below.

• **Align Left Sides:** Aligns the left sides of all currently selected fields, repeating collections, labels and pictures with the left-most selected item. You select the items to align by Shift-Clicking on them. Useful when long reports must have labels and fields aligned vertically over many pages, or fields need to be grouped together in neat "stacks".

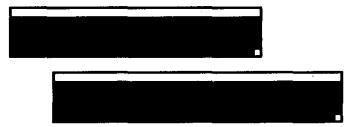


Selected but unaligned



Left Sides aligned

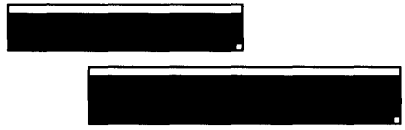
• **Align Right Sides:** Aligns the right sides of all currently selected fields, repeating collections, labels and pictures with the right-most selected item.



Selected but unaligned

Right Sides aligned

• **Align L\R Centers:** Aligns fields, repeating collections, labels and pictures along their Left\Right centers.



Selected but unaligned

Left\Right Centers aligned

• **Align Tops:** Aligns the tops of a group of fields, repeating collections, labels and pictures based on the location of the top-most selected item.

Selected but unaligned

Tops aligned

• **Align Bottoms:** Aligns the bottoms of a group of fields, repeating collections, labels and pictures based on the location of the bottom-most selected item.

Selected but unaligned

Bottoms aligned

• **Align T\B Centers:** Aligns fields, repeating collections, labels and pictures based on the location of their Top\Bottom centers.

Selected but unaligned

Top\Bottom Centers aligned


Whenever you start to design a new report or layout a data entry form, Reflex automatically provides a visual grid feature to make the accurate positioning of fields, repeating collections, etc, that much easier. You can always remove this default grid by selecting Hide Grid - this option will then read Show Grid, enabling you to bring the grid back at any time. No grid is shown during data entry or report display.

---


The Align To Grid option ensures that fields, repeating collections, labels, etc, will "snap" to the closest grid point. The design grid in data entry forms and reports provides a resolution of eight points per rectangle both in the horizontal and vertical directions. This feature makes the positioning of items during design work really easy. Align to Grid is the default - it can be turned off by selecting the Align To Grid option once again.

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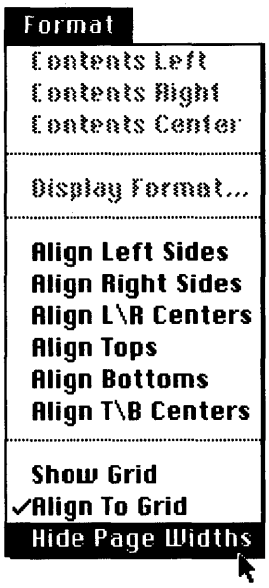
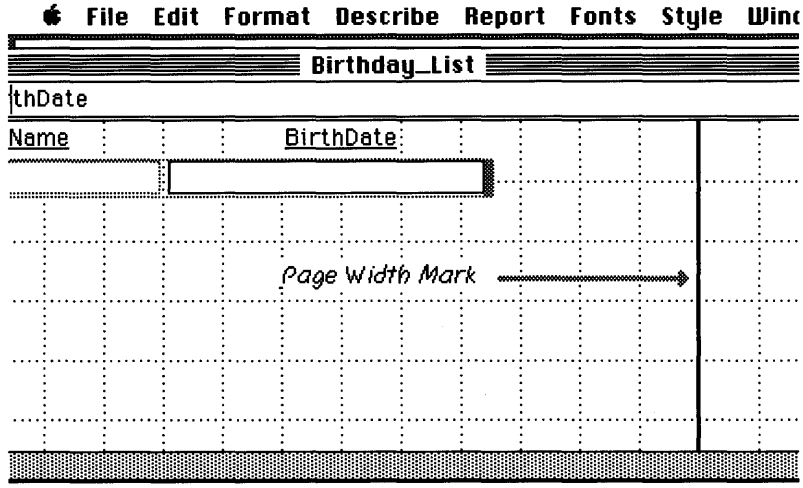



Reflex automatically displays the current page width on any data entry form or report you are designing. The page boundaries are signified by a solid black vertical line and the actual location of this line will depend on the page layout you arrange via the Page Setup menu option located in the File Menu. It will often be important to know just where the page width boundary is so that you don't inadvertently place objects off the page. The Hide Page Widths option is used to turn the display of such page boundaries on and off.



## DESCRIBE MENU

While developing database files in the Overview window, you will always have to tell Reflex the type of fields with which it will be dealing. In other words, you must decide what type of contents a particular field is meant to hold. The seven possible field types are: **Text, Number**, **Integer**, **Date**, **Logical**, **Time**, and **Sequence**.

Once a set of fields have been created, you must then decide which field(s) will form the Key. Set Key fields via the Key Field option. Change Key fields back into ordinary fields by using the Non-Key field option.

When you wish to have a record in one database file associated with other records in the same or another file, you will need to use a pair of Links. The two options - **A Link to One "..." Record** and **A Collection of Links to "..." Records** - are provided for this purpose.

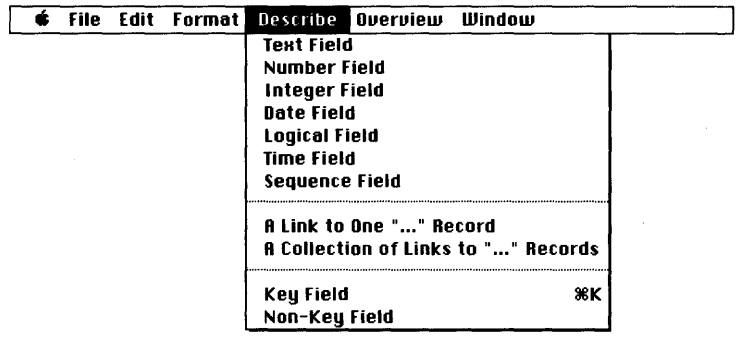
Describe menu options are updated (changed) when you switch from the Overview window to a database window and when you make a report window the active window.

- **Database window options:** When you switch from the Overview window to a data entry or form layout window, the Describe menu alters only slightly. There are two options for new objects - **Labels** and **Pictures**. Since you cannot set Links between records or make fields Key Fields or Non-Key fields while a file is open, these options have changed in their nature. The options for Links and Key fields are now included purely for descriptive purposes.

- **Report window options:** When you switch to a report window all seven field type options remain, but those for Links and Key fields are not shown. Instead, the lower part of the menu includes features for setting up Labels, Pictures, Repeating Collections, report page Headers/Footers, and the position of page breaks.

All options are now described in more detail.

## The Overview Describe Menu




This is the initial Describe menu that you will see after loading Reflex. It contains everything you will need to design, create and modify database file images within the Overview Window.

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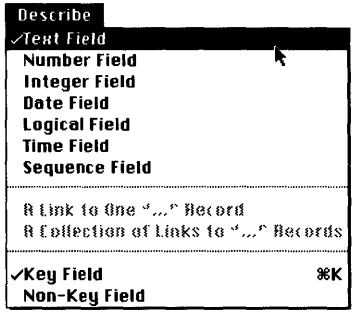
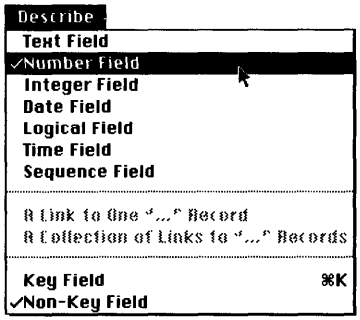



The **Text Field** option is used to indicate that a specific database or report field can contain any text string. A text string consists of one or more characters from the Macintosh character set including letters, numbers, symbols and special foreign language letters. Note that even though some entries might look more like numbers (telephone number, social security numbers, part numbers, etc), they do not have a valid number format and must therefore be classed as text fields.

The following are valid text field entries.

| | |
|---|---|
| A name: | Frank Smith |
| An address: | 1256 Savanna Avenue |
| A telephone number: | (499) 999-9999 |

---




There are three kinds of fields that will accept entries strictly in the form of numerical digits: the **Number Field**, the Integer field, and the Sequence field. The Number field is used when you will need to do calculations that require the precision offered by floating point arithmetic and the capability to handle very large/small numbers and fractions. Reflex provides up to 15 decimal digits of precision in calculations. Typically, number fields are used when you are dealing with: the price of an item; an interest rate; the result of some mathematical operation; large distances (eg: the distance to local stars), etc...

Because of the greater precision afforded by the Number field option, calculations involving these fields take longer than fields of type Integer. Integer values may be entered in Number fields.

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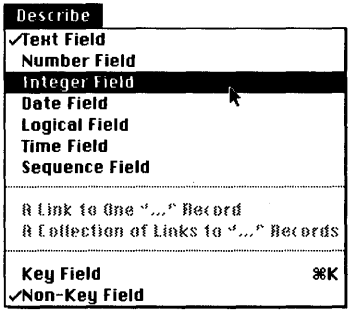


The **Integer Field** type operates much like the number field in that it accepts numerical information - the difference is that it only deals with whole numbers in the range: -2,147,483,647 to +2,147,483,647). Integers exist as a field type because they can be stored more compactly and can be computed more quickly.

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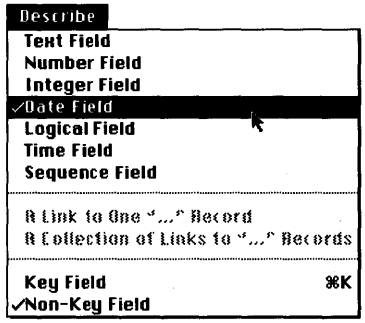


**Date Fields** will only accept entries in a valid date format, which takes the form of:

Month/Day/Year

While this is the only input format, Reflex allows you to choose from three date display formats in reports:

| | |
|---|---|
| Short Date Format: | 2/2/86 |
| Long Date Format: | February 6, 1986 |
| Abbreviated Date Format: | Feb 6, 1986 |

Choose which form you want by using the Display Format option located in the Format Menu.

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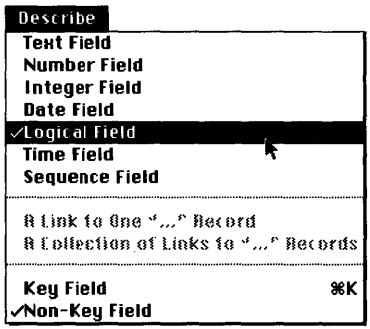


The **Logical Field** type is used whenever you wish to indicate that a condition is true or false, by entering the values "TRUE" and "FALSE".

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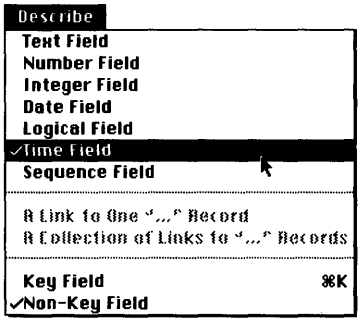


The **Time Field** option is used to ensure that a specific field only accepts information in a valid time format. Reflex uses the 24-hour time format, as below:

| | |
|---|---|
| 9 am must be entered as | 9:00 or 09:00:00 |
| 12.10pm must be entered as | 12:10:00 or 12:10 |
| 12.10am must be entered as | 00:10:00 |
| 8.34pm must be entered as | 20:34:00 or 20:34 |

Time values may be used in data entry and report form formulas provided they, like Date values, are preceded by the @ symbol.

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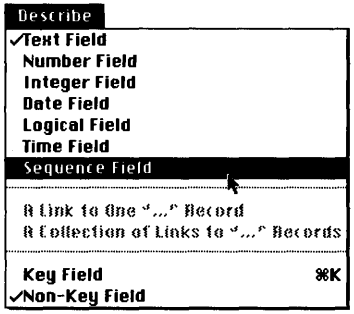


Reflex does not automatically tag each record with a unique number as it is entered. If you require record numbers, the **Sequence Field** type may be used. The actual record number given to a record will depend on the number of records already in a database, but the numbering technique is based on taking the highest number already allotted and adding one to it. There can be only one Sequence Field per database - the Sequence Field option will be dimmed (gray) if the current database file already contains a field of this type.

- If there are 0 records in a database, the first record entered will automatically be given the Sequence number of 1.

- If records are deleted, "gaps" will appear in the record number sequence. You may, if you wish, manually give an existing or new record the Sequence number of a deleted record. You can also change any existing sequence field number to fill in a gap between records or to create a gap between records.

- You can, if you wish, start record numbers at some specific value (such as starting with a record for a check number of 100).

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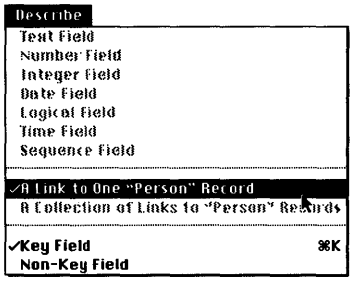
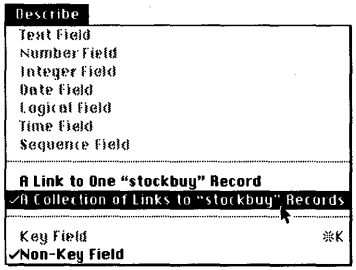



Reflex allows you to associate the records in connected database files. The two Describe menu options concerned with record linking are: **A Link to One "..." Record** and **A Collection of Links to Many "..." Records**.

- A Link to One "..." Record: This option is used to arrange it so that the current record in the current file is associated with at most one other record in another file to which it is connected by a link line. (Note that there are situations where you will want to associate records within a single database file - Reflex allows you to do this). The A Link to One "..." Record option is available when a Link in a file image is selected.




- A Collection of Links to Many "..." Records: This option is used to arrange it so that the current record in the current file is associated with zero, one or more records in another file to which it is connected by a link line. The A Collection of Links to Many "..." Records option is available when a Link in a file image is selected.

While both of these options are used initially to setup the state of a Link at either end of a link line, they can also be used later to change the status of a Link.

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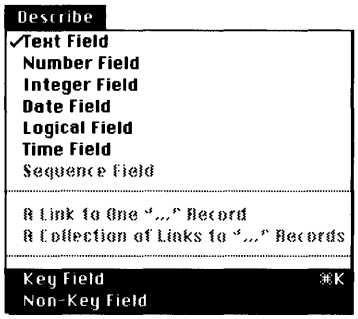



All Reflex database files must have at least one field set as a **Key Field** to ensure that every record in that file can be uniquely identified. The Key may consist of a single Key field (such as an employee number or a part number) or a combination of Key fields (such as a supplier name, the name of a part shipped by that supplier, and a project name which uses the part shipped by the supplier).

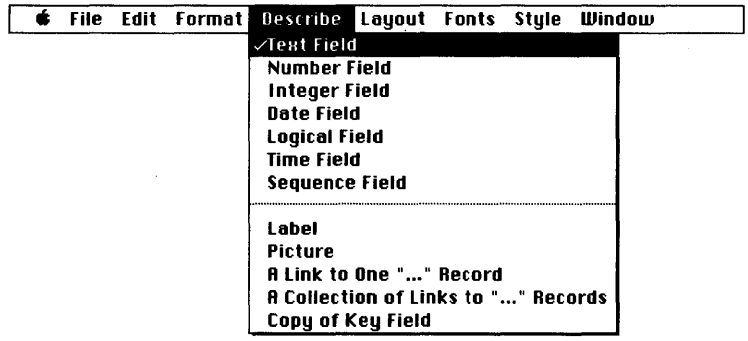
- A non-key field may be made a key field by selecting it and then choosing the Key-Field option.

- A key-field may be changed back into a non-key field by selecting it and choosing the **Non-Key Field** option.

All Key fields are immediately recognizable by the underline that appears below them. Database records will be automatically sorted in order of the Key fields. That is, if the Key fields are LastName and FirstName, all records will first be sorted LastName and then on FirstName.

---

## Layout Describe Menu




The Layout Describe menu appears when you select the Form Layout option from the Database menu during data entry.

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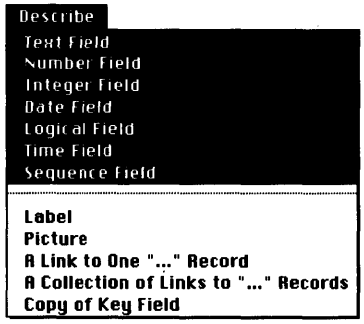
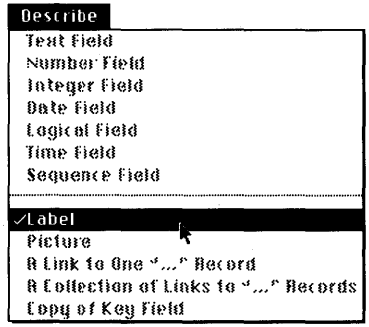



The first seven field type options remain the same as in the Overview window Describe menu, only the lower portion has been updated. The four lower options are not commands, they simply aid the user in indentifying the currently selected object .

---




A **Label** may contain a title, a heading, an annotation, an instruction, or any other descriptive text you want to include in your data entry forms or reports. A Label may be placed anywhere in a data entry form or report so long as it does not overlap any other label or field. If it does overlap, Reflex will display a dialog to that effect. Also, Labels can be as wide or as deep as you wish and carriage returns may be used to section Label text into paragraphs.

- In a data entry form, Reflex automatically places labels next to each field name. These can be changed at any time by switching into Form Layout and editing the label as you would any other Macintosh text. You may also create entirely new labels by clicking down on the form and starting to type. Alternatively, first draw a black box with the mouse and then select Label from the Describe menu. Click in the field and then enter text.

The Label option is available whenever you are customizing a data entry form or report.

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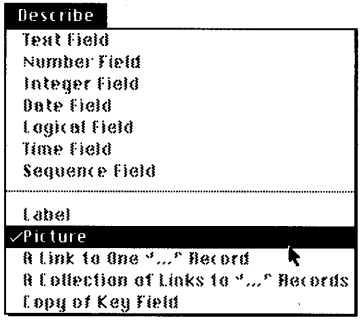


Graphic images or **Pictures** may be created in MacPaint, MacDraw or any other Macintosh graphics program, and then "cut and pasted" into a Reflex data entry form or report. This feature can be useful for inserting special page layout designs into data entry forms and logos into reports. Fields may be placed anywhere (embedded) within graphic images for greater visual effect.

This menu option is not a command and is descriptive only; a check mark appears next to the option when the current selection is of the Picture type. Pictures may not be edited within Reflex, they can only be transported from place to place via the clipboard's cut and paste facilities.

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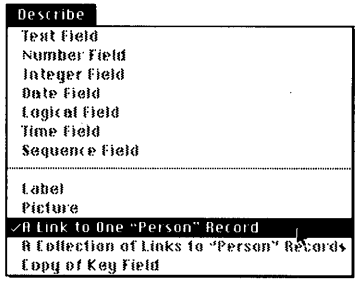
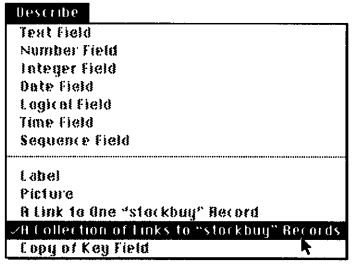



This option will be checked when the currently selected object is, for example, a record Link which is associated with at most one record in a database file called Person.

---




This option will be checked when the currently selected object is, for example, a Collection of Links to records in a database file called stockbuy.

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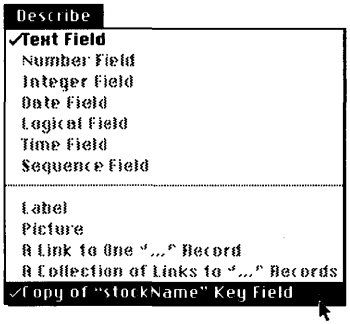


This option will be checked, and a name will appear within quotation marks, when the currently selected object is a copy of a Key field from a linked record. Key field copies only exist within a Link or a Collection of Links in a data entry form.

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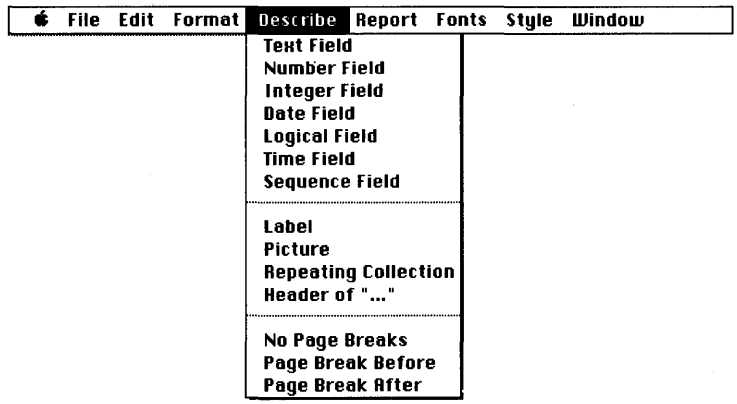
## The Report Describe Menu




The Report Describe menu appears whenever you create a new report, or use/modify an existing report. It contains report specific options that allow you to create **Headers** and **Footers** and to specify where you would/would not like **Page Breaks** to occur.

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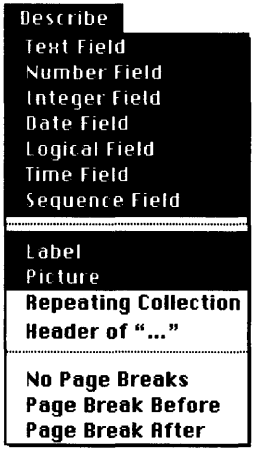


The first nine options in the Report Describe menu are used to create labels, set fields to different types and identify pictures that have been pasted into a report. The five remaining options are discussed below.

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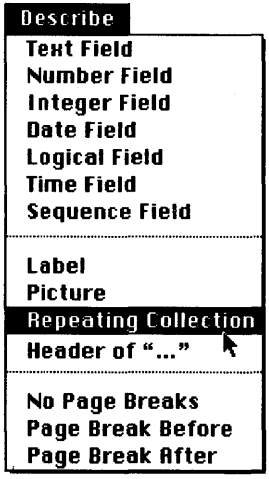


The **Repeating Collection** option is used to create a repeating collection in a report. Simply draw a generic black box anywhere in a report and then select this option - the box will become a repeating collection.

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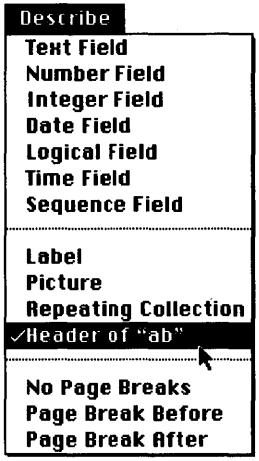


This option is checked when the selected object is a Header in the current report. If a Footer is selected this option becomes Footer of "...".

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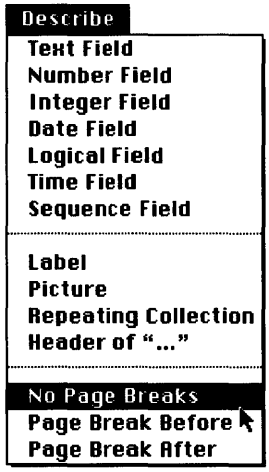
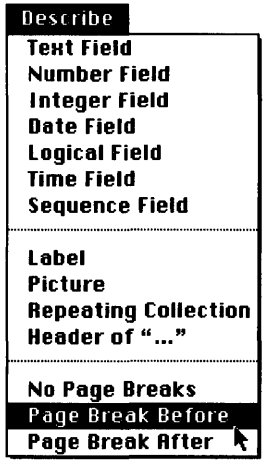



This option is used to indicate that you do not wish the contents of some specific report object to be split across pages during printing. Draw a thin vertical black bar next to the report object and select this option - the vertical bar will become a **No Page Breaks** icon.

---




This option is used to indicate that you wish page breaks to only occur before the selected object during printing. Click the mouse button with the cursor next to the relevant report object to get a generic black box.Select the **Page Break Before** option - the black box will become a Page Break Before icon.

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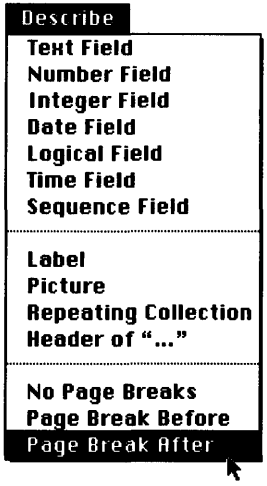


This option is used to indicate that you wish page breaks to only occur after the selected object during printing. Click the mouse button with the cursor next to the relevant report object to get a generic black box. Select the **Page Break After** option - the black box will become a "Page Break After" icon.

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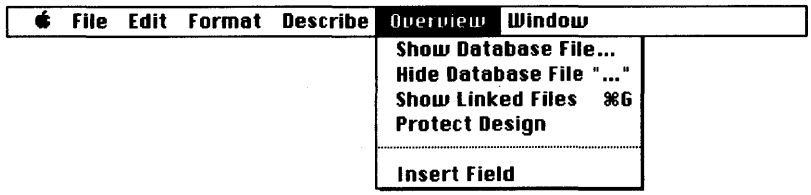
# OVERVIEW MENU




The Overview menu is only available when the Overview window is active. All the menu options here are concerned with operations on file images in the Overview window.

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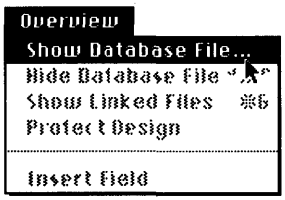


The **Show Database File** option is used to display a file image in the Overview window. It does not open a database file - it merely displays the structure of the file so that you can view or modify it.

Using Show Database File presents a dialog box that contains a list of all Reflex database files that exist on the current disk. Select the file name you wish to view and click on Open. Alternatively, click twice on the file image name bar, but not on the status icon.

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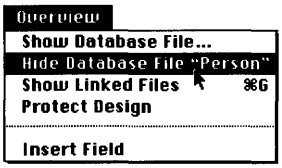


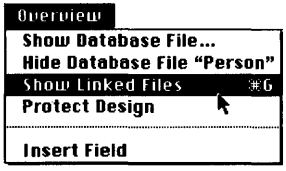

There are two ways to to remove a file image from the Overview window:

- Simply select the file and choose the **Hide Database File** option. The selected file name will appear in the menu to visually confirm which file is about to be hidden. If the selected file is open or hasn't yet been saved or if no file is selected, this command is not active (gray).

- Alternatively, use the much faster method of clicking on the file's status icon. This has the same effect as clicking on the close box of a Macintosh window.

Hiding a file does not affect a database file in any way - it just removes its image.

---




After showing an individual database in the Overview window, it is often useful to show any other files which contain linked records. **Show Linked Files** does just this.

- Reflex shows only the files with records that are directly linked to those in the selected file; the last file to be shown becomes the selected file.

- To see any other files containing records linked to those in the new current file, choose Show Linked Files once again, or use the ⌘G shortcut.

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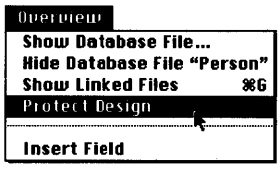


The **Protect Design** option allows you to stop any changes being made to an existing file design. To use, you simply select the relevant file image and then choose the Protect Design option (a check mark will appear next to it in the menu). To remove the protection, select the file image and then choose the Protect Design option once again.

---


The **Insert Field** option inserts a new field space below the currently selected existing field or, if the entire file is selected, below the last field in the file image. It can be used with new (unsaved) file images, or with existing file images; in the latter case you will have to save the design once again. Newly inserted fields can be placed at any position within the file image. Also, if you later reposition a non-key fieldabove a Key field, it will become a Key field; if a Key field is placed below a Non-key field, it will become a non-key field. New field(s) will appear below previously existing fields in data entry forms, regardless of their position in the Overview file image. You can reorder data entry fields and their associated labels at any time by selecting the Form Layout option from the Database menu. If you do this, the order of fields in the file image will be updated to match the modified data entry form.

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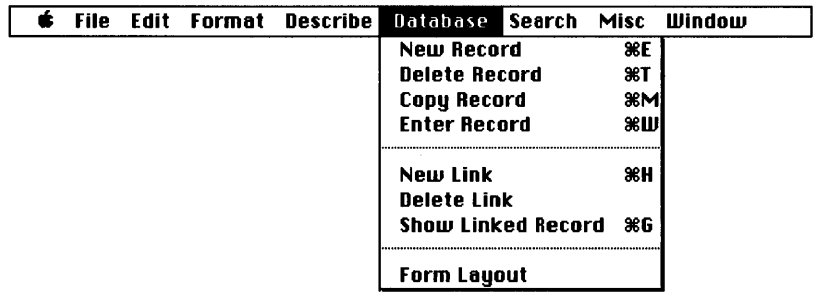
# DATABASE MENU




The **Database** menu contains all the data entry options you will need while using a data entry form plus the Form Layout option. This menu only appears when a data entry window is the active window.

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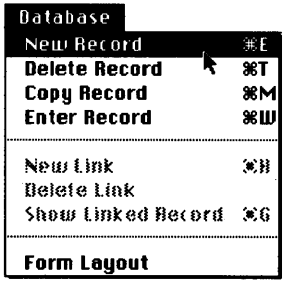
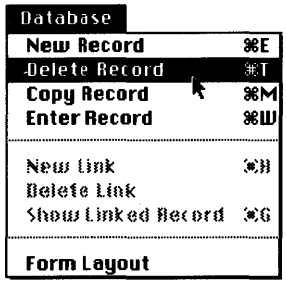


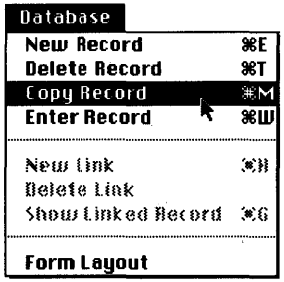

The **New Record** option is used to insert a new blank record into the active data entry form. Once filled in and added to the database file, the new record will automatically be placed in the correct sort position depending on the current record Key.

---




The **Delete Record** option is used to delete the currently displayed record from the current database file. If Link checking is enabled, you can delete any record providing it doesn't have A Collection of Links to records where the backlink is part of the Key. This is the same restriction as on deleting a Link; you must delete all such Links (not records) from the "other end". When you delete a record, it deletes all its Links for you.

---




The **Copy Record** option is used to make a copy of the current record in the active data entry form. This saves a lot of retyping when a number of very similar records need to be entered. Since each copy is an exact duplicate of an already existing record, you cannot insert a record copy into the current file until the Key is modified so that it is once again unique. Alternatively, you can use the "Revert" option to change the record copy to a blank new record if you decide you don't need it.

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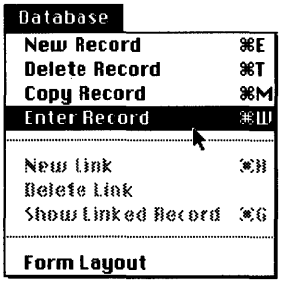


The **Enter Record** option does just that - it enters the current record into the current database file.

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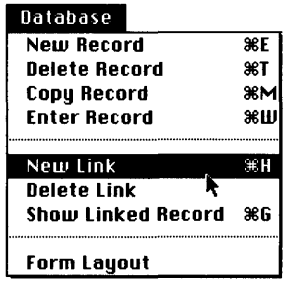
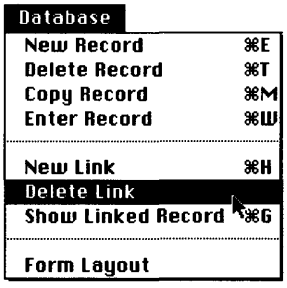
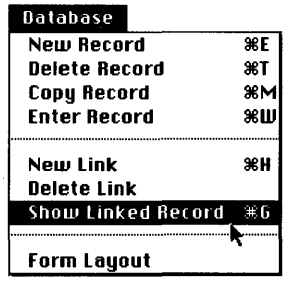


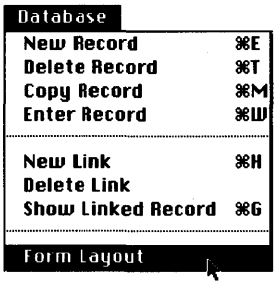

The **New Link** option is used to create a new blank Link in a Collection of Links in the current record. This item is only active if a Copy of a Key Field in a Collection of Links is selected.




The **Delete Link** option is used to remove a selected Link from the current record. This item is active only if a Copy of a Key Field in a Link is selected.

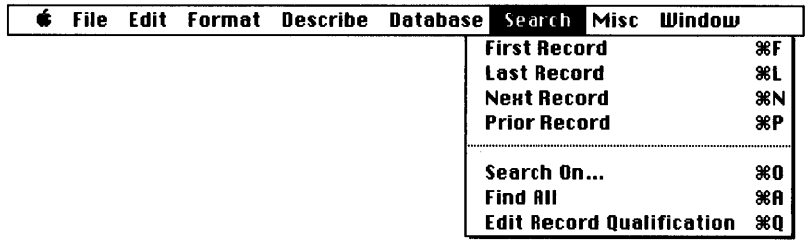



The **Show Linked Record** option is used to display the record in another file linked to the current record in the current file. If the file which contains a linked record is not open, it will be opened. When the file is open, Reflex will display the associated record in the relevant database window, behind the currently active window. This item is active only if a Copy of a Key Field in a Link is selected.




The **Form Layout** option is used when you wish to switch from displaying information in a data entry form to designing the layout of that form. Grid lines will appear in the layout form window and the activity indicator at bottom left of the window will contain the words "Form Layout".

## SEARCH MENU




The Search menu contains options that help you browse through all or just some records in a database file. It is also the menu you will use to display the QueryBuild dialog. It is only available when the current window is a database window.

---


The **First Record** option displays the first qualified database file record in the current data entry form. If there is no record qualification in the formula panel, using First Record will show the very first record entered into the file. If there is a record qualification in the formula panel, the first qualified record will be displayed.

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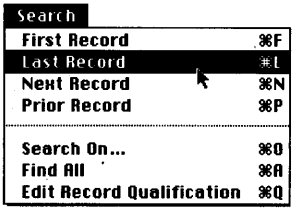


The **Last Record** option displays the last qualified database file record in the current data entry form. If there is no record qualification in the formula panel, using Last Record will show the very last record entered into the file. If there is a record qualification in the formula panel, the last qualified record will be displayed.

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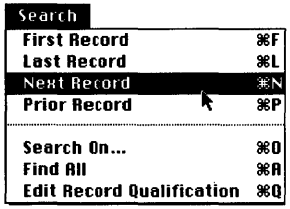


The **Next Record** option is used to move one record at a time through the records in a database file. If there is no record qualification in the formula panel, then Next Record will move one record closer to the end of the file from the current record. If there is a record qualification in the query panel, this option will move one qualified record closer to the end of the file from the current qualified record.

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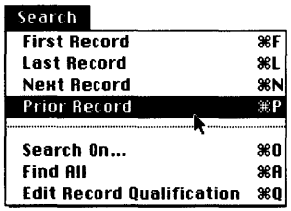
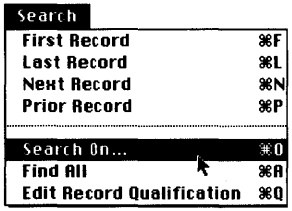


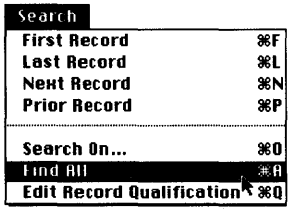

The **Prior Record** option is used to move one record at a time through the records in a database file. If there is no record qualification in the formula panel, then Prior Record will move one record closer to the beginning of the file from the current record. If there is a record qualification in the query panel, this option will move one qualified record closer to the beginning of the file from the current qualified record.

---



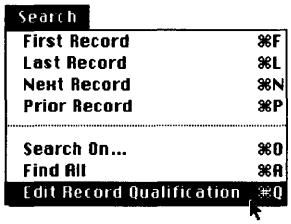

The **Search On** option is used to invoke the QueryBuild dialog - the Reflex feature which assists you in building record qualifications that specify which records will be displayed.

---



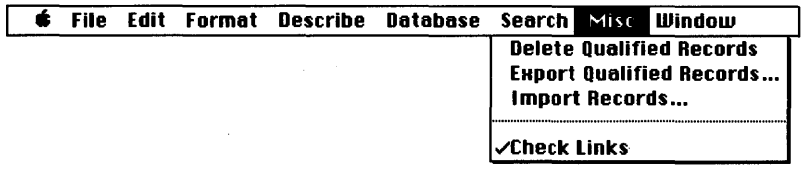

The **Find All** option is used when you want to display all records in a database file. This is used when a record qualification is present in the formula panel and you now wish to remove it.

---




The **Edit Record Qualification** option is used to place the insertion point cursor in the formula panel. If there is no record qualification in the formula panel, the insertion point is placed at the left-most point of the formula panel. If a record qualification already exists in the formula panel, the Edit Record Qualification option selects the whole record qualification, ready for editing.

## MISC MENU




The Misc menu contains features that you will need to delete multiple records, interchange information with other applications, and turn Reflex's record linking mechanism on and off. It is only available when the active window is a database window.

---


The **Delete Qualified Records** option acts in two ways. If there is no record qualification in the formula panel (and all records are therefore qualified), all records will be deleted. If there is a record qualification in the formula panel (and only a subset of the database file is therefore currently qualified) only those records that are qualified will be deleted. In both cases, Reflex will display a dialog warning you of what is about to happen and you have the option of proceeding with the record deletions or clicking on the Cancel button.

---

## The Export/Import Options


Reflex provides the **Import** and **Export** record options to enable you to interchange information in a textual format with other applications, or even between Reflex documents. For example, information produced in an Reflex report can be exported and then imported into a database file, thus creating a completely new file.

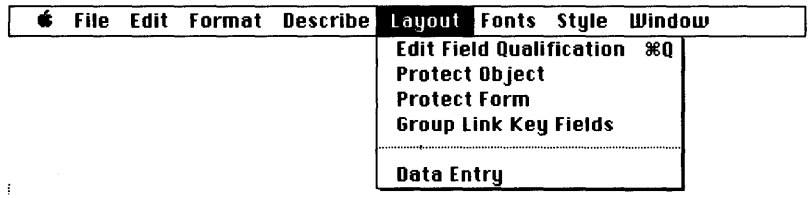
Reflex expects text files that are to be imported to have a format that matches the field and Link list specified for the database file that will receive the text file information. You specify the field and Link list via a dialog box that appears whenever you select Export Qualified Records or Import Records. Fields may be chosen for export or import in any order you wish.

There are three import/export formats that are supported: Clipboard, Text file, and Mail Merge.For more specific information on Import and Export, see the discussion in the section entitled Details & Techniques.

---

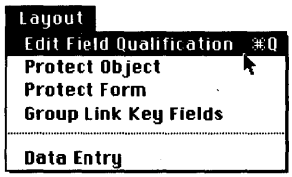

The Check Links option is used to turn Reflex's record link checking mechanism on and off. When there is a check mark alongside this option, Reflex will not allow the Links in associated records to contain inconsistent information. Check Links should only be turned off if you need to repair a damaged database.

## LAYOUT MENU




The **Layout** menu is displayed when you select Form Layout from the Database menu. It contains options that allow you to set up field entry qualifications, protect single objects in a form or the whole form, and group together the copies of Key fields that are contained in a Link.

---



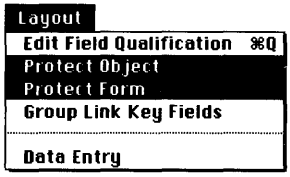

The **Edit Field Qualification** option is used to select the formula panel in a Form Layout window so that you can insert a field qualification if there is none, or edit any field qualification that already exists. A field qualification is simply a qualification which is used to monitor any entry in a specific field.

- If the field qualification is True for a field entry then the entry is allowed to be a value of the field. Provided all other fields in that record are also acceptable (they have no field qualifications or they do not have field qualifications with values of False), the record may be written to the current database.

- If the field qualification is False for a field entry, then the entry is not allowed to be a value of the field. No record that contains a field qualification with a value of false may be written to the current database. The field containing the invalid entry will be selected and an appropriate message will appear.

---

## Protecting Objects



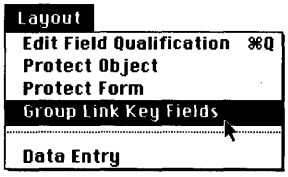

The **Protect Object** and **Protect Form** options operate in a very similar manner, they only differ in scope:

- Individual objects (a field, group of fields, labels, or pictures, etc...) protected with the Protect Object option may not be modified in any way.

- A whole data entry form protected with the Protect Form may not be modified in any way.

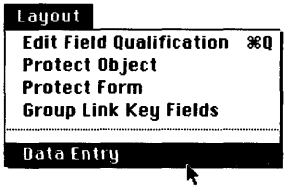
Both levels of protection can be removed by selecting the relevant menu option a second time.

---




The **Group Link Key Fields** option is used to disallow selection of individual Key field copies inside a Link. Key field copies can be ungrouped by selecting this menu option when it is checked; you would ungroup Key field copies inside a Link to rearrange or to resize them.

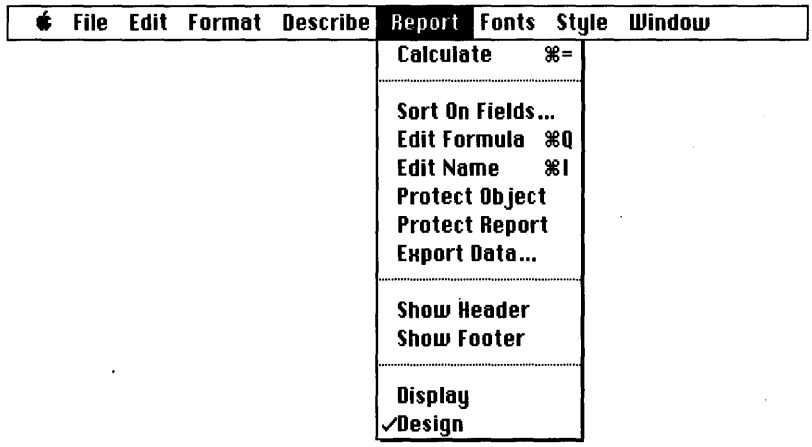
---




The **Data Entry** option switches a Form Layout window into a data entry window. Selecting this option replaces the Layout menu with the Database menu.

---

## REPORT MENU



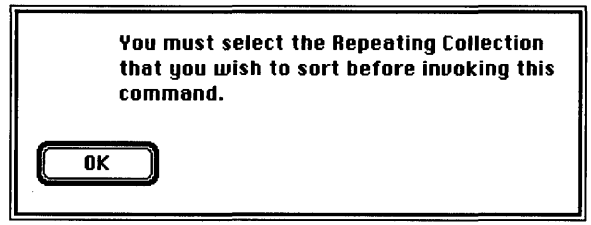

The **Report** menu contains all the options you will need to design and calculate Reflex reports. Data may even be exported from reports via this menu. It is the only menu with report specific options.

---


Unlike spreadsheet programs which typically recalculate the complete matrix each time a value is entered, Reflex reports are calculated manually each time you want to display them. If a report includes one or more repeating collections, Reflex automatically switches from Report Design to Report Display on calculation. Select the **Calculate** option from this menu, or use the ⌘= shortcut.

---


When you specify which fields are to be part of the Key in a database, Reflex uses the key field(s) to sort the records into ascending order. The **Sort On Fields ...** option is used to produce a report sorted on fields other than the Key field(s). You should always select the repeating collection that is to contain the newly sorted information. If you do not, Reflex will select the first repeating collection in the report for you. If there are no repeating collections in the report, Reflex will display the dialog shown below:




After selecting the relevant repeating collection and selecting Sort On Fields..., another dialog will appear asking you to select the fields to sort on. Select each field in turn by clicking on them. For each field to be sorted, click on either the A...Z,0...9 or the Z...A,9...0 button to tell Reflex whether you want the records to be sorted in an ascending or descending order.

Finally, click on the OK button. The dialog will go away and the report window you are working with will become active once again. Use the Calculate option or ⌘= shortcut to see the records in their new sort order.


The **Edit Formula** option is used to place the text cursor in the Formula panel. If there is no text in the formula panel, the cursor is placed at the far left of the panel. If there is some text in the panel, the whole panel is selected. You may also click directly in the panel and change any text there by using standard Macintosh text editing techniques.

---


The Edit Name option is used to select the contents of the Name Panel in a report window so that you may change the name of any currently selected object. You may also click directly in the panel and change any text there by using standard Macintosh text editing techniques.

---

## Protecting Reports & Report Objects


As with data entry forms, any object in a report or a complete report itself, can be protected from accidental design changes. To protect an object simply it and use the **Protect Object** option. Use **Protect Report** to protect the current report. If a field is protected or a report containing that field is protected, only the value in the field may be edited.

---


Information produced in a repeating collection of a report can be exported via the Export Data... option. Repeating Collection information may be exported to other applications via the Macintosh clipboard or to a text file in standard format or mail merge format.

However, a really powerful feature of Reflex is that you can convert the information in a report into a datbase file. To do this, simply export repeating collection information and then import it into a new or existing database file. See the discussion on Exporting and Importing data in the Details and Techniques section.

---

## Header and Footer Options


The **Show Header** and **Show Footer** options are used to display a header or footer for a report. You may have both a header and a footer in a report, but they both cannot be visible and edited at the same time. Options are:

- A global header and/or footer for a report.

- A header or footer of a repeating collection: Since it is not possible to predict how many records will be produced by a given repeating collection, you are able to attach a header and/or footer to a repeating collection so that if it produces more records than can fit on a page, your selected header, or footer, will print on the bottom of each page and the top of the next page that the repeating collection spans.

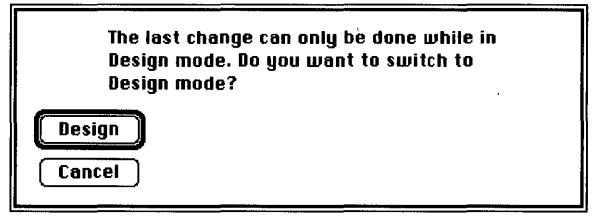
If a header/footer is visible, the Show Header/Show Footer option changes to Hide Header/Footer and can then be used to hide the header/footer.

---


The **Display** option is used to switch from report design to report display; the design grid lines disappear and the report contents are displayed. If there have been no changes to the report design, Reflex does not recalculate an already calculated report. If changes have been made, Reflex will automatically recalculate the report for you.

---


The **Design** option is used when you wish to switch from displaying report contents to making changes to the report design. If you attempt to make any design changes while displaying report information, Reflex will at first beep, and then display the dialog shown below:

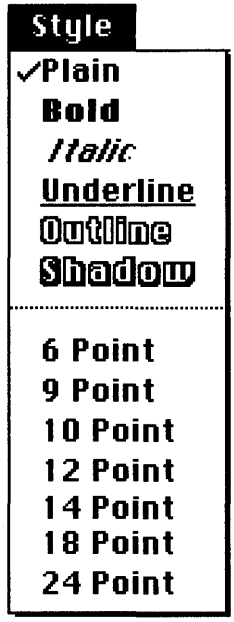



Click on the Design button to switch to report design work. Alternatively, click on the Cancel button to send the dialog away.

## FONTS MENU


Since Reflex data entry forms and reports can feature labels and fields of different fonts, the standard Macintosh Fonts menu is included. Select the object you want to set to a particular font and then select the relevant option from the **Fonts** menu. All Macintosh fonts are supported, but the available range will depend on which fonts you have installed or removed with Apple's Font/DA Mover™ utility. Only the first 16 fonts are shown in the menu. The Fonts menu is only available when Form Layout and Report Design windows are active. For more detailed information on this menu see **Macintosh™, the owner's guide**.

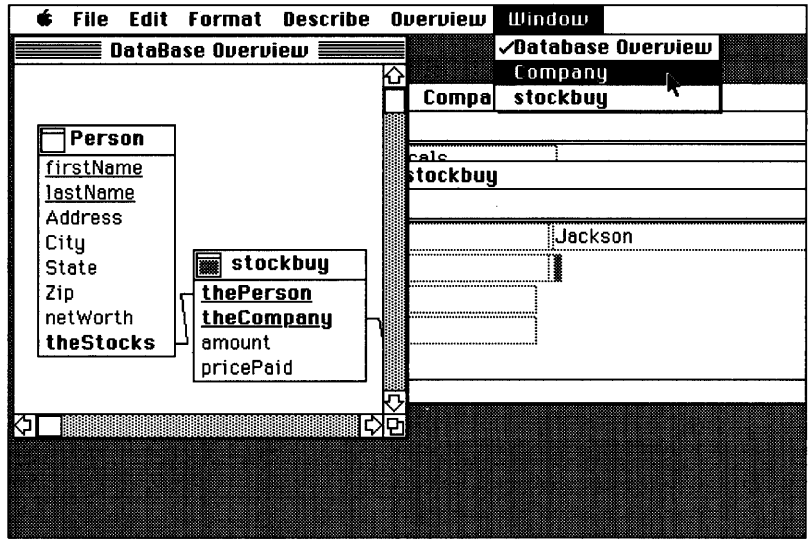
## STYLE MENU




The Style menu is the companion menu to Fonts. It offers the standard Macintosh font style options. For more detailed information on this menu see **Macintosh™, the owner's guide.**

## WINDOW MENU

When you have opened more than a few windows it can be difficult to find the one you want to work with since it may be hidden from view. In this case, go to the **Window** menu and select the name of the window that you wish to work with - it will become the active window. The name of the currently active window will always have a check mark alongside it.




The Window menu is always available.

## REFLEX FUNCTIONS

Reflex provides a rich list of functions which can be used use to retrieve information from database files or to create and customize reports. Those users who are familiar with spreadsheet programs will recognize many of the functions, but take note that some have been enhanced for use with database files. Others are unique to Reflex.

### Function Types

Reflex functions fall into five main categories:

**Text Functions**: These work with text strings.

**Arithmetic Functions**: These provide a range of sophisticated number manipulation capabilities. Both Integers and Numbers can be handled.

**Date Functions**: These work with date information.

**Time Functions**: These work with time values.

**Special Functions**: These functions provide powerful tools with which to further retrieve data - some will be new to you. Check to see if they are appropriate for work you are doing.

### Formats, Arguments & Results

Reflex functions may take zero, one, or more **Arguments** (depending on the function), but they always only produce one **Result.** Arguments can be text or numeric values, expressions, or the result of other functions. The type of Result returned is dependent on the function involved.

*Examples:*

**NOW**

The NOW function does not require any argument . It returns a time result, which is in fact the current time value obtained from the Macintosh system clock.

**INT(5.1)**

The INT function takes a single Number as an argument and returns the integer (whole number) portion. In the example, INT is the function name and 5.1 is the argument. The result would be 5.

**REPEAT("*",3)**

The REPEAT function takes a Text and a Number argument and displays the text string the specified number of times. In this example, REPEAT is the function name, "*" is the text string argument, and 3 is the number argument. The result would be ***.

**AVERAGE(1,2,3)**

The AVERAGE function takes a List of Numbers as arguments and returns that average value of that list. In the example, AVERAGE is the function name. 1,2,3 is the argument list. The result would be 2.

Refer to the Name/Argument/Result heading over each function name for specific guidance.

---

**TEXT FUNCTIONS**

**CHAR**

*Argument Type* : NUMBER *Result* : TEXT

**CHAR(Number)**

The CHAR function converts a given Number value to a Text String.

*Example 1:* CHAR(13) → carriage return

Example 2: CHAR(66) → B

---

**INCLUDES**

*Argument Type* : TEXT *Result* : LOGICAL

**INCLUDES("Text_String", "Target_Text_Pattern")**

Returns TRUE if the exact Target Text Pattern is found at any position in Text String. Otherwise it returns FALSE.

*Example:* INCLUDES("Tuesday", "day") , TRUE

---

## LENGTH

*Argument Type* : TEXT *Result* : INTEGER

**LENGTH("Text_String")**

Calculates the LENGTH of any Text value and returns an Integer value.

*Example*: LENGTH("Four") → 4

---

## LOCATE

*Argument Types* : TEXT,TEXT *Result* : INTEGER

**LOCATE("Text_String", "Target_Text_Pattern")**

LOCATEs the starting position of Target Text Pattern in Text String.

- The first character of Text String is position 1, the second is 2, etc.
- If LOCATE returns a zero value, the Target text pattern was not found in Text String.

*Example 1*: LOCATE("The result should be five","r") → 5

This example locates the letter "r" at the beginning of the word "result".

*Example 2*: LOCATE("Tuesday", "Monday") → 0

In this example, the locate function cannot find the text string "Monday" in the text string "Tuesday" and so a zero result is returned.

---

## MID

*Argument Types* : TEXT,NUMBER,NUMBER *Result* : TEXT

**MID("Text_String", Start_Position, Count_of_Characters)**

Extracts a part of Text String, Count of Characters in length, beginning at Start Position.

*Example:* MID("254 Middle Avenue, San Diego, CA",20,9)
→ San Diego

In this example, the MID function extracts "San Diego" from the text string.

---

## REPEAT

*Argument Types* : TEXT, NUMBER *Result* : TEXT

**REPEAT("Text_String", Repeat_Count)**

Repeats Text String for Repeat Count times.

*Example 1:* REPEAT("Say that again..",2) → Say that again..Say that again..

This example shows how to repeat a text string a specific number of times.

*Example 2:* REPEAT("*",4) → ****

Special characters from Macintosh fonts may be displayed a specific number of times with the REPEAT function as well. This example displays the "*" character four times.

---

**STARTS**

*Argument Types* : TEXT,TEXT *Result* : LOGICAL

**STARTS("Text_String", "Target_Text_Pattern")**

Returns TRUE if Target String STARTS with Target Text Pattern. Otherwise returns FALSE.

*Example:* STARTS("Tuesday","Tu") → TRUE

---

**ARITHMETIC FUNCTIONS (with zero or one argument).**

**ABS**

*Argument Type:* NUMBER *Result:* NUMBER

**ABS(Number)**

Gives the ABSolute value of Number; it returns the magnitude of Number without a leading sign.

*Example:* ABS(-45.4) → 45.4

---

**EXP**

*Argument Type:* NUMBER *Result:* NUMBER

**EXP(Number)**

Gives the EXPonentiation of the transcendental number represented by the letter **e** raised to the power of Number. Also see the LN arithmetic function below.

*Example:* EXP(2.5) → 12.1824939607035

---

INFINITY

*Argument Type:* NONE *Result:* NUMBER

**INFINITY**

Gives the largest possible number - it will always be larger than any number it is compared with, excluding INFINITY.

---

INT

*Argument Type:* NUMBER *Result:* INTEGER

**INT(Number)**

Gives the INTeger portion of Number

- If Number is an integer, the INT function returns the same Number.
- If Number contains a whole number and a fraction, the INT function strips away the fraction and returns just the whole number. This works for positive and negative numbers.
- If Number is less than +1 but greater than zero, the INT function returns a zero (0).
- If Number is between - .999... and zero the INT function returns a zero.

*Example 1:* INT(443.6) → 443

*Example 2:* INT(.99) → 0

---

LN

*Argument Type:* NUMBER *Result:* NUMBER

**LN(Number)**

Gives the natural logarithm of Number to the base **e.** This is the inverse function of EXP.

*Example 1:* LN(4) → 1.38629436111989

*Example 2:* LN(EXP(2)) → 2

---

LOG

*Argument Type:* NUMBER *Result:* NUMBER

**LOG(Number)**

Gives the LOGarithm of Number to base 10.

*Example:* LOG(100) → 2

---

PI

*Argument Type:* NONE *Result:* NUMBER

**PI**

Gives the value of PI ($\pi$) to 15 digits.

*Example 1:* PI → 3.14159275358979

*Example 2:* PI * 6^2 → 113.097335529233

This example returns the area of a circle with a radius of 6 units of measurement.

---

**ROUND**

*Argument Type:* NUMBER *Result:* INTEGER

**ROUND(Number)**

ROUNDs Number to the nearest integer value.

- If Number contains a fraction in the range 0... to .499... then Number will be rounded down.
- If Number contains a fraction in the range .5... to .999... then Number will be rounded up.
- If Number is negative and contains a fraction in the range 0 to .499... then Number will be rounded up to the nearest whole negative number.
- If Number is negative and contains a fraction in the range .5 to .999... then Number will be rounded down to the nearest whole negative number.

*Example :* ROUND(5.499981) → 5

---

**SQRT**

*Argument Type:* NUMBER *Result:* NUMBER

**SQRT(Number)**

The SQRT function computes the square root of Number.

- You are not allowed to compute the SQRT of a negative number - any attempt to do so will result in an error message.

Example: SQRT(100) → 10

---

**ARITHMETIC FUNCTIONS (with a variable number of arguments)**

The general forms for these functions are:

- **Function_Name(formula FROM query)**
- **Function_Name(formula, formula, formula, .....)**

---

## AVERAGE

*Argument Type:* LIST OF NUMBERS *Result:* NUMBER

**AVERAGE(List_of_Numbers)**

Gives the AVERAGE value of the List of Numbers.

*Example 1:* AVERAGE(2,5,3,3) → 3.25

*Example 2:* AVERAGE(salary FROM employee) → $39131.66

This example returns the average of all the salaries paid to employees stored in the Employee database file.

---

## COUNT

*Argument Type:* LIST *Result:* INTEGER

**COUNT(List)**

Gives the COUNT of the List. This function deals with how many list values exist, it is not concerned with the actual list item values themselves. The List may also be a query.

Example 1: COUNT(1,2,3,4,5) → 5

Example 2: COUNT(employee) → 15

This example returns the total number of employees stored in the Employee database by counting the number of records.

---

FV

*Argument Type:* NUMBER, NUMBER, NUMBER *Result:* NUMBER

**FV(Payment, Interest_Rate, Periods)**

Returns the Future Value of the Payment compounded at the given Interest Rate, for the specified number of Periods.

*Example:* FV(1000, .1, 10) → $2593.74

---

MAX

*Argument Type:* LIST OF NUMBERS *Result:* NUMBER

**MAX(List_of_Numbers)**

Gives the MAXimum value, or largest number, that exists in the List of Numbers. Opposite of next function, MIN.

*Example 1:* MAX(30,23,89,45) → 89

The maximum value in the list.

*Example 2:* MAX(salary FROM employee) → $54000

The maximum salary earned by an employee in the Employee database file.

---

MIN

*Argument Type:* LIST OF NUMBERS *Result:* NUMBER

**MIN(List_of_Numbers)**

Gives the MINimum value, or smallest number, that exists in the List of Numbers. See previous function, MAX.

Example 1: MIN(30,23,89,45) → 23
Example 2: MIN(salary FROM employee) → $28250

---

MOD

*Argument Types:* NUMBER, NUMBER *Result:* NUMBER

**MOD(Number, Modulus)**

If both Number and Modulus are positive, MOD returns the remainder when Number is divided by Modulus.

If both Number and Modulus are negative, MOD returns the negative of the remainder.

If the Modulus is positive and Number is Negative the Modulus is added to the remainder so that the Result is between zero and Modulus minus 1.

If the Modulus is negative and the Number is positive then the negative of the Modulus is added to the remainder so that the Result lies between the Modulus +1 and zero.

- Any attempt to divide the first Number by zero will result in an error message.
- The result will have the same sign as the second Number .

*Example: 1* MOD(20, 5) → 0

*Example 2:* MOD(18, -5) → -2

*Example 3:* MOD(-5, 4) → 3

*Example 4:* MOD(-5, -4) → -1

## NPV

*Argument Types:* LIST OF NUMBERS *Result:* NUMBER

**NPV(Interest_Rate, List_of_Numbers)**

Calculates the Net Present Value (today's value) of specific amounts of money (the List of Numbers) you will receive in the future based on some specific Interest Rate.

- The Interest Rate is expressed in decimal fashion (.1 for 10%, .27 for 27%, etc).
- There are Numbers in the List of Numbers, representing the income over one or more Interest Rate periods.

The example below is designed to show if it would be better to take a lump sum payment of $10,000 now or have $12,000 paid to you in $2,000 amounts over the next six years with an assumed inflation rate of 10%.

*Example:* NPV(.1, 2000, 2000, 2000, 2000, 2000, 2000) → $9533.08

---

## PMT

*Argument Type:* NUMBER, NUMBER, NUMBER *Result:* NUMBER

**PMT(Principal, Interest_Rate, Period)**

Computes the amount of each payment required to pay back a loan based on the Principal owed, the Interest Rate being charged, and the number of payment Periods.

*Example:* PMT(5000, .01, 48) → $131.67

---

PV

*Argument Type:* NUMBER, NUMBER, NUMBER *Result:* NUMBER

**PV(Payment, Interest_Rate, Period)**

The present value of Payment discounted for the numbers of payment Periods at the specified Interest Rate.

*Example:* PV(1000, .1, 10) → $385.54

---

STDEV

*Argument Type:* LIST OF NUMBERS *Result:* NUMBER

**STDEV(List_of_Numbers)**

Gives the STandard DEViation of the List of Numbers.

*Example:* STDEV(43,23,81) → 29.461839....

---

SUM

*Argument Type:* LIST OF NUMBERS *Result:* NUMBER

**SUM(List_of_Numbers)**

Gives the SUM of the List of Numbers.

*Example 1:* SUM(40,30,35) → 105

*Example 2:* SUM(salary FROM employee) → $586975

This example returns a total of all the salaries paid to employees in the Employee database file.

---

## TRIGONOMETRIC FUNCTIONS

**For all trigonometric functions the angle is represented in radians, where a full circle of 360 degrees is 2*PI radians.**

### ATAN

*Argument Type:* NUMBER *Result:* ANGLE NUMBER

**ATAN(Number)**

Gives the ArcTANgent of Number. This is the angle for which the TAN is the given value, ie: ATAN(TAN(x)) = x.

*Example:* ATAN(1) → .785398163397448

---

### COS

*Argument Type:* ANGLE NUMBER *Result:* NUMBER

**COS(Angle_Number)**

Gives the COSine of Angle Value.

*Example:* COS(PI/3) → .5

---

### SIN

*Argument Type:* ANGLE NUMBER *Result:* NUMBER

**SIN(Angle_Number)**

Gives the SINe of Angle Number.

*Example:* SIN(PI/6) → .5

---

## TAN

*Argument Type:* ANGLE NUMBER *Result:* NUMBER

**TAN(Angle_Number)**

Gives the TANgent of Angle Number.

*Example:* TAN(PI/4) → 1

---

## DATE FUNCTIONS

## DATE

*Argument Types:* INTEGER,INTEGER,INTEGER *Result:* DATE

**DATE(Year_value, Month_value, Day_value)**

The DATE function allows you to manipulate date values.

*Example 1:* DATE(82,3,21) → 3/21/82

This example shows how integer values may be converted to a Date.

*Example 2:*
DATE(YEAR(TODAY)+1, MONTH(TODAY),DAY(TODAY)) → 9/25/86

This example shows how you can produce a date one year ahead of Today's date, which is September 25, 1985. (The TODAY function obtains the date information from the Macintosh system clock/calendar).

---

YEAR

*Argument Type:* DATE *Result:* INTEGER

**YEAR(Date_Value)**

The YEAR function extracts the year value as an integer from Date Value so that you can view it or apply mathematical operations to it.

- The "@" symbol must precede all date constants in formulas.

*Example:* YEAR(@6/27/46)+40 → 1986

---

MONTH

*Argument Type:* DATE *Result:* INTEGER

**MONTH(Date_value)**

The MONTH function extracts the month value as an integer from Date Value so that you can view it or apply mathematical operations to it.

- The "@" symbol must precede all date constants in formulas.

*Example:* MONTH(@6/27/45)+2 → 8

---

DAY

*Argument Type:* DATE *Result:* INTEGER

**DAY(Date_Value)**

The DAY function extracts the day value as an integer from Date Value so that you can view it or apply mathematical operations to it.

- The "@" symbol must precede all date constants in formulas.

*Example:* DAY(@6/27/45) → 27

---

## TIME

*Argument Types:* INTEGER, INTEGER, INTEGER *Result:* TIME

**TIME(Hour_Integer, Minute_Integer, Second_Integer)**

- The TIME function allows you to manipulate time values.

*Example:* TIME(9,3,2) → 9:03:02

The example shows how integer values may be converted to a Time.

---

## HOUR

*Argument Type:* TIME *Result:* INTEGER

**HOUR(Time_Value)**

The HOUR function extracts the hour value as an Integer from Time Value so that you can view it or apply mathematical operations to it.

- The "@" symbol must precede all time constants in formulas.

*Example:* HOUR(@11:22:54) → 11

---

## MINUTE

*Argument Type:* TIME *Result:* INTEGER

**MINUTE(Time_Value)**

The MINUTE function extracts the month value as an integer from Time Value so that you can view it or apply mathematical operations to it.

- The "@" symbol must precede all time constants in formulas.

*Example:* MINUTE(@11:22:54) → 22

---

SECOND

*Argument Type:* TIME *Result:* INTEGER

**SECOND(Time_Value)**

The SECOND function extracts the second value as an integer from Time Value so that you can view it or apply mathematical operations to it.

- The "@" symbol must precede all time constants in formulas.

*Example:* SECOND(@11:22:54) → 54

---

TODAY

*Argument Type:* NONE *Result:* DATE

**TODAY**

Obtains today's date from the Macintosh system clock/calendar and will therefore only be as accurate as the settings of your Macintosh clock/calendar.

*Example:* TODAY → 11/20/85

---

NOW

*Argument Type:* NONE *Result:* TIME

**NOW**

The NOW function obtains the current time from the Macintosh's system clock and will therefore only be as accurate as the setting of your Macintosh system clock.

*Example:* NOW → 10:52:21

---

**SPECIAL FUNCTIONS**

## ERROR

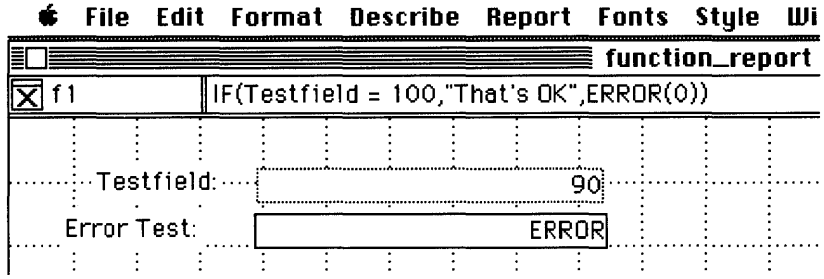
*Argument Type:* NUMBER *Result:* ERROR

**ERROR(Error_Number)**

Generates a specific Reflex error message, dependent on the value of Error Number.

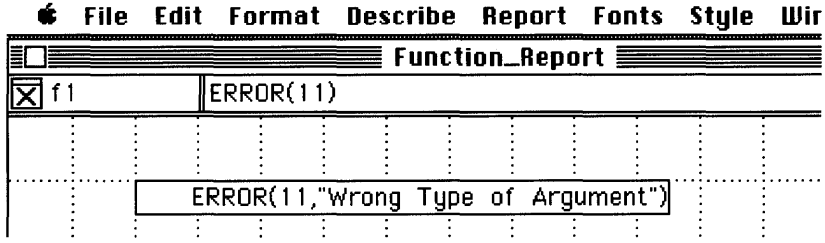
- The error number can be chosen from the range 0 - 42 (see the section on Error Messages).

*Example 1:*




**ERROR(0) is used as a general error indicator.**

*Example 2:*




**ERROR(11) generates a specific error message**

## EXISTS

*Argument Type:* ANY *Result:* LOGICAL

**EXISTS(Name or Query)**

The EXISTS function can be used in two ways. It can check to see if a field has a non-blank value. It can also be used to check if there is at least one record in a database file or repeating collection that meets a qualification.

*Example 1:*
EXISTS(employee WHERE LENGTH(LastName) = 6) → TRUE

This example checks a database file called Employee for any records that have a LastName field that contains a value with exactly six characters. If it finds one, it does not return the field value - it just returns TRUE. If no records had met the criteria, then EXISTS would have returned a value of FALSE.

*Example 2:* COUNT(employee WHERE EXISTS(Homephone))

This example gives the count of people in a database file called Employee who have a value in the Homephone field (the Employee file supplied with Reflex does not have a Homephone field, but you can add one if you wish).

---

## FALSE

*Argument Type:* NONE *Result:* LOGICAL

**FALSE**

Can be used within a formula to indicate that a condition has a value of FALSE. See NO, YES, and TRUE for companion functions.

*Example:* FALSE → FALSE

---

## IF

*Argument Types:* LOGICAL, ANY, ANY *Result:* ANY

**IF(Condition, Then_Formula, Else_Formula)**

If Condition is true, return Then Formula. If Condition is false, return Else Formula.

- The True and False formulas may be any Reflex formulas.

*Example:* IF(100 < 200,"Correct","Incorrect") → Correct

---

## ISERROR

*Argument Type:* Any *Result:* LOGICAL

ISERROR(Formula)

Returns TRUE if the value of the Argument is one of the defined Reflex Error values.

---

## ISNA

*Argument Type:* Any *Result:* LOGICAL

ISNA(Formula)

Returns TRUE if the value of the Argument is NA.

---

LOOKUP

*Argument Type:* Formula FROM Query *Result:* ANY

**LOOKUP(Formula FROM Query)**

The LOOKUP function finds the first record from the query that meets its qualification and computes the formula for that record and then returns the computed value. If no record is found that meets the qualification the LOOKUP function returns NA.

*Example 1:* LOOKUP(netWorth FROM person WHERE FirstName = "Mark") → $400000

*Example 2:*
LOOKUP(FirstName&" "&LastName FROM
person WHERE
city = "Los Altos") → Mark Hoffman

This example will return a concatenated field (made up of the FirstName and LastName fields) for each person in the Person database file that lives in Los Altos.

---

NA

*Argument Type:* NONE *Result:* NA

**NA**

Used to generate the Not Available indicator.

*Example:* NA → NA

---

## NO

*Argument Type:* NONE *Result:* Logical

**NO**

Can be used within a formula to indicate a negative condition - the NO function is equivalent to the FALSE function. Also see YES and TRUE.

Example: NO → NO

---

## PREVIOUS

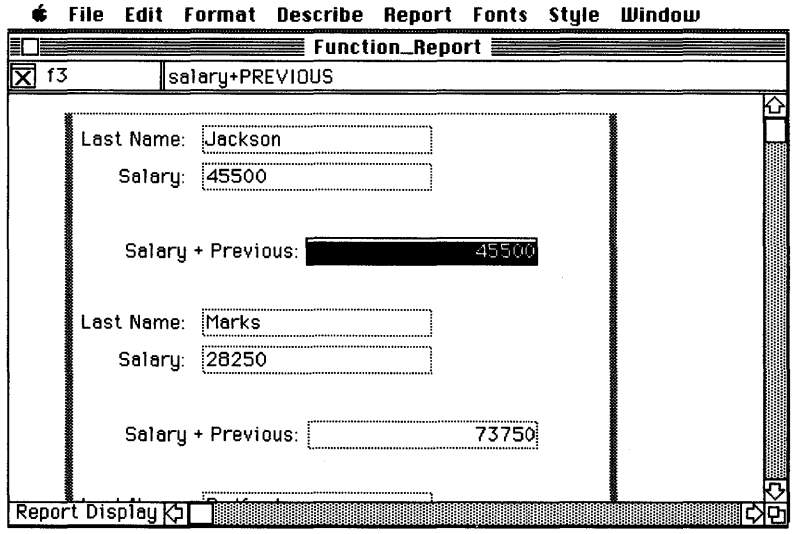
*Argument Type:* NONE *Result:* ANY

**PREVIOUS**

The PREVIOUS function only works within repeating collections. It allows you to obtain a running calculation of various field values included in a repeating collection.

- The Total field shown below will produce a running total of the salary field in the repeating collection and contains the formula: Salary + PREVIOUS.

*Example:*



## TRUE

*Argument Type:* NONE *Result:* LOGICAL

**TRUE**

Can be used within a formula to indicate that a condition is TRUE. See YES, FALSE, and NO for companion functions.

*Example:* TRUE → TRUE

---

## YES

*Argument Type:* NONE *Result:* LOGICAL

**YES**

Can be used within a formula to indicate an affirmative condition - the YES function is equivalent to the TRUE function. Also see NO and FALSE.

Example: YES → YES

---

# REFLEX ERROR MESSAGES

**ERROR(1,"Text Result Required")**

This error message occurs when you attempt to display a non-text result in a field of type Text.

**ERROR(2,"Numeric Result Required")**

This error message occurs when you attempt to display a non-numeric result in a field of type Number or Integer.

**ERROR(3, "Date Result Required")**

This error message occurs when you attempt to display a non-date result in a field of type Date.

**ERROR(4, "Logical Result Required")**

This error message occurs when you attempt to display a non-logical result in a field of type Logical.

**ERROR(5, "Time Result Required")**

This error message occurs when you attempt to display a non-time result in a field of type Time.

**ERROR(6, "Text Argument Required")**

This error message occurs when a Text argument is required but you have supplied some other argument type.

**ERROR(7, "Numeric Argument Required")**

This error message occurs when a Numeric argument is required but you have supplied some other argument type.

**ERROR(8, "Date Argument Required")**

This error message occurs when a Date argument is required but you have supplied some other argument type.

**ERROR(9, "Logical Argument Required")**

This error message occurs when a Logical argument is required but you have supplied some other argument type.

**ERROR(10, "Time Argument Required")**

This error message occurs when a Time argument is required but you have supplied some other argument type.

**ERROR(11, "Wrong Type of Argument")**

This error message occurs when a specific argument is required but you have supplied some other invalid type.

**ERROR(12, "Reference to Error Value")**

This error message occurs when you refer to an object that contains a value of type ERROR.

**ERROR(13, "Missing Arguments")**

This error message occurs when one or more arguments are missing from a formula.

**ERROR(14, "SQRT Argument Negative")**

This error message occurs when you try to obtain the square root of a negative number.

**ERROR(15, "+ or - Arguments Infinite")**

This error message occurs when you attempt to add -INFINITY to INFINITY or subtract INFINITY from INFINITY.

**ERROR(16, "/ Arguments Invalid")**

This error message occurs when you attempt an invalid division operation (eg: 0 / 0 or INFINITY / INFINITY).

**ERROR(17, "* Arguments Invalid")**

This error message occurs when you attempt an invalid multiplication operation (eg: 0 * INFINITY).

**ERROR(18, "MOD Argument Zero")**

This error occurs when you attempt supply the MOD function with a zero argument.

**ERROR(19, "SIN, COS or TAN Argument Infinite")**

This error message occurs when you attempt an invalid operation with one of these functions such as: SIN(INFINITY) or SIN(-INFINITY).

**ERROR(20, "LOG or LN Argument Negative")**

This error message occurs when you attempt to use either function with a negative number.

**ERROR(21, "^ Argument Invalid")**

This error message occurs when you attempt an invalid operation with this function such as: -3 ^ .5

**ERROR(22, "NPV, PV, FV, PMT Interest Argument Invalid")**

This error message occurs when you supply an invalid NPV interest rate argument to one of these function, such as: NPV(-2,4,4)

**ERROR(23, "Number too large for Integer")**

This error message occurs when you compute a number that is too large to be handled by an Integer type field.

**ERROR(24, "Name not found")**

This error message occurs when you supply a Name Reference and the name you refer to does not exist, or is not available on currently mounted disks.

**ERROR(25, "Circular Reference")**

This error message occurs in a number of ways:

- When you have a field refer to itself.
- When you have field A refer to field B and field B refer to field A.
- When you have field A refer to field B, field B refer to field C, ... refer to field X, and field X refer to field A.

**ERROR(26, "Reference is not a valid Source")**

This error message occurs when you attempt to make a reference to a component of something that is not a Source (a field, for example) and therefore has no components.

**ERROR(27, "Name not found in Source")**

This error message occurs when you use a correct reference to a component of a Source, but the component you specify does not actually exist.

**ERROR(28, "Empty Link")**

This error message occurs when you make a correct reference to a component of a Link and that Link contains nothing - it is empty.

**ERROR(29, "Invalid Reference to Link Collection")**

This error message occurs when you make a correct reference to a component of a Link Collection as if it were just a simple Link - the Link Collection contains many Links and you have just asked for an unspecified single value.

**ERROR(30, "Linked Record not found")**

This error message occurs when you reference a link and the linked record is not found. The message will appear when the Links between records are inconsistent (corrupted) in some way.

**ERROR(31, "MID or REPEAT Argument Invalid")**

This error message occurs when you use a negative Number argument with either function, such as: MID("Hello", 2, -2).

**ERROR(32, "DATE Argument Invalid")**

This error message occurs when you attempt to use an invalid date argument with the DATE function such as:

DATE(1985,99,3)

This example has a bad second argument for the month.

**ERROR(33, "TIME Argument Invalid")**

This error message occurs when you attempt to use an invalid time argument with the TIME function such as:

TIME(-8,45,0)

This example has a bad first argument for the hour.

**ERROR(34, "Query used incorrectly")**

This error message occurs when you use a Query in the wrong place, or context such as:

3+Person WHERE Networth > 10000.

**ERROR(35, "Query required")**

This error message occurs when you needed to use a Query but did not supply one, such as:

LOOKUP (Networth FROM 12).

**ERROR(36, "Source Reference Required")**

This error message occurs when you needed to supply a reference to a Source, but did not do so, such as:

LOOKUP (Networth FROM StockReport).

**ERROR(37, "Empty Repeating Collection")**

This error message occurs when you attempt to calculate a report that includes a repeating collection that does not contain anything for displaying the report contents.

**ERROR(38, "Not Implemented")**

This error message occurs when you attempt to use a new feature not supported in this version of Reflex.

**ERROR(39, "Damaged Formula")**

This error message occurs when the internal representation of a formula has been corrupted. This is a very severe error and should be reported to Borland International.

**ERROR(40, "Unknown Arithmetic Problem")**

This error message occurs when Reflex cannot detect the specific nature of an arithmetic problem. This is a very severe error and should be reported to Borland International.

**ERROR(41, "Unknown Calculation Problem")**

This error message occurs when there has been some unspecified internal Reflex problem in calculation. This is a very severe error and should be reported to Borland International.

**ERROR(42, "LOOKUP returned Not Available")**

This error message occurs when you use the LOOKUP function in a Record Qualification Formula in a database window and it does not return the value of TRUE or FALSE - the value(s) you wanted were Not Available (i.e. NA).

## REFLEX DATA SHEET

### General

- Runs on any 512K+ Mac, Mac XL or Macintosh Plus
- Runs under the Switcher with minimum 300K partition
- Uses additional memory as database buffers for increased performance
- Context sensitive Help facility
- Hard disk install

### Database Design

- Fully Relational, multiple file database
- Maximum field length: 1002 bytes
- Maximum fields per record: 254
- Maximum record length: 1008 bytes
- Maximum records per file: limited only by capacity of disk
- Number of open files: 15
- Design of a database file, its fields, and Links to other files through visual layout of file images on the Database Overview
- Database fields can be Text, Number, Integer, Date, Time, Logical, or Sequence Number data types.
- Links between files (1-1, 1-many, many-many) are defined by simply drawing lines between database file images.
- Can add, delete, rename, reorder, and change types of fields and Links, with automatic restructuring of data.
- Multi-field keys.

### Visual Layout

- Visual layout of the data entry form and report design allowed
- Change size, shape and position of fields
- Add, edit, and/or move text labels
- Paste pictures from Clipboard into data entry form or report design
- Alignment and formatting of objects.
- Grid shown on screen with automatic alignment to grid to simplify layout
- Display format for numbers: General, Decimal, Scientific, Dollars, Percent with Digits and Commas.
- Display format for dates: Short, Long, and Abbreviated.
- Complete selection of Macintosh fonts, sizes and styles

## Data Entry

- Data entry form can be customized using Visual Layout
- QueryBuild feature can be used to easily retrieve records based on qualification of values of database fields combined with AND and OR.
- User can perform more complex retrievals by entering arbitrary formulas
- Automatically checks for data of correct type for each field
- User can define more specialized data checks for each field.
- Consistency of Links between files is automatically maintained (i.e. checks that mentioned record exists)
- Export/Import data to/from Text files
- Supports Export of data for mail merge operations.

## Report Generation

- Automatic generation of simple table-style reports for a database file
- Reports can also be designed using Visual Layout
- Can reference values in database files by using relational database functions and operators
- Can reference values in other reports
- Computed fields with full set of logical, arithmetic, date, time, statistical, comparison, and text functions and operators
- Summary Functions (i.e. COUNT, SUM, AVERAGE, MIN, MAX, STDEV and NPV) can be performed
- QueryBuild feature can be used in reports to help construct database record qualifications
- Natural order of evaluation (includes references to other reports)
- Repeating Collections allow the calculation of arbitrary values to be performed for each specified record of a database file.
- Report layout automatically modified to allow display of these multiple calculated values in Repeating Collections
- Repeating Collections include as a special case nested control breaks with arbitrary summary calculations
- Sorting by multiple values of each Repeating Collection level
- Headers, Footers and control over Page breaks
- Print report to Screen, to Printer, or Export to Text file (can then be Imported back into database file to add or update data records)
- Print quality: Draft, Standard, & High Resolution

## New Reflex Features

> **Rapid browsing through a database.** Press Command-Shift N (or hold down Shift while selecting Next Record from the Search menu) to scroll 10 qualified records forward through the database. To scroll backward, press Command-Shift P (or hold down Shift while selecting Previous Record from the Search menu).

> **Griding by fractions of an inch.** Major grid divisions occur every half inch. Grid points for alignment occur every eighth inch.

> **Finding help under HFS.** Under HFS, Reflex looks for the help file first in the Reflex folder, then in the executed volume, and finally in all mounted volumes.

> **Bumping sequence numbers when Make Copy of Record is chosen.**

> **New option in Overview Menu: Change File Destination.** This will create a new version of the database on the chosen volume and then delete the old version of the database.

> **Faster selecting of groups of objects in form design.** Press the option key and drag a "lasso" box similar to Finder's. Release the mouse to select all objects completely enclosed by the box.

> **Additional operations on a group of selected objects.** You can perform the following operations on a group of selected fields: field type changes, display format changes, font changes, style changes, protect (unprotect) objects, and text alignment.

> **Controlling page breaks in repeating collections.** Select a repeating collection and choose No Page Breaks from the Describe menu.

> **Supporting non-standard paper sizes.** Use the Paper Sizes command from the File menu to customize page sizes. This information will be valid for all printers except the LaserWriter, which uses the system's page size information.

> **Supporting custom import/export files.** Select the Custom Text File button in the first export or import dialog box.

> **Second LOOKUP argument.** The LOOKUP function now accepts an optional second argument. NA will be returned as the default if a second argument is not specified. For example, **LOOKUP(Amount FROM Order WHERE Name="-none-",0)** return the value zero.

> **WEEKDAY function.** This function takes a date argument and returns an integer for the corresponding day of the week (1 for Sunday, 2 for Monday, 3 for Tuesday, and so forth). For example, **WEEKDAY (@12/7/41)** returns 1 since Dec. 7, 1941, was a Sunday.

> **Date/Time arithmetic.** The following expressions involving dates, time values, and integers are now supported: ***date - date, date + integer, date - integer, time - time, time + integer, time - integer***

# INDEX

## G



## H



## IJ



## K



## L



## M

## S



## T



## UV



## WXYZ

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***Appointment Calendar*** to remind you of important meetings and appointments.

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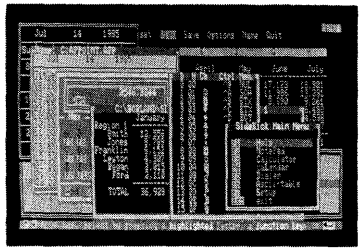
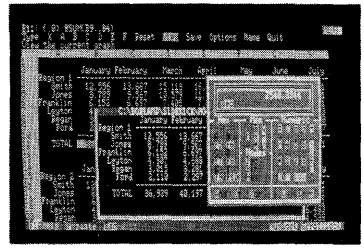
***An ASCII Table*** for easy reference.



All the SideKick windows stacked up over Lotus 1-2-3.® From bottom to top: SideKick's "Menu Window," ASCII Table, Notepad, Calculator, Appointment Calendar, Monthly Calendar, and Phone Dialer.



Here's SideKick running over Lotus 1-2-3. In the SideKick Notepad you'll notice data that's been imported directly from the Lotus screen. In the upper right you can see the Calculator.

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BORLAND INTERNATIONAL

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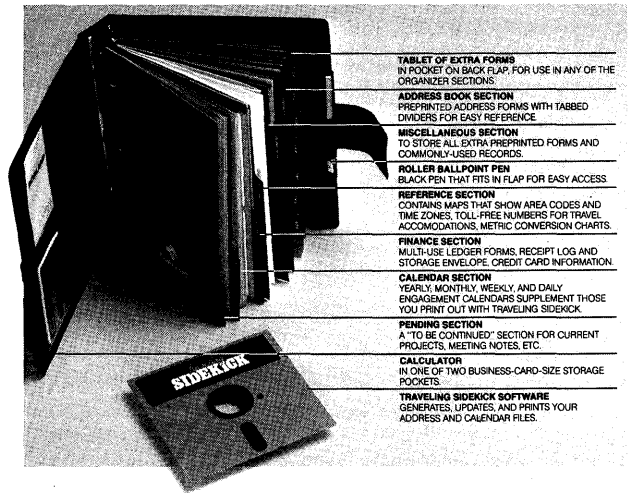


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***Suggested Retail Price: $69.95***

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SuperKey, at your convenience, will make your screen go blank after a predetermined time of screen/keyboard inactivity. You've paid hard-earned money for your PC. SuperKey will protect your monitor's precious phosphor and your investment.

### *SuperKey protects your work from intruders while you take a break*

Now you can lock your keyboard at any time. Prevent anyone from changing hours of work. Type in your secret password and everything comes back to life—just as you left it.

### *Suggested Retail Price: $69.95 (not copy protected)*

**Minimum system configuration: IBM PC, XT, AT, PCjr and true compatibles. PC-DOS (MS-DOS) 2.0 or greater. 128K RAM. One disk drive.**

BORLAND INTERNATIONAL

If you use an IBM® PC, you need

# TURBO Lightning®

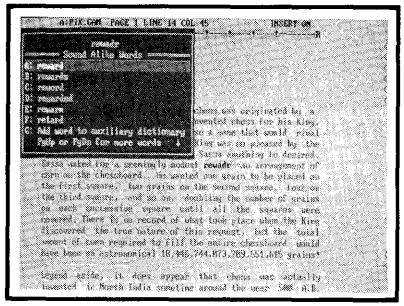
***Turbo Lightning teams up with the Random House® Concise Dictionary to check your spelling as you type!***

Turbo Lightning, using the 83,000-word Random House Dictionary, checks your spelling *as you type*. If you misspell a word, it alerts you with a beep. At the touch of a key, Turbo Lightning opens a window on top of your application program and suggests the correct spelling. Just press one key and the misspelled word is instantly replaced with the correct word. It's that easy!

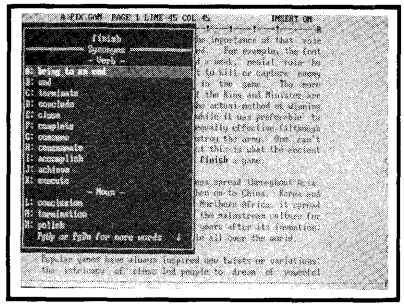
***Turbo Lightning works hand-in-hand with the Random House Thesaurus to give you instant access to synonyms***

Turbo Lightning lets you choose just the right word from a list of alternates, so you don't say the same thing the same way every time. Once Turbo Lightning opens the Thesaurus window, you see a list of alternate words, organized by parts of speech. You just select the word you want, press ENTER and your new word will instantly replace the original word. Pure magic!

***If you ever write a word, think a word, or say a word, you need Turbo Lightning***




The Turbo Lightning Dictionary




The Turbo Lightning Thesaurus

***Turbo Lightning's intelligence lets you teach it new words. The more you use Turbo Lightning, the smarter it gets***

You can also *teach* your new Turbo Lightning your name, business associates' names, street names, addresses, correct capitalizations, and any specialized words you use frequently. Teach Turbo Lightning once, and it knows forever.

***Turbo Lightning is the engine that powers Borland's Turbo Lightning Library™***

Turbo Lightning brings electronic power to the Random House Dictionary and Random House Thesaurus. They're at your fingertips—even while you're running other programs. Turbo Lightning will also "drive" soon-to-be-released encyclopedias, extended thesauruses, specialized dictionaries, and many other popular reference works. You get a head start with this first volume in the Turbo Lightning Library.

And because Turbo Lightning is a Borland product, you know you can rely on our quality, our 60-day money-back guarantee, and our eminently fair prices.

***Suggested Retail Price: $99.95 (not copy protected)***

**Minimum system configuration: IBM PC, XT, AT, PCjr, and true compatibles with 2 floppy disk drives. PC-DOS (MS-DOS) 2.0 or greater. 256K RAM. Hard disk recommended.**

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# LIGHTNING WORDWIZARD™

***Lightning Word Wizard includes complete, commented Turbo Pascal® source code and all the technical information you'll need to understand and work with Turbo Lightning's "engine." More than 20 fully documented Turbo Pascal procedures reveal powerful Turbo Lightning® engine calls. Harness the full power of the complete and authoritative Random House® Concise Dictionary and Random House Thesaurus.***

### *Turbo Lightning's "Reference Manual"*

Developers can use the versatile on-line examples to harness Turbo Lightning's power to do rapid word searches. Lightning Word Wizard is the forerunner of the database access systems that will incorporate and engineer the Turbo Lightning Library™ of electronic reference works.

### *The ultimate collection of word games and crossword solvers!*

The excitement, challenge, competition, and education of four games and three solver utilities—puzzles, scrambles, spell-searches, synonym-seekings, hidden words, crossword solutions, and more. You and your friends (up to four people total) can set the difficulty level and contest the high-speed smarts of Lightning Word Wizard!

### *TURBO LIGHTNING—CRITICS' CHOICE*

"Lightning's good enough to make programmers and users cheer, executives of other software companies weep."
**Jim Seymour, *PC Week***

"The real future of Lightning clearly lies not with the spelling checker and thesaurus currently included, but with other uses of its powerful look-up engine."
**Ted Silveira, *Profiles***

"This newest product from Borland has it all."
**Don Roy, *Computing Now!***

**Minimum system configuration: IBM PC, XT, AT, PCjr, Portable, and true compatibles. 256K RAM minimum. PC-DOS (MS-DOS) 2.0 or greater. Turbo Lightning software required. Optional—Turbo Pascal 3.0 or greater to edit and compile Turbo Pascal source code.**

**BORLAND**
INTERNATIONAL

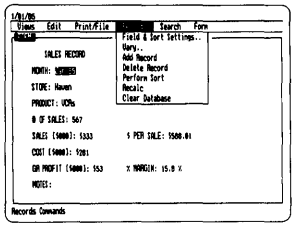
***Suggested Retail Price: $69.95***

# REFLEX®

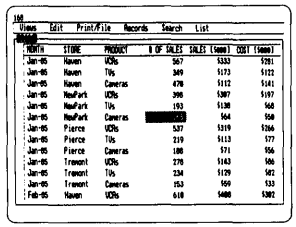
## THE ANALYST

***Reflex is the most amazing and easy-to-use database management system. And if you already use Lotus 1-2-3,® dBASE,® or PFS: File,® you need Reflex—because it's a totally new way to look at your data. It shows you patterns and interrelationships you didn't know were there, because they were hidden in data and numbers. It's also the greatest report generator for 1-2-3.***

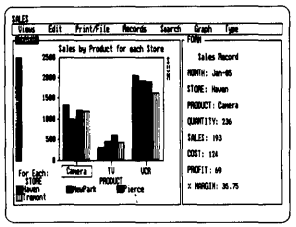
***REFLEX OPENS MULTIPLE WINDOWS WITH NEW VIEWS AND GRAPHIC INSIGHTS INTO YOUR DATA.***



The FORM VIEW lets you build and examine your database.

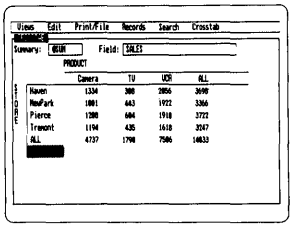


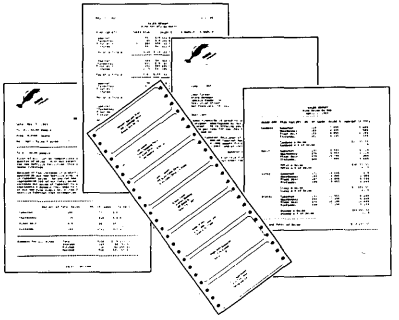
The LIST VIEW lets you put data in tabular list form just like a spreadsheet.



The GRAPH VIEW gives you instant interactive graphic representations.

The CROSSTAB VIEW gives you amazing "cross-referenced" pictures of the links and relationships hidden in your data.





The REPORT VIEW allows you to import and export to and from Reflex, 1-2-3, dBASE, PFS: File, and other applications, and prints out information in the formats you want.

**So Reflex shows you—Instant answers. Instant pictures. Instant analysis. Instant understanding.**

## *THE CRITICS' CHOICE:*

"The next generation of software has officially arrived."
***Peter Norton, PC WEEK***

"Reflex is one of the most powerful database programs on the market. Its multiple views, interactive windows and graphics, great report writer, pull-down menus, and cross tabulation make this one of the best programs we have seen in a long time . . .

The program is easy to use and not intimidating to the novice . . . Reflex not only handles the usual database functions such as sorting and searching, but also "what-if" and statistical analysis . . . it can create interactive graphics with the graphics module. The separate report module is one of the best we've ever seen."
***Marc Stern, INFOWORLD***

***Suggested Retail Price $149.95 (not copy protected)***

**Minimum system configuration: IBM PC, XT, AT, and true compatibles. PC-DOS (MS-DOS) 2.0 or greater. 384K RAM minimum. IBM Color Graphics Adapter, Hercules Monochrome Graphics Card, or equivalent. Hard disk and mouse optional. Lotus 1-2-3, dBASE, or PFS: File optional.**

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BOR 0066A

# REFLEX WORKSHOP™

***Includes 22 "instant templates" covering a broad range of business applications (listed below). Also shows you how to customize databases, graphs, crosstabs, and reports. It's an invaluable analytical tool and an important addition to another one of our best sellers, Reflex: The Analyst 1.1.***

## *Fast-start tutorial examples:*

Learn Reflex as you work with practical business applications. The Reflex Workshop Disk supplies databases and reports large enough to illustrate the power and variety of Reflex features. Instructions in each Reflex Workshop chapter take you through a step-by-step analysis of sample data. You then follow simple steps to adapt the files to your own needs.

## *22 practical business applications:*

Workshop's 22 "instant templates" give you a wide range of analytical tools:

### *Administration*

- Scheduling Appointments
- Planning Conference Facilities
- Managing a Project
- Creating a Mailing System
- Managing Employment Applications

### *Sales and Marketing*

- Researching Store Check Inventory
- Tracking Sales Leads
- Summarizing Sales Trends
- Analyzing Trends

### *Production and Operations*

- Summarizing Repair Turnaround
- Tracking Manufacturing Quality Assurance
- Analyzing Product Costs

### *Accounting and Financial Planning*

- Tracking Petty Cash
- Entering Purchase Orders
- Organizing Outgoing Purchase Orders
- Analyzing Accounts Receivable
- Maintaining Letters of Credit
- Reporting Business Expenses
- Managing Debits and Credits
- Examining Leased Inventory Trends
- Tracking Fixed Assets
- Planning Commercial Real Estate Investment

Whether you're a newcomer learning Reflex basics or an experienced "power user" looking for tips, Reflex Workshop will help you quickly become an expert database analyst.

**Minimum system configuration: IBM PC, AT, and XT, and true compatibles. PC-DOS (MS-DOS) 2.0 or greater. 384K RAM minimum. Requires Reflex: The Analyst, and IBM Color Graphics Adapter, Hercules Monochrome Graphics Card or equivalent.**

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***Suggested Retail Price: $69.95 (not copy protected)***

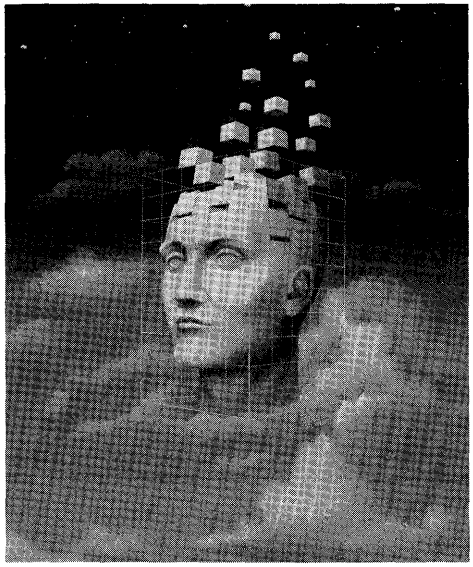
# TURBO PROLOG™

## the natural language of artificial intelligence

...TEP-BY-STEP TUTORIAL AND DEMO PROGRAMS WITH SOURCE CODE INCLUDED!

***Turbo Prolog brings fifth-generation supercomputer power to your IBM® PC!***

### *Turbo Prolog takes programming into a new, natural, and logical environment*



With ***Turbo Prolog***, because of its natural, logical approach, both people new to programming *and* professional programmers can build powerful applications such as expert systems, customized knowledge bases, natural language interfaces, and smart information management systems.

***Turbo Prolog*** is a *declarative* language which uses deductive reasoning to solve programming problems.

***Turbo Prolog's*** development system includes:

- ☐ A complete Prolog incremental compiler that conforms to the Clocksin and Mellish Edinburgh standard Prolog.
- ☐ A full-screen interactive editor.
- ☐ Support for both graphic and text windows.
- ☐ All the tools that let you build your own expert sytems and **AI** applications with unprecedented ease.

***Turbo Prolog*** provides a fully integrated programming environment like Borland's Turbo Pascal,® the *de facto* worldwide standard.

### *You get the complete Turbo Prolog programming system*

You get the 200-page manual you're holding, software that includes the lightning-fast ***Turbo Prolog*** incremental compiler and interactive editor, and the free GeoBase natural query language database, which includes commented source code on disk, ready to compile. (GeoBase is a complete database designed and developed around U.S. geography. You can modify it or use it "as is.")

**Minimum system configuration: IBM PC, XT, AT, Portable, 3270, PCjr and true compatibles. PC-DOS (MS-DOS) 2.0 or later. 384K RAM minimum.**

***Suggested Retail Price $99.95 (not copy protected)***

BORLAND INTERNATIONAL

# TURBO PASCAL®

## *VERSION 3.0 with 8087 support and BCD reals*

## *Free MicroCalc Spreadsheet With Commented Source Code!*

### *FEATURES:*

***One-Step Compile:*** No hunting & fishing expeditions! Turbo finds the errors, takes you to them, lets you correct them, and instantly recompiles. You're off and running in record time.

***Built-in Interactive Editor:*** WordStar®-like easy editing lets you debug quickly.

***Automatic Overlays:*** Fits big programs into small amounts of memory.

***MicroCalc:*** A sample spreadsheet on your disk with ready-to-compile source code.

***IBM® PC Version:*** Supports Turtle Graphics, color, sound, full tree directories, window routines, input/output redirection, and much more.

### *THE CRITICS' CHOICE:*

"Language deal of the century . . . Turbo Pascal: it introduces a new programming environment and runs like magic."

***—Jeff Duntemann, PC Magazine***

"Most Pascal compilers barely fit on a disk, but Turbo Pascal packs an editor, compiler, linker, and run-time library into just 39K bytes of random access memory."

***—Dave Garland, Popular Computing***

"What I think the computer industry is headed for: well-documented, standard, plenty of good features, and a reasonable price."

***—Jerry Pournelle, BYTE***

### *LOOK AT TURBO NOW!*

- ☑ More than 500,000 users worldwide.
- ☑ Turbo Pascal is the de facto industry standard.
- ☑ Turbo Pascal wins PC MAGAZINE'S award for technical excellence.
- ☑ Turbo Pascal named "Most Significant Product of the Year" by PC WEEK.
- ☑ Turbo Pascal 3.0—the fastest Pascal development environment on the planet, period.

***Suggested Retail Price: $99.95; CP/M®-80 version without 8087 and BCD: $69.95***

***Features for 16-bit Systems:*** 8087 math co-processor support for intensive calculations. Binary Coded Decimals (BCD): eliminates round-off error! A *must* for any serious business application.

**Minimum system configuration: 128K RAM minimum. Includes 8087 & BCD features for 16-bit MS-DOS 2.0 or later and CP/M-86 1.1 or later. CP/M-80 version 2.2 or later 48K RAM minimum (8087 and BCD features not available). 8087 version requires 8087 or 80287 co-processor.**

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BOR 0061A

# TURBO PASCAL
# TURBO TUTOR®

***VERSION 2.0***

## *Learn Pascal From The Folks Who Created The Turbo Pascal® Family*

**Borland International proudly presents Turbo Tutor, the perfect complement to your Turbo Pascal compiler. Turbo Tutor is really for everyone—even if you've never programmed before.**

And if you're already proficient, Turbo Tutor can sharpen up the fine points. The manual and program disk focus on the whole spectrum of Turbo Pascal programming techniques.

- **For the Novice:** It gives you a concise history of Pascal, tells you how to write a simple program, and defines the basic programming terms you need to know.
- **Programmer's Guide:** The heart of Turbo Pascal. The manual covers the fine points of every aspect of Turbo Pascal programming: program structure, data types, control structures, procedures and functions, scalar types, arrays, strings, pointers, sets, files, and records.
- **Advanced Concepts:** If you're an expert, you'll love the sections detailing such topics as linked lists, trees, and graphs. You'll also find sample program examples for PC-DOS and MS-DOS.®

10,000 lines of commented source code, demonstrations of 20 Turbo Pascal features, multiple-choice quizzes, an interactive on-line tutor, and more!

Turbo Tutor may be the only reference work about Pascal and programming you'll ever need!

***Suggested Retail Price: $39.95 (not copy protected)***

**Minimum system configuration: Turbo Pascal 3.0. PC-DOS (MS-DOS) 2.0 or later. 192K RAM minimum (CP/M-80 version 2.2 or later: 64K RAM minimum).**

# TURBO PASCAL DATABASE TOOLBOX™

## *Is The Perfect Complement To Turbo Pascal®*

**It contains a complete library of Pascal procedures that allows you to sort and search your data and build powerful database applications. It's another set of tools from Borland that will give even the beginning programmer the expert's edge.**

### *THE TOOLS YOU NEED!*

***TURBO ACCESS Using B+ trees:*** The best way to organize and search your data. Makes it possible to access records in a file using key words instead of numbers. Now available with complete source code on disk, ready to be included in your programs.

***TURBO SORT:*** The fastest way to sort data using the QUICKSORT algorithm—the method preferred by knowledgeable professionals. Includes source code.

***GINST (General Installation Program):*** Gets your programs up and running on other terminals. This feature alone will save hours of work and research. Adds tremendous value to all your programs.

### *GET STARTED RIGHT AWAY—FREE DATABASE!*

Included on every Toolbox diskette is the source code to a working database which demonstrates the power and simplicity of our Turbo Access search system. Modify it to suit your individual needs or just compile it and run.

### *THE CRITICS' CHOICE!*

"The tools include a B+ tree search and a sorting system. I've seen stuff like this, but not as well thought out, sell for hundreds of dollars." ***—Jerry Pournell, BYTE MAGAZINE***

"The Turbo Database Toolbox is solid enough and useful enough to come recommended." ***—Jeff Duntemann, PC TECH JOURNAL***

***Suggested Retail Price: $69.95 (not copy protected)***

**Minimum system configuration: 128K RAM and one disk drive (CP/M-80: 48K). 16-bit systems: Turbo Pascal 2.0 or greater for MS-DOS or PC-DOS 2.0 or greater. Turbo Pascal 2.1 or greater for CP/M-86 1.0 or greater. 8-bit systems: Turbo Pascal 2.0 or greater for CP/M-80 2.2 or greater.**

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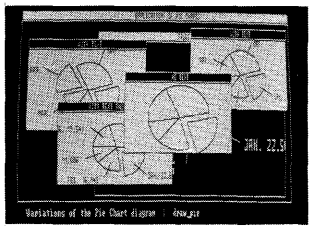
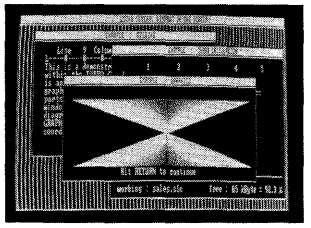
# TURBO PASCAL GRAPHIX TOOLBOX®

## *A Library of Graphics Routines for Use with Turbo Pascal®*

**High-resolution graphics for your IBM® PC, AT,® XT,® PCjr®, true PC compatibles, and the Heath Zenith Z-100.™ Comes complete with graphics window management.**

Even if you're new to Turbo Pascal programming, the Turbo Pascal Graphix Toolbox will get you started right away. It's a collection of tools that will get you right into the fascinating world of high-resolution business graphics, including graphics window management. You get immediate, satisfying results. And we keep Royalty out of American business because you don't pay any—even if you distribute your own compiled programs that include all or part of the Turbo Pascal Graphix Toolbox procedures.





***What you get includes:***

- Complete commented source code on disk.
- Tools for drawing simple graphics.
- Tools for drawing complex graphics, including curves with optional smoothing.
- Routines that let you store and restore graphic images to and from disk.
- Tools allowing you to send screen images to Epson-compatible printers.
- Full graphics window management.
- Two different font styles for graphic labeling.
- Choice of line-drawing styles.
- Routines that will let you quickly plot functions and model experimental data.
- And much, much more . . .

"While most people only talk about low-cost personal computer software, Borland has been doing something about it. And Borland provides good technical support as part of the price."

***John Markov & Paul Freiberger, syndicated columnists.***

***If you ever plan to create Turbo Pascal programs that make use of business graphics or scientific graphics, you need the Turbo Pascal Graphix Toolbox.***

***Suggested Retail Price: $69.95 (not copy protected)***

**Minimum system configuration: IBM PC, XT, AT, PCjr, true compatibles and the Heath Zenith Z-100. Turbo Pascal 3.0 or later. 192K RAM minimum. Two disk drives and an IBM Color Graphics Adapter (CGA), IBM Enhanced Graphics Adapter (EGA), Hercules Graphics Card or compatible.**

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BOR 0068A

# TURBO PASCAL EDITOR TOOLBOX™

## *It's All You Need To Build Your Own Text Editor Or Word Processor*

***Build your own lightning-fast editor and incorporate it into your Turbo Pascal® programs.*** Turbo Editor Toolbox gives you easy-to-install modules. Now you can integrate a fast and powerful editor into your own programs. You get the source code, the manual, and the know-how.

***Create your own word processor.*** We provide all the editing routines. You plug in the features you want. You could build a WordStar®-like editor with pull-down menus like Microsoft's® Word, and make it work as fast as WordPerfect.®

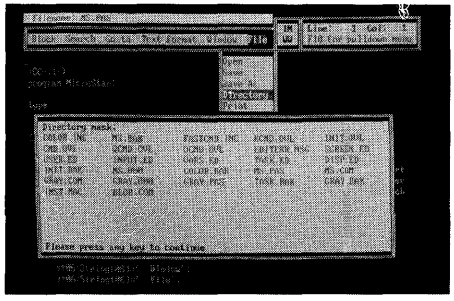
***To demonstrate the tremendous power of Turbo Editor Toolbox, we give you the source code for two sample editors:***

***Simple Editor*** A complete editor ready to include in your programs. With windows, block commands, and memory-mapped screen routines.

***MicroStar*** A full-blown text editor with a complete pull-down menu user interface, plus a lot more. Modify MicroStar's pull-down menu system and include it in your Turbo Pascal programs.

The Turbo Editor Toolbox gives you all the standard features you would expect to find in any word processor:

- Wordwrap
- UN-delete last line
- Auto-indent
- Find and Find/Replace with options
- Set left and right margin
- Block mark, move, and copy
- Tab, insert and overstrike modes, centering, etc.



MicroStar's pull-down menus.

And Turbo Editor Toolbox has features that word processors selling for several hundred dollars can't begin to match. Just to name a few:

☑ ***RAM-based editor***. You can edit very large files and yet editing is lightning fast.

☑ ***Memory-mapped screen routines.*** Instant paging, scrolling, and text display.

☑ ***Keyboard installation.*** Change control keys from WordStar-like commands to any that you prefer.

☑ ***Multiple windows.*** See and edit up to eight documents—or up to eight parts of the same document—all at the same time.

☑ ***Multitasking.*** Automatically save your text. Plug in a digital clock, an appointment alarm—see how it's done with MicroStar's "background" printing.

Best of all, **source code is included for everything in the Editor Toolbox.**

***Suggested Retail Price: $69.95 (not copy protected)***

**Minimum system configuration: IBM PC, XT, AT, 3270, PCjr, and true compatibles. PC-DOS (MS-DOS) 2.0 or greater. 192K RAM. You must be using Turbo Pascal 3.0 for IBM and compatibles.**

BORLAND INTERNATIONAL



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# TURBO PASCAL GAMEWORKS™

## *Secrets And Strategies Of The Masters Are Revealed For The First Time*

**Explore the world of state-of-the-art computer games with Turbo GameWorks. Using easy-to-understand examples, Turbo GameWorks teaches you techniques to quickly create your own computer games using Turbo Pascal.® Or, for instant excitement, play the three great computer games we've included on disk—compiled and ready to run.**

### *TURBO CHESS*

Test your chess-playing skills against your computer challenger. With Turbo GameWorks, you're on your way to becoming a master chess player. Explore the complete Turbo Pascal source code and discover the secrets of Turbo Chess.

"What impressed me the most was the fact that with this program you can become a computer chess analyst. You can add new variations to the program at any time and make the program play stronger and stronger chess. There's no limit to the fun and enjoyment of playing Turbo GameWorks Chess, and most important of all, with this chess program there's no limit to how it can help you improve your game."

***—George Koltanowski, Dean of American Chess, former President of the United Chess Federation, and syndicated chess columnist.***

### *TURBO BRIDGE*

Now play the world's most popular card game—bridge. Play one-on-one with your computer or against up to three other opponents. With Turbo Pascal source code, you can even program your own bidding or scoring conventions.

"There has never been a bridge program written which plays at the expert level, and the ambitious user will enjoy tackling that challenge, with the format already structured in the program. And for the inexperienced player, the bridge program provides an easy-to-follow format that allows the user to start right out playing. The user can 'play bridge' against real competition without having to gather three other people."

***—Kit Woolsey, writer of several articles and books on bridge, and twice champion of the Blue Ribbon Pairs.***

### *TURBO GO-MOKU*

Prepare for battle when you challenge your computer to a game of Go-Moku—the exciting strategy game also know as "Pente.®" In this battle of wits, you and the computer take turns placing X's and O's on a grid of 19×19 squares until five pieces are lined up in a row. Vary the game if you like, using the source code available on your disk.

***Suggested Retail Price: $69.95 (not copy protected)***

**Minimum system configuration: IBM PC, XT, AT, Portable, 3270, PCjr, and true compatibles. PC-DOS (MS-DOS) 2.0 or later. 192K RAM minimum. To edit and compile the Turbo Pascal source code, you must be using Turbo Pascal 3.0 for IBM PCs and compatibles.**

BORLAND INTERNATIONAL



BOR 0065A

# How To Buy Borland Software

# REFLEX FOR THE MAC™

***The easy-to-use relational database that thinks like a spreadsheet. Reflex for the Mac lets you crunch numbers by entering formulas and link databases by drawing on-screen lines.***

## *Some of the things Reflex for the Mac will do for you are included on the examples disk:*

- A 1040 tax application with Schedule A, Schedule B, and Schedule D, each contained in a separate report document.
- A portfolio analysis application with linked databases of stock purchases, sales, and dividend payments.
- A checkbook application.
- A client billing application set up for a law office, but easily customized by any professional who bills time.
- A parts explosion application that breaks down an object into its component parts for cost analysis.

## *Reflex for the Mac accomplishes all of these tasks without programming—using spreadsheet-like formulas. Some other Reflex for the Mac features are:*

- Visual database design.
- "What you see is what you get" report and form layout with pictures.
- Automatic restructuring of database files when data types are changed, or fields are added and deleted.
- Display formats which include General, Decimal, Scientific, Dollars, Percent.
- Data types which include variable length text, number, integer, automatically incremented sequence number, date, time, and logical.
- Up to 255 fields per record.
- Up to 16 files simultaneously open.
- All Macintosh™ fonts and styles are selectable for individual fields and labels.

## *Critic's Choice*

". . . a powerful relational database . . . uses a visual approach to information management." ***InfoWorld***

". . . gives you a lot of freedom in report design; you can even import graphics." ***A+ Magazine***

". . . bridges the gap between the pretty programs and the power programs." **Stewart Alsop, *PC Letter***


*4585 SCOTTS VALLEY DRIVE*
*SCOTTS VALLEY, CALIFORNIA 95066*

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