Tutorial Exercise 1

In this exercise, you'll create a new database dictionary, set several preformatting options, define a relationship and set Referential Integrity constraints, then use the Application Wizard to generate and run either a 32-bit or 16-bit application depending on your operating system. The applications will access a TopSpeed data file that's been set up and "pre-loaded" with data for you.

Rapid Application Development

You should be able to do this within 20 minutes.

- ❏ Can you create an application faster than with your current development tools?
- ✓ Yes. This section shows you how.

The Data

We'll take two tables which are part of a larger Order/Entry database, the whole of which includes five files. These tables reside in one physical file, in the \CWEVAL\TUTOR01 directory.

The data file is in the TopSpeed file format. The TopSpeed file format is one of the so-called "superfile" formats: it can include multiple tables (and keys) residing in a single physical DOS file. It also automatically compresses memo fields.

The file already contains data, so that when you run the application, you'll be able to "play with" some existing data.

Skills

In this exercise, you'll learn to:

- ❏ **Import file definitions from an existing file**. You'll be able to use this skill to create applications immediately from databases that already exist on your hard drive or network.

- ❏ **Preformat controls by field**. You can specify that a particular database field should always have a special control (such as an option box with radio buttons) or a special font and font style for an entry-type control. Since you can use a database dictionary to create many applications that maintain the same data, this not only saves time, but provides a common look and feel for the applications that maintain the same database.

Skills

You'll also learn to:

- ❑ **Define Relationships**
- ❑ **Define Referential Integrity Constraints**.
- ❑ **Run the Application Wizard**.
- ❑ **Define the target operating system**. (You'll create a 32-bit application if you run Windows 95 or Windows NT).

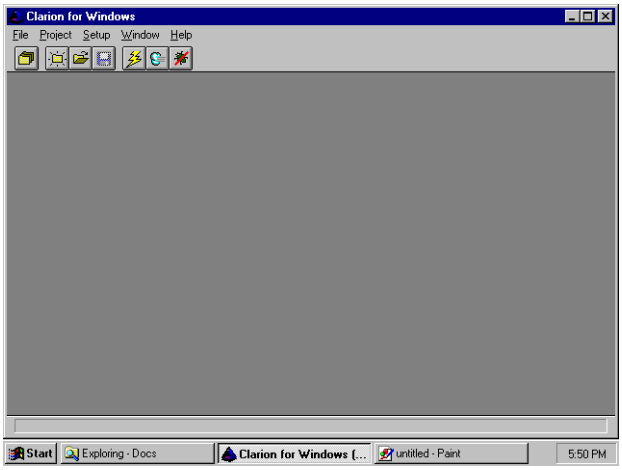
Reminder

We know it's difficult to switch back and forth between the development environment and this document. That's why we we've provided another document with all these instructions, formatted to letter sized paper, ready to print. Open the document called D:\DOC\TUTOR01.PDF (where D: is your CD-ROM drive letter) by double-clicking it in Explorer or File Manager, then print it.

Alternatively, if you're viewing this in full screen mode, press ESC to reduce it to a regular window, so that you can ALT-TAB between this document and the Clarion for Windows development environment.

Start the Development Environment

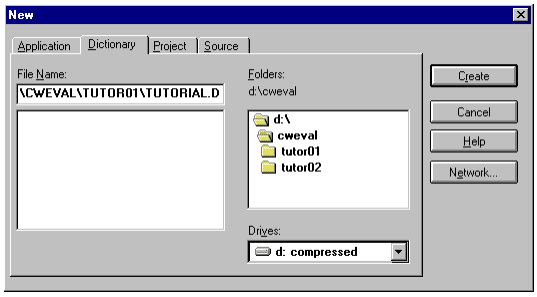
If the development environment is not already running, open it by choosing it from the Start menu, or clicking on its Program Manager icon. It should look like this.



Create a New Dictionary -1-

- ❑ From the development environment menu, choose File ➤ New. In the New dialog, click on the Dictionary tab. The applications you create with Clarion for Windows don't have to be database applications. But when they are, the best starting point is the data dictionary.

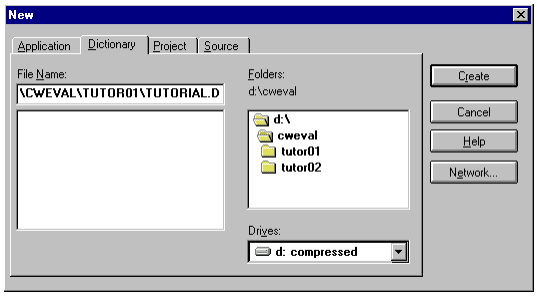
It's important that you follow the directions on the next "page," so that you create your dictionary in the subdirectory in which we've placed your data files.



Create a New Dictionary -2-

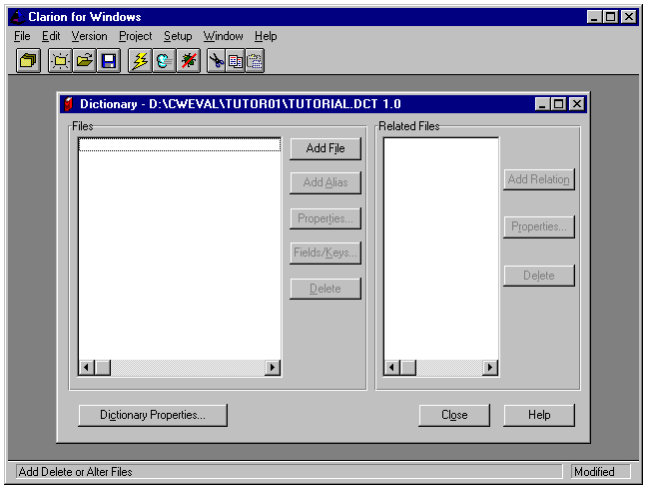
- ❏ Type \CWEVAL\TUTOR01\TUTORIAL.DCT in the File Name box of the New dialog. Then press the Create button.

You can optionally locate the directory called \CWEVAL\TUTOR01 in the folders list, walking the directory tree as necessary by double-clicking folders; then type in the file name. It's important to specify the correct subdirectory, because we already placed a data file for your application there.



Import a File Definition -1-

At this point the Dictionary dialog appears, with your dictionary file name (\CWEVAL\TUTOR01\ TUTORIAL.DCT) at the top. The list at the left holds file or table names. The list at the right will hold the relationships you define for those files.



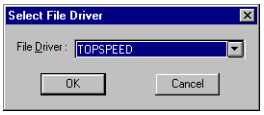
Import a File Definition -2-

- ❏ From the development environment menu, choose File ➤ Import File.

The Select File Driver dialog includes a dropdown list showing the database drivers installed in your system. You'll choose TopSpeed, which is the default. But you can take a moment to drop down the list to view the other drivers available.

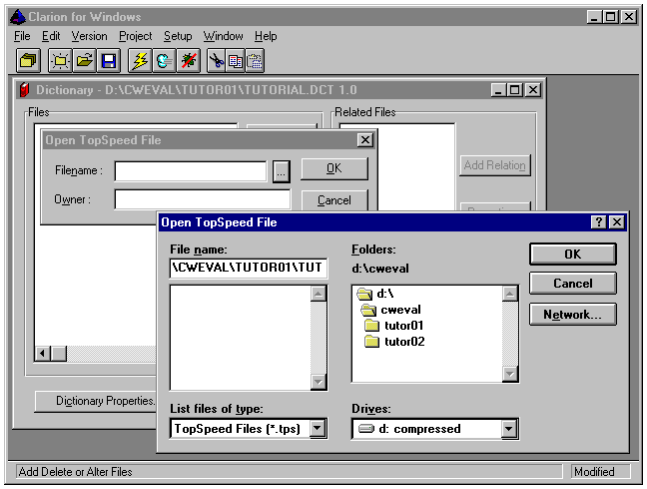
Import a File Definition -3-

- ❏ In the Select File Driver dialog, choose the TOPSPEED File Driver, then press the OK button.



Import a File Definition -4-

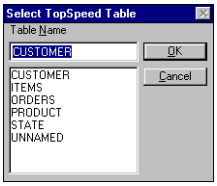
- ❏ In the Open TopSpeed File dialog, press the ellipsis (...) button, then choose \CWEVAL\TUTOR01\TUTORIAL.TPS in the file dialog which then appears. Then press the OK button to close the Open TopSpeed File dialog



Import a File Definition -5-

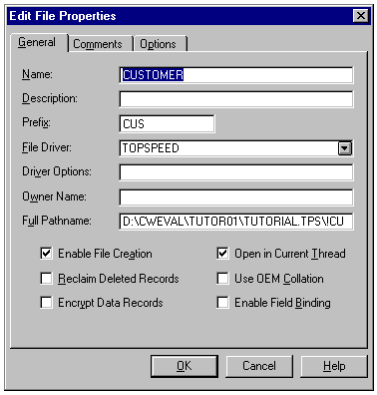
Since the file contains multiple tables, you need to specify the table you want.

- ❑ In the Select TopSpeed table dialog, choose Customer (it's the default, since it's the first table listed, and press the OK button.



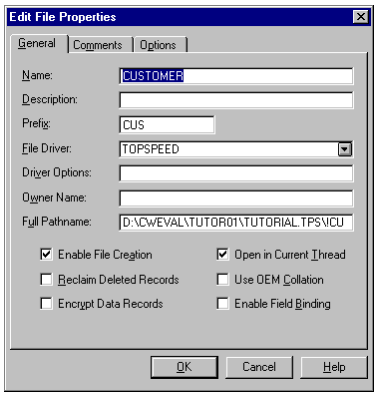
Import a File Definition -6-

The Edit File Properties dialog appears. It allows you to specify options for the FILE structure as a whole. In this case, the default options specify that the application should automatically create a new, empty file if none exists, and that each thread should have its own separate record buffer.



Import a File Definition -7-

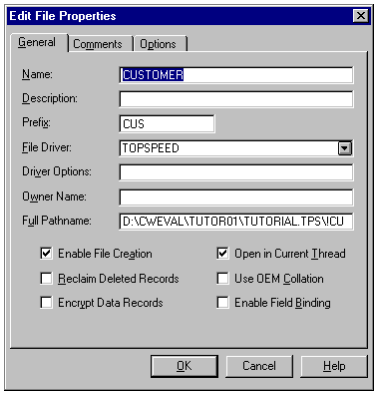
Also, for your convenience, the Comments tab provides a text box for notes; so when you're trying to remember how you designed your database six months down the road, you can read your own explanation!



Import a File Definition -8

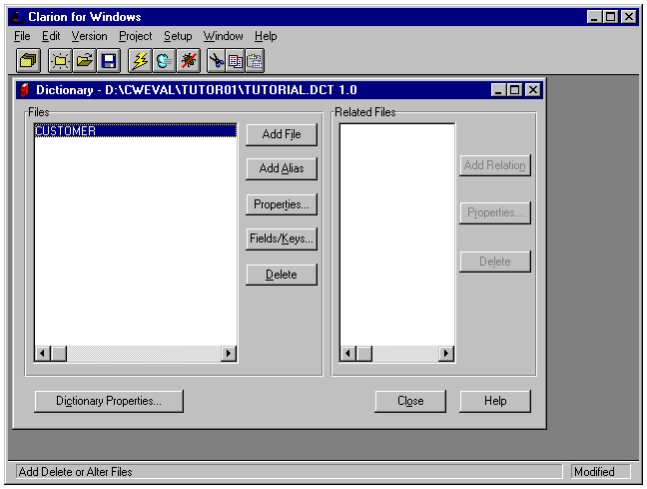
The dictionary editor also allows you to set checkpoints, so that you can "undo" a revision should you run into a problem.

- ❏ Press OK to close the Edit File Properties dialog.



The Dictionary So Far

So far, the dictionary holds one file definition. That includes all the field and key definitions.

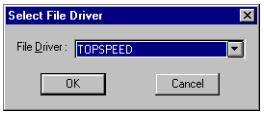


Import Second File Definition -1-

Next, you'll add a second, related file definition. It will be the Orders table, which is related to the Customer table by the customer number.

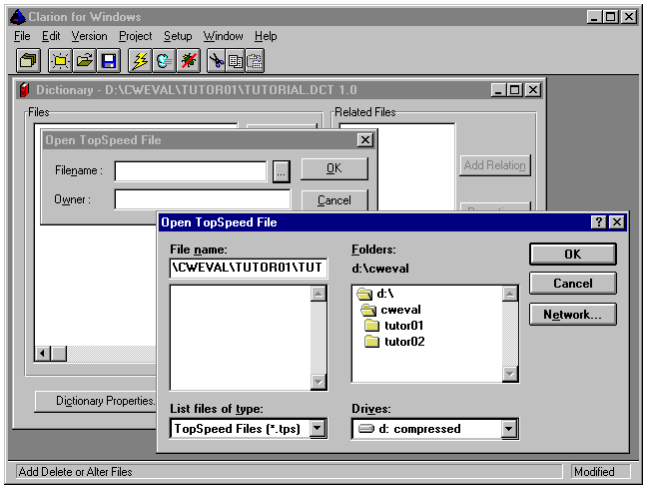
- ❑ From the development environment menu, choose File ➤ Import File.

- ❑ In the Select File Driver dialog, choose the TOPSPEED File Driver, then press the OK button.



Import Second File Definition -2-

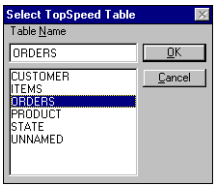
- ❑ In the Open TopSpeed File dialog, press the ellipsis (...) button, then choose \CWEVAL\TUTOR01\TUTORIAL.TPS in the file dialog which then appears. Then press the OK button to close the Open TopSpeed File dialog.



Import Second File Definition -3-

Since the file contains multiple tables, you need to specify the table you want.

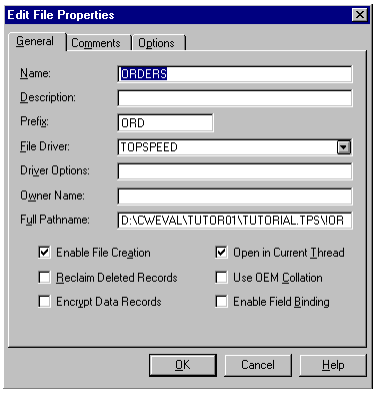
- ❏ In the Select TopSpeed table dialog, choose Orders, and press the OK button.



Import Second File Definition -4-

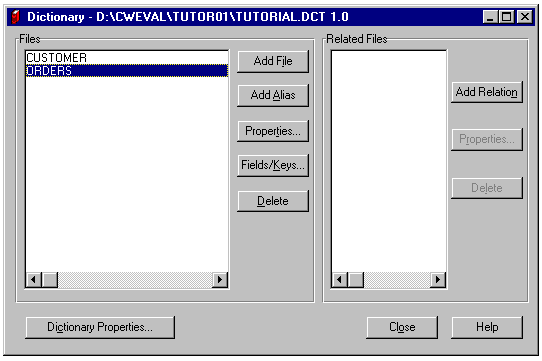
The Edit File Properties dialog appears. Accept the defaults for the Orders table.

- ❏ Press OK to close the Edit File Properties dialog.



The Dictionary So Far

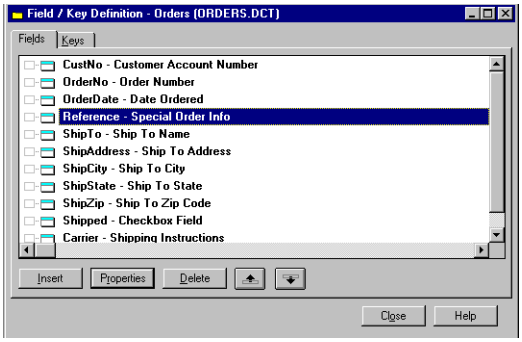
Now, the dictionary holds two file definitions. That includes all the field and key definitions.



Set Auto-Increase Keys -1-

Key attributes include primary, exclude null, and others. You'll set the customer number key to auto-number, which tells the Application Generator you want to generate code to auto-increment the key value for any new records added to the database.

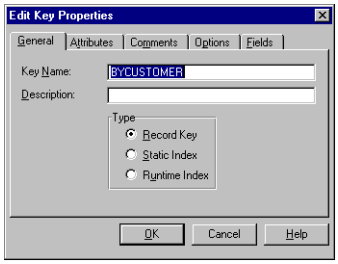
- ❏ With the Orders file selected, press the Field/Keys button, opening the Fields/Key Definition dialog.



Set Auto-Increase Keys -2-

- ❏ Select the Keys tab. The BYCUSTOMER key should be selected.

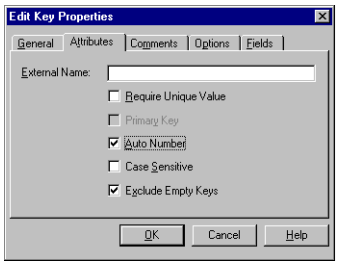
- ❏ Press the Properties button. The Edit Key Properties dialog appears.



Set Auto-Increase Keys -3-

- ❏ Select the Attributes tab in the Edit Key Properties dialog.

- ❏ Check the Auto Number box.



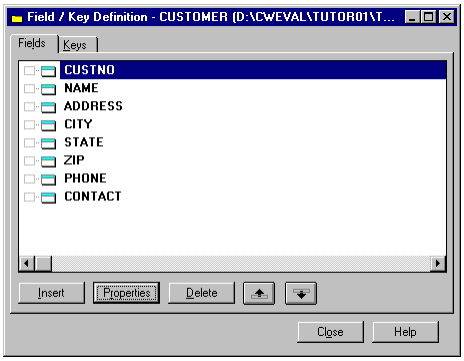
Set Auto-Increase Keys -4-

- ❏ Press the OK button to close the Edit Key Properties dialog.
- ❏ Press the Close button to close the Field/Key Definition dialog. This returns you to the Dictionary dialog.

Set Auto-Increase Keys -5-

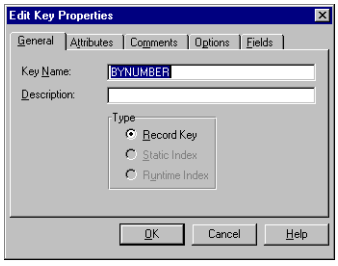
Now you need to set the Auto-Number attribute for the Customer file.

- ❏ Select the Customer file in the Dictionary dialog.
- ❏ Press the Fields/Keys button. This displays the Field/Key Definition dialog.



Set Auto-Increase Keys -6-

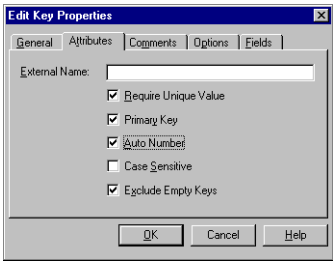
- ❏ Select the Keys tab. The BYNUMBER key should be selected.
- ❏ Press the Properties button. The Edit Key Properties dialog appears.



Set Auto-Increase Keys -7-

- ❏ Select the Attributes tab in the Edit Key Properties dialog.

❑ Check the Auto Number box.



Set Auto-Increase Keys -8-

❑ Press the OK button to close the Edit Key Properties dialog.

❑ Press the Close button to close the Field/Key Definition dialog. This returns you to the Dictionary dialog.

❑ Choose File ➤ Save, to save your work so far.

Pre-Formatting Controls

You can specify that a particular database field should always have a special control (such as an option box with radio buttons) or a special font and font style for an entry-type control. Since you can use a database dictionary to create many applications that maintain the same data, this not only saves time, but provides a common look and feel for the applications that maintain the same database.

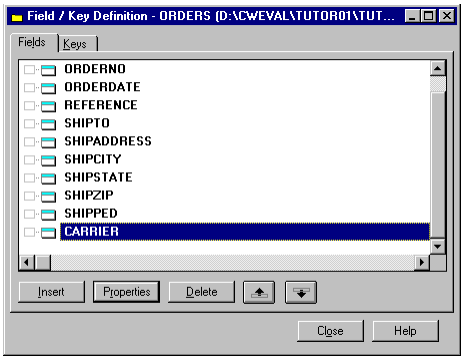
❑ Which development environment supports greater code reusability?
  ✓ Clarion. By storing application options in the database dictionary, you have a head start on all projects that reference the same database.

Pre-Formatting A Control

The Orders file has a field called Carrier, which holds a string value describing how the order should be shipped. We'll pre-define this field in the dictionary, so that the Application Wizard knows that we want to create radio buttons that offer the end user a choice of "Mail," "UPS," or "Other." We'll set the default value as "Mail."

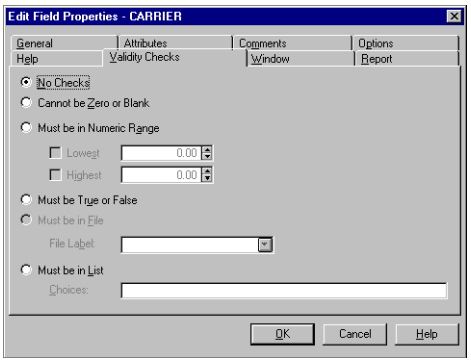
Pre-Formatting the Carrier Field -1-

- ❏ Select the Orders file in the Dictionary dialog.
- ❏ Press the Fields/Keys button. This displays the Field/Key Definition dialog.
- ❏ Select the Carrier field.



Pre-Formatting the Carrier Field -2-

- ❏ With the Carrier field selected, press the Properties button. The Edit Field Properties dialog appears. This is the dialog for storing all the information about a given field. The General tab sets the basic properties, including the field name and data type. This is a one-byte field.
- ❏ Click on the Validity Checks tab.



Pre-Formatting the Carrier Field -3-

You'll take advantage of a shortcut. When you define a list of allowable values in the Validity Checks, the Dictionary Editor automatically pre-formats the control as an option box with radio buttons.

Additionally, you'll take advantage of another feature to save space in the data file. For a one-byte field, your application will automatically store only the first character of the values you define in the list (of course, you must be sure that they're unique) in the data file.

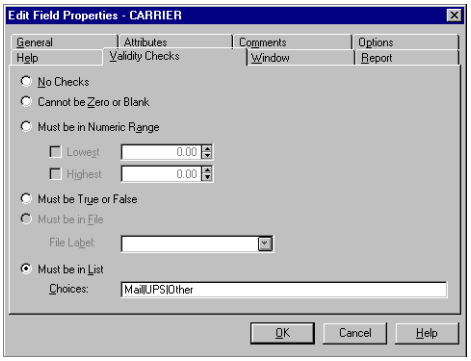
❑ Select the Must be in List radio button on the Validity Checks sheet.

Pre-Formatting the Carrier Field -4-

❑ Type the following in the Choices box, including the pipe symbols, which separate the valid choice values:

```
Mail|UPS|Other
```

"No selection" is a valid radio button choice, and the end user will see exactly that for each new record unless you specify otherwise. You **do** want to set a default value for the carrier type.

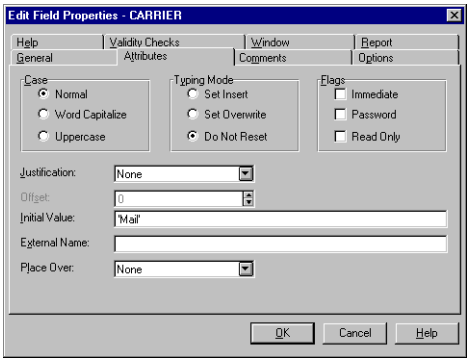


Pre-Formatting the Carrier Field -5-

❑ Click on the Attributes tab.

❑ Type the following in the Initial Values box. Be sure to enclose the word between single quotes:

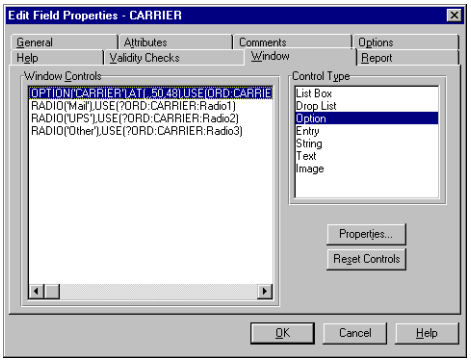
```
'Mail'
```



Pre-Formatting the Carrier Field -6-

❑ You'll just check your work. Click on the Window tab. This stores your control choices for the update form that the Application Wizard will generate for you.

It should look like the illustration.



Pre-Formatting the Carrier Field -7-

Notice that you could also have specified a drop down list box, or various other entry controls. If you were to press the Properties button on this sheet, you'd find additional options, such as the ability to specify the font, font size, and font style for the control. For now, don't change the options.

- ❑ Press the OK button to close the Edit Field Properties dialog.
- ❑ Press the Close button to close the Field/Key definition dialog.
- ❑ Choose File ➤ Save, to save your work so far.

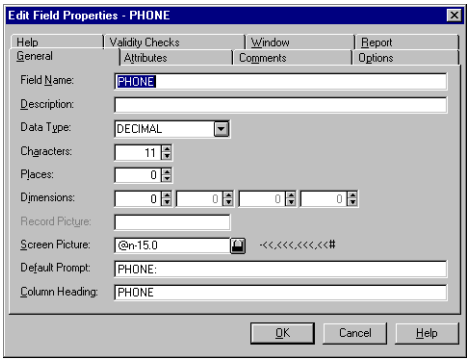
Pre-Formatting a Field Picture

A field picture formats a value for a window or report control. For example, you can store a long value in a database with a value of 2710 hex (10,000 decimal). A currency picture might format the value so that it appears in an entry control as $10,000.00, to cite only one example. A numeric picture could format it to appear as 10000, 10,000, or maybe even 00000000000000000000000010000, and others, depending on the format picture you choose.

You'll use a pattern picture to format a number stored in the phone field. In the data file, it's stored in the format 2125551212. You'll format it to appear to the end user as (212) 555-1212.

Pre-Formatting the Phone Field -1-

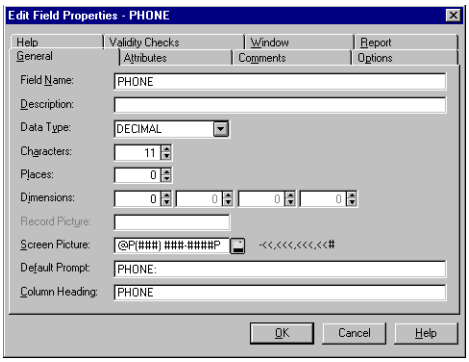
- ❑ Select the Customer file in the Dictionary dialog.
- ❑ Press the Fields/Keys button. This displays the Field/Key Definition dialog.
- ❑ Select the Phone field.



Pre-Formatting the Phone Field -2-

- ❑ With the Phone field selected, press the Properties button.
- ❑ Type the following in the Screen Picture edit box, on the General sheet. Don't forget the space after the area code parentheses.

```
@P(###) ###-####P
```



Pre-Formatting the Phone Field -3-

- ❑ Press the OK button to close the Edit Field Properties dialog.
- ❑ Press the Close button to close the Field/Key definition dialog.
- ❑ Choose File ➤ Save, to save your work so far.

Defining the File Relationship

For the two files used in this example, you'll only need to set one relationship. Customer is the parent, and Orders is the child (there may be one customer for many orders).

The following topics will define the relationship, and set the Referential Integrity constraints. Referential Integrity is the means by which the database relationships are maintained. Verifying unique values for the fields comprising the primary key, and excluding null values are part of this process. Cascading a key value change in a parent record to its related children, or deleting the child records when a parent is deleted are also part of the process.

Referential Integrity Constraints

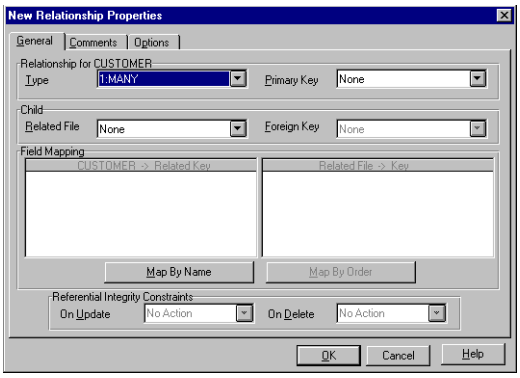
Clarion implements RI checks in the generated code. This allows you to support RI for **any** database. You can also specify no RI checks, and let the DBMS handle it for you, where applicable. This option is very convenient, for example, for a company with an older AS/400 database. The older software didn't support RI; so you can have your Clarion application generate the code. If you upgrade the DBMS software to a newer version in which the AS/400 **does** handle the RI, you simply "uncheck" the RI options in your Clarion app, regenerate, and recompile.

Referential Integrity Constraints

- ❏ Which development environment has the strongest data dictionary?
  - ✓ Clarion. It's flexible, and the development environment maintains live links between it and your application files. Your applications adapt as your business needs change. All you need to do is update the data dictionary, regenerate the application, and recompile.

Setting the Relationship -1-

- ❏ Select the Customer file in the Dictionary dialog.
- ❏ Press the Add Relation button. The New Relationship Properties dialog appears.



Setting the Relationship -2-

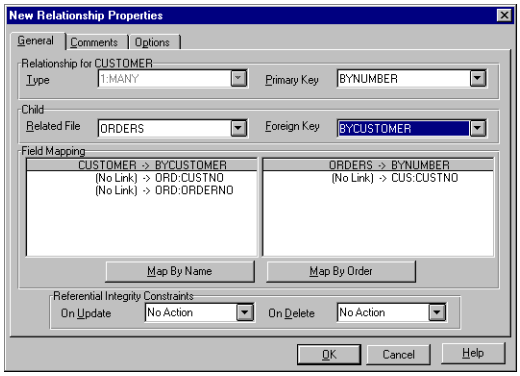
The Customer file appears at the top of the New Relationship Properties dialog.

- ❏ Select the BYNUMBER key in the Primary Key drop-down list.

- ❏ Select ORDERS in the Related File drop-down list.
- ❏ Select BYCUSTOMER from the Foreign Key drop-down list.

Setting the Relationship -3-

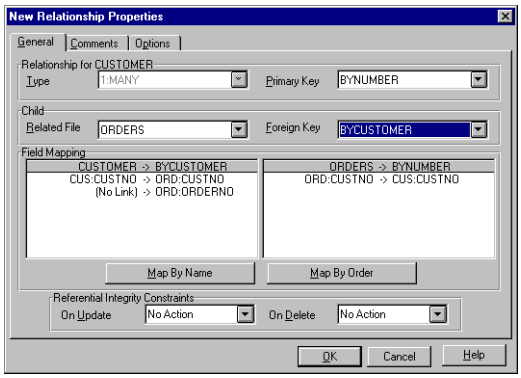
This is how the New Relationship Properties dialog looks so far.



Setting the Relationship -4-

The Orders file key has two components, while the Customer file key has one. You don't have to worry about it; the generated code will take care of everything for you.

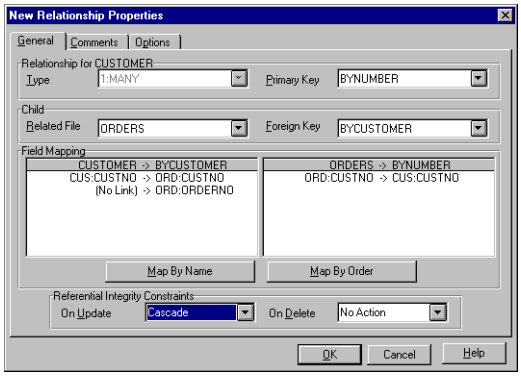
- ❏ Press the Map By Name button to define the relationship by field. This matches the customer number fields in the Customer and Orders tables.



Setting the Relationship -5-

Set the RI constraint options. You'll choose Cascade on Update. This would update child records when you update the key value for a parent record. In this case, if you change the customer number in the customer file, it would update the number in the Order file.

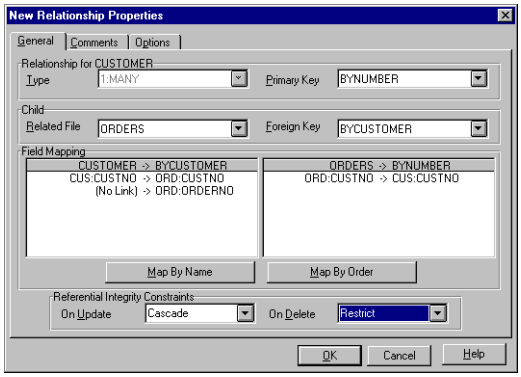
- ❏ Select Cascade from the On Update drop-down list.



Setting the Relationship -6-

You'll choose Restrict on Delete. This would disallow the deletion of a parent record if there are related children. In this case, if the end user attempts to delete a customer record with related orders, the application would disallow it.

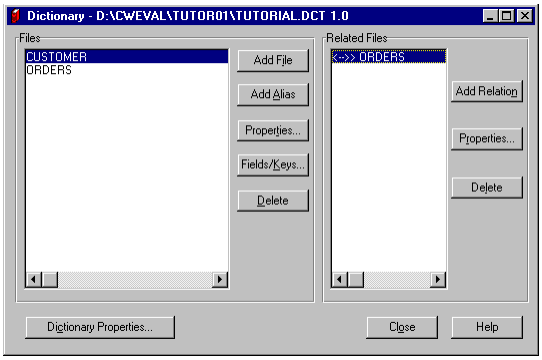
- ❑ Select Restrict from the On Delete drop-down list.



Close the Dictionary -1-

- ❑ Press the OK button to close the New Relationship Properties dialog.

You're done with the dictionary. You've imported definitions from existing data files, pre-formatted controls, and set RI options. The dictionary should look like this:



Close the Dictionary -2-

- ❏ Choose File ➤ Save, to save your dictionary.
- ❏ Press the Close button to close the Dictionary dialog.

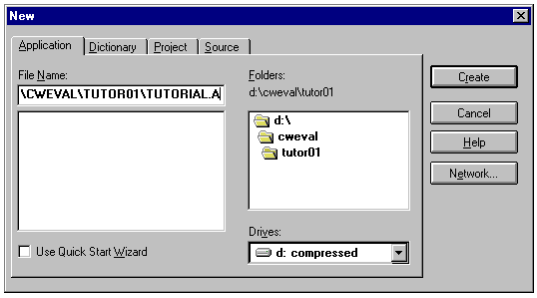
The Application Wizard

The Application Wizard will read your data dictionary and create an application for its maintenance. It will include browses for navigating the file, update forms, and reports.

- ❏ Choose File ➤ New from the development environment menu.
- ❏ If not already selected, click on the Application tab.

New Application

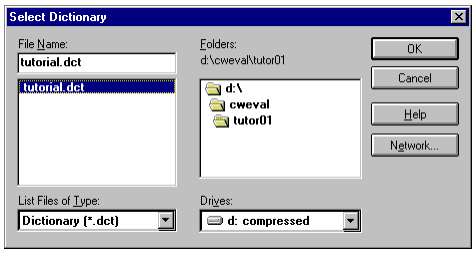
- ❏ Be sure that the Use Quick Start Wizard check box is **unchecked**. Quick Start is a convenience feature that lays out a data table quickly; but since we imported existing files, we don't need it for this example.
- ❏ Type \CWEVAL\TUTOR01\TUTORIAL.APP in the File Name box.
- ❏ Press the Create button.



The Application Properties Dialog -1-

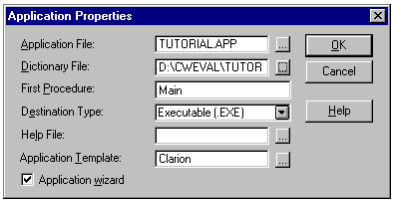
This dialog specifies the name of the .APP file, which stores your application description. You must specify the data dictionary name.

- ❏ First make sure the Application Wizard check box is **checked**.
- ❏ Press the ellipsis button (...) next to the Dictionary File box.
- ❏ Choose \CWEVAL\TUTOR01\TUTORIAL.DCT from the Select Dictionary dialog, then press the OK button to close the Select Dictionary dialog.



The Application Properties Dialog -2-

You're now ready to create your application file. The Application Properties dialog should look something like this.

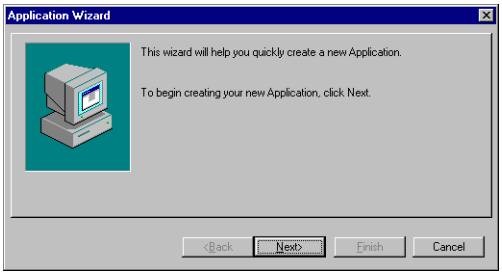


- ❏ Press the OK button.

The Application Wizard -1-

The Application Wizard appears. The first sheet is an "intro."

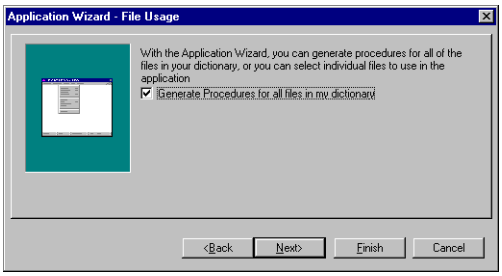
- ❏ Press the Next button.



The Application Wizard -2-

The second sheet asks you whether you want the Application Wizard to process all the files/tables in your dictionary; i.e., prepare a browse/form/report for each one.

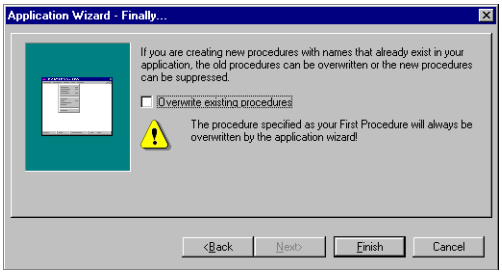
- ❏ Press the Next button; there are only two files in the dictionary, so you want to process them both.



The Application Wizard -3-

The third sheet asks whether you want the App Wizard to overwrite existing procedures in your application. This allows you to run the Application Wizard **after** you've done some work in an application. Unlike one-time-only, one-way wizards in other RAD tools, you can run Clarion wizards any time.

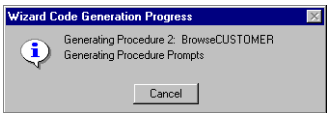
- ❏ Press the Finish button. You don't have to worry about anything here.



The Application Wizard -4-

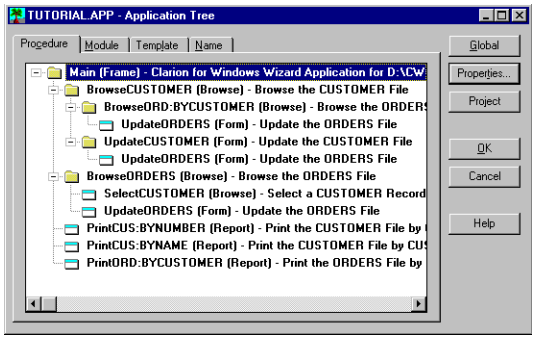
The Wizard Code Generation Progress appears. The Application Generator is reading your data dictionary, and choosing appropriate templates from the template registry.

- ❏ Can you create an application faster than with your current development tools?
  - ✓ Yes. You just created a complex application from scratch.



The Application Tree

Your application is ready. You now see the Clarion Application Tree. It's a logical procedure call tree. It organizes your project in a hierarchy of procedures. A window or a report structure can comprise a procedure. Likewise, a source code function can also be a procedure. You can see at a glance how everything is connected. It's hard to misplace your code (the Visual Basic "hidden behind a thousand doors" syndrome).



Project Settings -1-

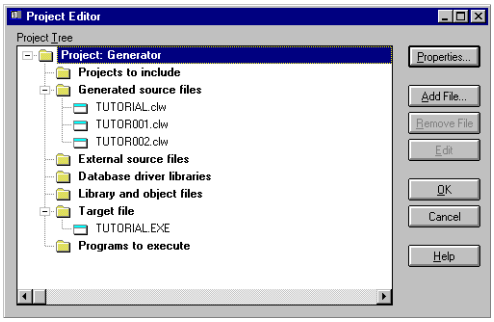
The default target Operating System for the compiler in the Evaluation Edition is 16-bit Windows 3.1. If you're using Windows 95 or Windows NT, we'll change it with a couple of clicks.

If you're using Windows 3.1, jump ahead five topics.

Project Settings -2-

- ❑ Press the Project button. The Project Editor dialog appears, with the top level folder selected. The Project System stores the various compile options and pragma.

- ❑ With the top level folder selected, press the Properties button in the Project Editor dialog.



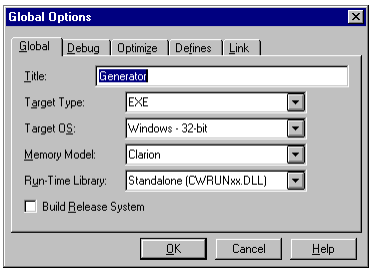
Target OS -1-

- ❑ In the Global Options dialog, choose Windows - 32 bit from the Target OS drop-down list. This specifies you want to compile an application to run on Windows 95 or Windows NT.

- ❑ The full edition of Clarion for Windows allows you to compile everything into one single executable file. The Evaluation Edition default—Standalone—requires that CWRUNxx.DLL be present when the end user runs your app. Your executables will dynamically link to many functions in the .DLL at runtime. This option is actually helpful for settings where you expect your end user to have many Clarion-created applications on the hard drive; it can literally save megabytes of disk space.

Target OS -2-

This is how the Global Options dialog should look:

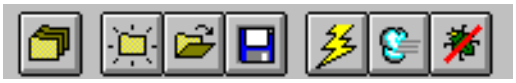


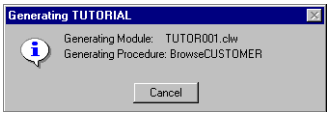
Get Ready to Compile

- ❑ Press the OK button to close the Global Options dialog.
- ❑ Press the OK button to close the Project Editor dialog.

Compile and Run -1-

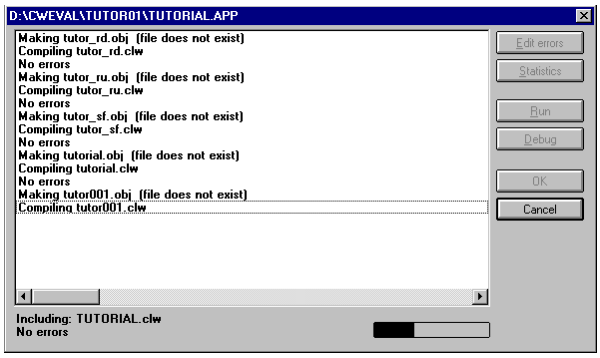
- ❑ Choose File ➤ Save to save your work so far.
- ❑ Press the Make & Run button (sixth tool bar button from the left on the toolbar). It's a blue puff of smoke because Clarion apps leave others in the dust. A progress window reports the progress of code generation.





Compiling

After the Application Generator generates the Clarion language source code, it's converted to an intermediate symbolic language, which in turn is sent to the back-end TopSpeed compiler, which compiles it into the executable.



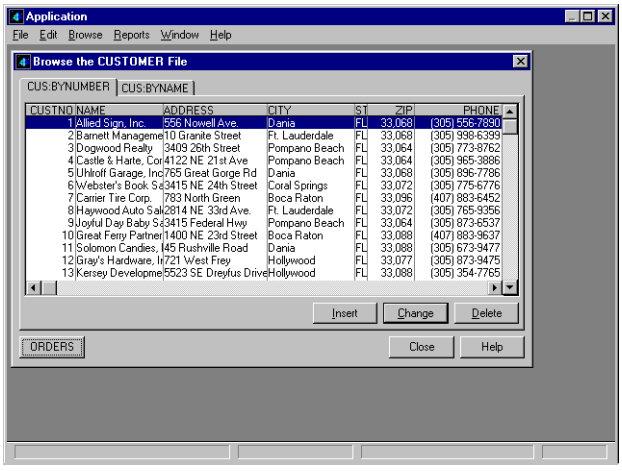
Running the App -1-

Your app should run once the compile process is over. (Note for Windows 95 users, just in case: if you receive a DDE timeout error, you need to make more memory available for disk swapping. The 32-bit compiler needs a lot of memory).

- ❏ Choose Browse ➤ Browse the Customer File from the menu. (Note: the Application Generator picks up the menu text from the description in the dictionary. You only scratched the surface of the pre-formatting options when you edited the dictionary.)

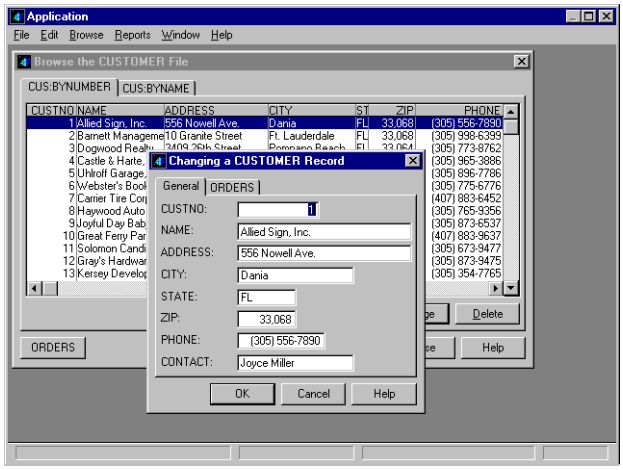
Running the App -2-

Note the formatting for the phone field reflects the pattern picture you stored in the dictionary.



Running the App -3-

- ❏ With customer number 1 selected, press the Change button. An update form for the Customer record appears.



Running the App -4-

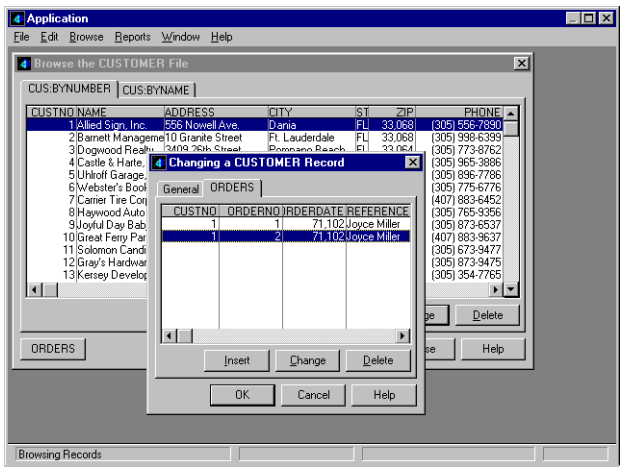
Note the zip code was formatted as ##,###. That's the default format for a decimal value. You could have specified a picture of @N05, which would have formatted it without the commas, and with leading zeroes. In the next exercise, you'll work with a dictionary with all fields pre-formatted. Additionally, descriptions are provided for files and keys, so that the menu items and tabs are also pre-formatted.

The code for this update form includes support for concurrency checking in a networked environment.

Running the App -5-

- ❑ Click on the ORDERS tab in the Changing a Customer Record dialog.

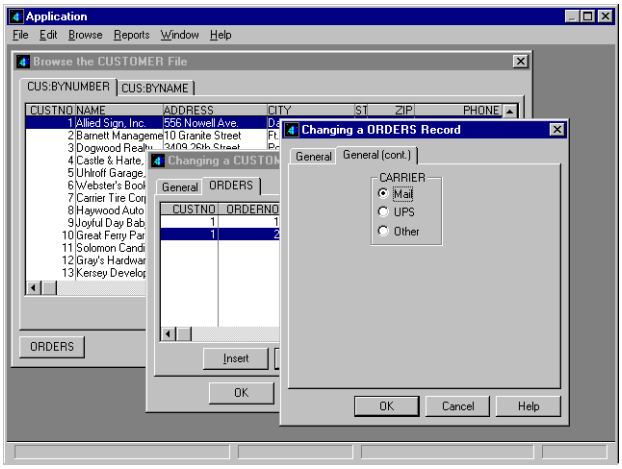
Notice that the Application Wizard automatically provided a listbox showing all the child order records for this customer record.



Running the App -6-

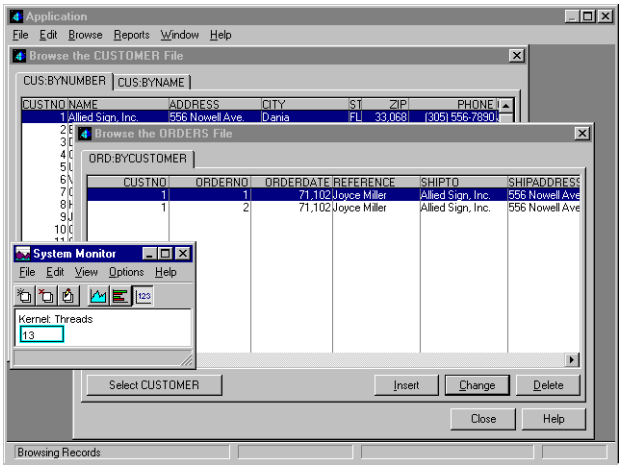
- ❑ With the Orders tab selected, press the Change button in the Changing a Customer Record dialog.

❑ Select the General (cont.) tab in the Changing a Orders Record dialog. Notice the option box and radio buttons for the Carrier field; that's the field you pre-formatted.



Running the App -7-

Continue experimenting with the application as you wish. If you set the target OS to 32-bit, you can run the System Performance Monitor to confirm that each browse opens a new thread.



Summary

To summarize, you've just created a multi-threaded app that maintains two related data files, providing visual "links" between them in the windows that the end user sees. You pre-formatted a couple of fields in the data dictionary; those options will migrate to any additional applications you develop from the same dictionary, so imagine how much work you save by preformatting all the fields that need it (e.g., the zip code field).

Where to Go From Here

You can either go on to the next exercise, or take a shot at creating an application from your own data files. Be sure to work with a copy of your database first, until you're more familiar with Clarion.

Do you have dBase or Clipper files? You can use the direct drivers. For Microsoft Access files, you can use an ODBC driver (note: you cannot use the Microsoft Office 4.x Access driver—it's designed **only** for use by Microsoft Office! Be sure your Access ODBC driver—ODBCJT16.DLL or ODBCJT32.DLL—is version 2.00.23.17 or higher. Select the driver in File Manager or Explorer and choose File/Properties).

The Next Exercise

The next part of the exercise takes a dictionary with more extensive formatting (based on these two tables, plus the others from the same database), and introduces you to the template interface. You'll customize some of the windows that the Application Wizard creates for you, adding even more functionality.

Final Note

- ❏ Which development environment gives you the overall speed and flexibility you need to create the best solutions to a wide array of your end users' needs?
  - ✓ Clarion. You can immediately create an application to manage a database with an unlimited number of tables, just from this short introduction. Remember that we suggest you work with a copy of your data, until you learn a little more about Clarion, or better still, go on to exercise two!