

EXHIBIT A
PART 2 OF 2

The Description

The case description is a critical paragraph of text that forms the basis for the first search from the Search Panel. The object is to write a sentence or short paragraph that describes the symptoms of the problem, or the characteristics of the case, as the operator is likely to phrase them. For instance, here are two examples:

"The toast always comes out too dark."

"Concrete hydro-electric dam anchored in basalt."

CBR Express simply ignores most of the general "filler" words used in descriptions, such as most articles, prepositions and verbs of being (the *ignored words*). It also strips off most punctuation and suffixes, reducing the amount of data to process during the search. Think of the two descriptions written above. When *CBR Express* reads them, it concentrates on the parts with the greatest meaning:

"Toast dark"

"Concrete hydro electr dam anchor basalt"

As you can see, it is important to write accurate, precise descriptions.

One lesson we have learned in using *CBR Express* for various types of applications is that it is important to make the description *complete*. It should contain *all* of the pertinent information about the case. This greatly aids initial searches, and searches by expert operators. The case's questions, discussed below, may repeat some of this information for the guidance of less expert users.

The matching algorithm will score the operator's search description based on how much of the search description is contained within the case description. For instance, the search description,

"Rumbling noise."

will provide a perfect match against the case description:

"Worn bearings make *rumbling* or rattling noise."

If all of the parts of the search description appears within the case description (after correcting for ignored words), *CBR Express* concludes that the two descriptions are "exactly" similar.

The only thing you can do wrong in writing a case description is to load it with obscure terms that the operator doesn't know. This is not a problem for systems where the operator will be a domain expert, but since the purpose of a CBR system is frequently to distribute expert knowledge to non-experts, it is appropriate for the case-base author to be cautious about this issue. You can cure this either by converting the description into lay language, or by establishing a standard vocabulary for descriptions and training the operators to use it.

Selecting Questions

We add questions to a case description to confirm various aspects of the case. Often these questions just *repeat and verify the case description*. Questions may also be used to rule out cases, or to confirm them absolutely.

The first role of the questions is to confirm characteristics of the case already mentioned in the case description. "Do the lights come on?" "Is the bread burned?" "Is this a reinforced concrete structure?" "Is it a TTL dual inline pin chip?"

The second purpose of the questions is to guide the operator into a dialog that elicits more exact information. We may know that the car won't start, but "Are the headlights bright?" The customer may have to go check. "Is the AFC light on?" "Is the structure over 100 feet tall?" These questions probe for information the operator may not have mentioned in the initial description.

This second category of questions frequently requires some additional explanation. *CBR Express* lets you write a paragraph (or more) to explain each question and how to answer it. The operator can browse this additional information from the Search Panel if faced by an unfamiliar question. For instance, if the question says, "Is there gas in the car?" most people would know how to check the fuel level. If the question says, "Is there gas in the airplane?"

most people would need some instructions before proceeding. For the question, "Does the beetle have a spatulate aedeagus?" most people would need to see a *picture*. Through graphic browsing of external ToolBook files, *CBR Express* supports this option, too.



Warning: *Questions must be useful!* If a question does not help locate cases, discard it. It is tempting to load up the case description with questions and answers that really just display miscellaneous information about the case, but are not very useful in a search. One way to recognize these questions is to observe that the search operator avoids answering them, usually because he or she doesn't know how to answer, or just doesn't care. If the search operator repeatedly avoids answering a question, consider removing it. Questions that do not assist the search are just in the way.



Warning: It is absolutely essential to *reuse* questions in multiple cases rather than create multiple instances of the same or similar questions and use them in one case each. It is very beneficial to design a questioning strategy ahead of time, and adhere to it while creating cases. See *Designing CBR Express Case Bases* for more information on question design.

Question Types *CBR Express* supports four types of answers to questions: Yes or No, Numeric, Text, and List. The type of answer determines how *CBR Express* will score them against cases.

- **Yes/No** questions may be answered Yes, No, and Not Answered. These are the most generally-useful type of question.
- **List** questions are selected from a scrolling list of legal answers. These, too, are widely used in most case bases.

- **Numeric** questions have answers that may be positive or negative integers and floating-point numbers, and occur within a specific range between upper and lower limits.
- **Text** questions accommodate text input of unrestricted length.

If a question is defined as having a "Yes/No" answer or a list answer, *CBR Express* conducts a simple string match of the answer against the cases in the case base. If the search answer agrees with the case answer, *CBR Express* raises the case's score. If not, the score of the case may be reduced. The comparison is not case-sensitive.

For a text answer, *CBR Express* bases the matching score on the number of words in the search answer that appear in the case answer. If all of the search words also occur in the case, full credit is given. If half of the search words occur in the case's answer, half credit is given, and so on.

Matching on numeric answers is a very special feature. Should the number 9 be scored as "similar" to the number 10? Sometimes it would be, but not always. For instance, if the range of legal values for the question was 0 to 100, then it's reasonable to score 9 as being very close to 10. On the other hand, if the legal range is 9 to 10, the two numbers are as far apart as they can possibly be. *CBR Express* treats the legal range (the spread from the maximum to the minimum legal value) as 100% of the possible spread. If the search value falls within 10% of the case value, some credit is awarded to the matching score. The score is proportional to the distance between the two numbers. An exact match gets full credit. A complete miss lowers the score of the case.

Special Scoring *CBR Express* permits the case-base author to assign special scoring behaviors to individual cases and to the case base in general. In particular, the search operator should be aware of effects caused by *mismatch weight* and *absolute scoring*.

The purpose of *mismatch weight* is to penalize the score of cases that contradict answers in the search description. *CBR Express* encourages the use of mismatch weights for Yes/No and Numeric questions, so you will see case scores

diminish when you answer questions in ways that contradict particular cases.

The features mentioned above are applied to the case base as a whole. *Absolute scoring*, on the other hand, is applied to individual questions within particular cases. The case-base author may declare that a correct answer to *this* question in *this* case absolutely confirms that the case should be selected. You'll see the case's score jump up to 100. Alternately, the case-base author may declare that a wrong answer to a particular question should absolutely disqualify the case. The case's score plummets to zero.

The search operator has no direct interaction with these features, all of which are under the control of the case-base author.

Automatic Question Answering

When you search a case base using *CasePoint*, you may discover that some of the questions are being answered automatically. *CasePoint* supports the use of *rules* to copy information from the search description into the answers of particular questions. Rules can also make deductions about answers based on logical implications between one question and another. (If the power is off, then we know for a fact that the lamp is out.)

See our manual, *Adding Rules to CasePoint*, for more information on this powerful feature.

Actions

What is an action, then? In the context of a help-desk application, an action is a solution to the problem. "Set the toaster to *toast* instead of *broil*." "Put the gear shift in the *park* position and try again." "Plug in the power cord." "Send the unit in for repair."

In the context of a more general application, an "action" may be thought of as a convenient data record that associates additional information with the case. For instance, in the ADHESIVE case base supplied with *CBR Express*, "Zap-a-Gap" is an instance of the class of adhesives represented by the case "Superglue." Superglue is represented by a case,

and additional information about products in the "Superglue family" is stored as actions attached to that case.

Note that many of the actions are not really case-specific. Cases may share actions. For instance, "Send the unit in for repair" is an action that might apply to any number of cases. In *CBR Express* you can define the action once and reuse it as necessary.

If an action would require any special knowledge (the address to send the unit for repair), you may add this information to the action for the operator to browse as needed. As before, *CBR Express* also permits graphic browsing of action procedures via external ToolBook pages.

Other than that, there is little to know about actions. They are much easier to define than questions. The actions are the output of the *CBR Express* system, and are not used in case matching.



Warning: *CBR Express* assumes that an action represents a *complete plan or procedure*. If a case has multiple actions, therefore, they should be interpreted as alternative solutions to the problem, and not as steps of a single solution.

Consider a case base where the cases represent dietary programs (no-salt, low-fat, etc) and the actions represent recipes. Each action should be a complete recipe, not an ingredient of a recipe. That way the case-base search can produce a list of recipes from which the user may select one or more. If the actions were to represent individual ingredients, then a case-base search might return an action list that *inappropriately combines ingredients from multiple recipes*.

If you search for *mousse*, you'd rather get a choice between chocolate mousse and salmon mousse, not a combination of the two.

Routine Case Definition

The *CBR Express* interface was designed to ease the day-to-day task of case definition and maintenance. After the first few hours, the case-base author is likely to be building cases predominantly by recombining existing questions and actions, rather than by defining a whole set of new questions for each case. In this environment, building a case definition becomes a rapid point-and-click operation. Just name the case, write a description, click on the questions you want, answer them, click on the actions you want, and save the case. It is possible to build significant cases in only a minute or two.

When starting a new case base, however, there are few questions and actions to draw upon. This presents the case-base author with a choice of styles. *CBR Express* allows you to define your lists of questions and actions before building a case, which is the simplest procedure. You may also go straight to the Case Panel and start building your first case. *CBR Express* allows you to make brief excursions to the Question Panel and the Action Panel as needed, returning you to the Case Panel and automatically inserting the newly created question or action into the case definition.

Defining the First Case

In this section we provide a step-by-step procedure for defining a sample case. The case we have in mind is very simple, but it covers all of the points required to build an initial case of any size.

Getting Ready

Start up *CBR Express*. Use the Options menu to switch to Maintenance Mode.

Now use the **File** menu to create a new case base file. The procedures for creating new databases differ depending on whether you are using RDM database support or one of the SQL databases. Please refer to page 28 for a discussion of this subject.

Questions:	Add...	New >	Edit >	Move	Remove	Answers:	Scoring:
Are you having print quality problems?						Yes	
What does the print quality look like?						White streaks.	
Where did you buy this printer?						Retail source u...	
How many jams to you have in a run of 20 pages?						10	

Actions:	Add...	New >	Edit >	Move	Remove
Return printer to the factory for repairs.					

Case Panel

Title and Description

The first task is to name the case. Try to use a brief, descriptive label that uniquely identifies the case. "Power cord unplugged." "False colors on screen." Titles like "User Error No. 7" are sometimes tempting, but are not helpful. Try to put enough information in the case title that the operator will not be forced to browse the case in order to recognize it on the Search Panel.

To enter the case title, just click the mouse on the **Title** field to create a text cursor there.⁹ Then type the case name. If you would like to follow along with us, type:

⁹ Tab and Shift-Tab are also available for moving among fields and buttons.

Cartridge low on toner causes white streaks.

As you see, we are going to create a diagnostic case for a printer or dry copier. The next step is to write the case description. Again, just click the mouse on the Description field to enter it and begin editing. Guidelines about how to write a good description were presented earlier in this chapter. For our sample case, use this description:

Faded area or faded block of vertical white streaks.

Once the description is ready, it's time to create the questions. We are going to create four of them, one for each answer type.

First Questions Look at the five buttons along the top of the Questions field. These are the controls for adding, browsing, deleting and rearranging questions. Since there are no existing questions, we cannot Add . . . them from a list. Click on the New > button instead. This will shift us to the Question Panel.

Question Panel

Yes/No Question: On the Question Panel, type in the text of the question in the Question field. Just click once on the field and type. For our example, type:

Are you having print quality problems?

Optionally, you may define some additional text for the operator to browse, or even specify a remote ToolBook and

page to browse for information about the question. This is the purpose of the Additional Information area of the Question Panel.

Notice that the Type of Answer section contains radio buttons, and the default is Yes or No. We'll just leave the other controls at their default settings in order to create a default "Yes or No" question.

Now click the mouse on the Save > button at the bottom of the screen.¹⁰ Clicking on this button has three results. First, *CBR Express* saves the question in the case base. Second, it shifts us back to the Case Panel. Third, it brings the new question along and inserts it into the Questions field of the case definition.

When a new question appears in the Questions field, the corresponding answer is always Not Answered. This answer is automatically highlighted for you. To answer it, just type Y for yes or N for no. In this case, we recommend Y. Alternately, you may press the Return key to answer the question using a dialog box like this one:

The dialog box has a title bar that says "Yes/No Question". Inside the box, the question "Are you having print quality problems?" is displayed on the left. To the right of the question are four buttons stacked vertically: "Yes", "No", "Not Answered", and "Cancel". The "Not Answered" button is currently selected, indicated by a dark background.

Yes or No Dialog Box

¹⁰ An important tip: When you see a button with ellipses (...), clicking on the button will produce a dialog box. If the button has a greater-than sign (>), clicking on it will shift to another *CBR Express* panel, as in this case.

Our first question definition is now complete. Let's try another.

List Question: Now let's create a multiple-choice question. Click on the New > button again to go back to the Question Panel.

This time type in the question:

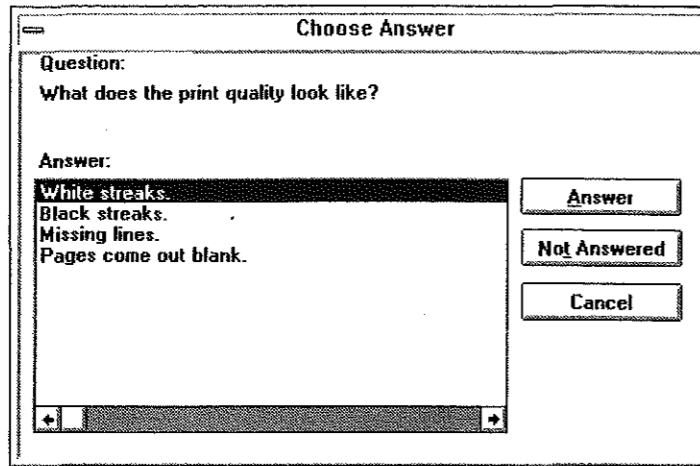
What does the print quality look like?

We will set up this question with a list of legal answers. The user will be restricted to using answers from this list.

First click the mouse on the List radio button. This button enables the adjacent scrolling text field. You may type a list of multiple-word answers in this box, using the normal editing techniques (such as cutting and pasting from the Edit menu). For our introductory lesson, type in a few print quality descriptions, such as:

White streaks.
Black streaks.
Missing lines.
Pages come out blank.

Finally, click the mouse on the Save > button or just press the control-S accelerator key. This will take you back into the Case Panel, with your new question on the second line of the Questions field.



List Answer Dialog Box

Naturally the new question has no answer yet. Since the answer field is automatically highlighted for you, simply press the Enter key. This brings up the Text Question dialog box with your list of legal answers in it. Click on one of them and press the Answer button. If it should happen that the list of answers is very long, note that you can type the first letter of the answer you desire and the box will automatically scroll to that portion of the list.

That's all there is to defining a multiple-choice question.

Text Question: Click the mouse on the New > button above the Questions field. This shifts us back to the Question Panel again.

Type in the question text as before. The new question is:

Where did you buy this printer?

A text question is useful where the user's response cannot be fully anticipated or rigidly typed. We might have cases in the case base that respond to problems from particular distributors (think of warranty or refund policies), but the customer might respond with the name of a retail outlet unknown to the system. The text question lets us gather the input and try it. If it doesn't match, there is no harm done.

To create a text-type question, click the mouse on the Text radio button at the lower left of the panel. That's all it takes. Then click the mouse on the Save > button at the bottom of the screen.

The new question will automatically appear in the Questions field of the case definition. To answer it, click the mouse on the Not Answered label. CBR Express will pop up a text input dialog box. Just type in your answer. For our example, type:

Retail source unknown.

Press the Enter key to dismiss the box. CBR Express will put the first two or three words of the answer on the appropriate line of the answer field. To reopen the answer for further editing, just click on it.

Text Input Dialog Box

Numeric Question: The last type of question has a numeric answer. This requires a little additional information to define.

Click on the **New >** button to move to the Question Panel. The text of the fourth question is:

How many jams do you have in a run of 20 pages?

Click the mouse on the **Numeric** radio button. This enables nearby fields for entering the minimum and maximum legal values for the answer. These values are required in order for *CBR Express* to perform similarity matching on numbers. For this question the legal range of values is:

Min: 0
Max: 20

These limits will be enforced by the Numeric Input dialog box, and they form the basis for estimating the similarity of numeric values applied to this question. Be sure to set them correctly.

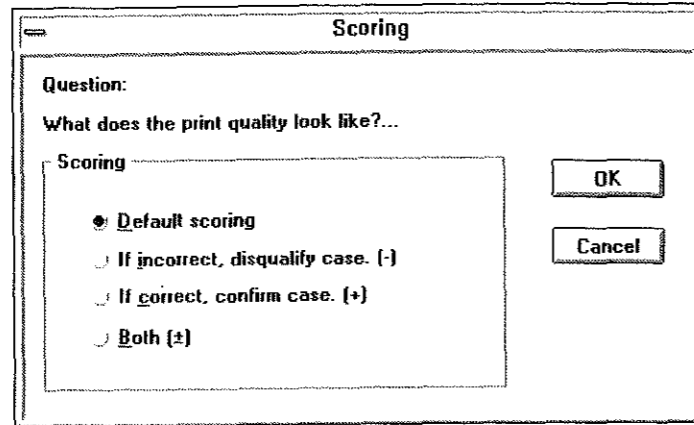
To finish, click on the **Save >** button again to save the question and take it back to the Case Panel.

To answer the new question, just click on **Not Answered** as you did before. *CBR Express* will pop up a numeric input dialog box for you to type the number in. For our example, use "10." Click on the **Answer** button to dismiss the box.

Numeric Input Dialog Box

Absolute Scoring

The narrow column at the left edge of the **Answers** field of the Case Panel is for applying *absolute scoring* behavior to individual questions within a particular case. To apply absolute scoring to a question, simply add the question to the case, answer the question, and then click the mouse on the "Scoring:" column next to the answer. You will see this dialog box:



The Scoring Dialog Box

This box permits you to assign a special scoring algorithm to a question. The options are:

- **Default scoring:** Normal *CBR Express* feature scoring.
- **Elimination scoring (-):** If the user's answer to this question does not match the answer in the case, the case will be eliminated from contention. (Its score is set to zero.)
- **Confirmation scoring (+):** If the user's answer to this question is the same as the answer in the case, the case will be immediately selected. (Its score will be set to 100.)
- **Both (+) and (-):** Answering the question will either immediately confirm or immediately eliminate the case.

Absolute scoring is discussed in several parts of Chapter 6, and is considered an advanced tool for case-base design and optimization.

Standard Question Order

Users of *CBR Express* frequently wish to exert some control over the order of the questions presented on the Search Panel. *CBR Express* presents the Search Panel questions in a standard order. In *CasePoint* you also have the option to employ *strata* ordering, described in the next subsection.

In standard ordering, *CBR Express* combines the questions of the five best cases into one list on the Search Panel. The questions from the best-matching case are displayed at the top of the list, presented in the same order as they appear in the case definition.

The questions from the second-best case are then appended to the list, and so on, but duplicate questions are suppressed. In this fashion, the most important questions are generally at the top of the list, and the importance of the questions diminishes as one travels farther down the list.

If the order of the first few questions is critical, note that the Case Panel permits re-ordering the questions in a case definition. The procedure is very simple:

1. Click the mouse on the question you wish to move.
2. Click the mouse on the Move button above the Question field.
3. Click the mouse on the line of the field where you wish the question to go.

Strata Question Ordering

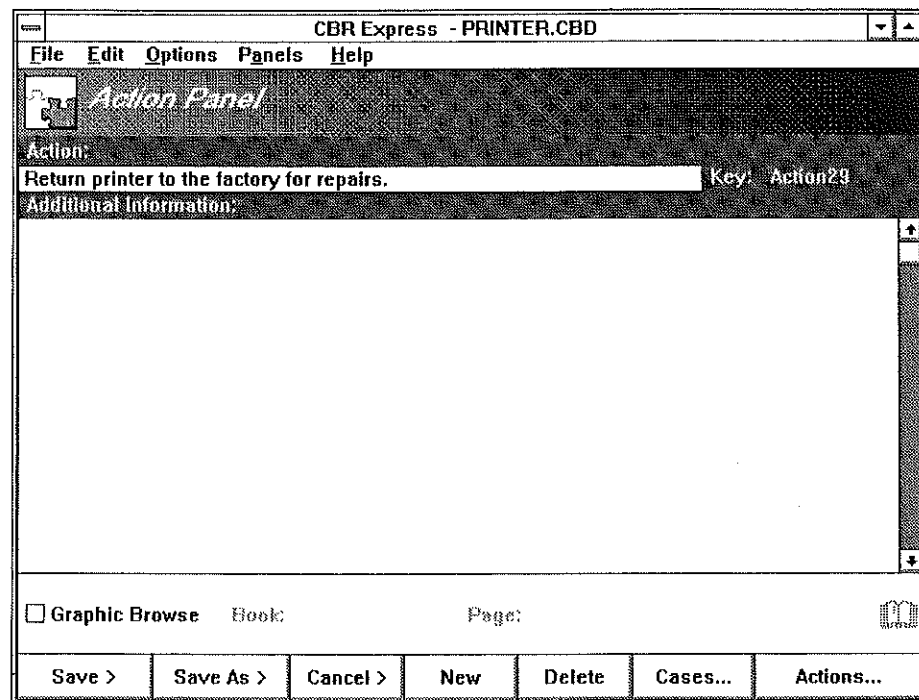
In addition to the standard question ordering encountered on the *CBR Express* Search Panel, *CasePoint* also offers "strata" ordering as an option.

In strata ordering, *CasePoint* examines the questions of the matching cases and reorders them based on how pertinent they seem to be. Instead of ranking the questions strictly by case score, the ranking is determined by a combination of case score and the number of matching cases that contain the question. That way a question present in three out of five matching cases may go to the top of the list even if it does not appear in the best-matching case.

In a sense, strata ordering lets the cases vote on which question is the most important one to answer next.

For the case-base author there are no special considerations about ordering questions for strata retrieval. The strata search works with any kind of case base, regardless of how the questions have been arranged inside the cases.

Strata question ordering is not available on the *CBR Express* Search Panel.



Action Panel

First Actions

Actions are easy to define. The procedure is similar to that for defining new questions, but there is less to do.

To create a new action for your case definition, go down to the **Actions** field and click on the **New >** button at the top

margin of the field. This button takes you to the Action Panel.

We are defining a case where print quality is poor, the paper does not jam, and the retail dealer is unknown. This might be an appropriate action for such a case:

Return printer to the factory for repairs.

Then press the **Save >** button. There is nothing else to do.

At this point you should be back in the Case Panel, looking at a complete case definition with four questions and one action.

Saving the New Case

Once the case definition is complete, click the mouse on the **Save** button at the lower left corner of the Case Panel. It takes a few seconds to update the case-base file and to index the case into *CBR Express's* matching mechanism. The message field at the top of the screen will inform you when the case has been saved.

Defining a Similar Case

It is very convenient to be able to use one case as a template for creating another. *CBR Express* offers a simple mechanism for stamping out a series of similar cases. Let's use our initial case to quickly create a second, similar case.

If the initial case definition is no longer on display in the Case Panel, click on the **Cases . . .** button at the lower right of the panel. This pops up a Case List dialog box containing the names of all defined cases. Double-click on the title of our initial case to load it into the Case Panel. When the case has loaded, notice that the **Key** field in the upper left corner contains a unique token that identifies this case to *CBR*

Express. If you are following our directions for this exercise, this field will read "Case1."¹¹

Now make some minor modifications to the case. *Change the name*. Alter one or two answers. Note that one does not usually change the description when making a "similar" case. You may, but similar cases really ought to have similar descriptions.

To save the altered definition, simply click the mouse on the *Save* button or press the control-S accelerator key. *CBR Express* will notice that you have changed the title of the case, and will present a dialog box asking you whether you intend to modify the original case, or to create a new one. Just click the mouse on the appropriate button.

Defining Subsequent Cases

Once the case-base author has built up a certain stock of questions and actions, the task of defining a case speeds up and becomes more streamlined. Let's define one more case, using existing questions and actions.

Click on the *New* button at the bottom of the Case Panel to clear the fields. Now type in:

This is a point-and-click case.

as the title of the case. The description might be:

This case is built of questions and actions selected from lists.

To select the questions, click the mouse on the *Add...* button at the top margin of the *Question* field. This will

¹¹ Do not be concerned if the field displays some other number. The case key is not of great importance.

pop up a browse dialog box containing the list of defined questions. Click the mouse once on *each* of the questions you wish to include in the case. Then click on the *OK* button. This will dismiss the browse box and import the selected questions into the case.

Be sure to answer the questions. A case with unanswered questions doesn't make much sense.

Now click on the *Add...* button at the top margin of the *Action* field. This will bring back the browse box, but with the list of actions on display. Double-click on an action to select it and dismiss the box. (Selecting multiple actions is also permitted.)

Now you have a case definition that is all ready to save. Go ahead and click on the *Save* button.

Question Weight

You may have noticed that we did not ask you to alter the *Question Weight* fields on the *Question Panel*. For most questions, the default values are appropriate and do not need to be changed.

The interaction of the match and mismatch weights of a question with those of the other questions in a particular case is complex, and lies beyond the scope of this guide. Speaking in general terms, however, the *match weight* of a question influences the relative importance of the question in determining a case's score. If all of the questions in a case have the same match weight, then they will all contribute equally to the score of that case. If one question has a much higher match weight than the others, then it will tend to dominate the scoring process.

The *mismatch weight* influences the score of cases where the question does *not* match. It is intended as a penalty, and we find that it works best when the mismatch weight is

set to a small fraction of the match weight. For instance, the default values are match weight 10, mismatch weight 2.

Be advised that the importance of the case descriptions can be adjusted, too. If you wish to make your descriptions either more or less important to the overall scoring, you may set the percentage contribution of the descriptions on the Case Base Options... dialog box.

The case-base author is advised to leave these weights at their default settings except in circumstances where a special matching behavior is clearly indicated. The default settings have been selected to produce the most intuitive behavior for the comfort of new users.

Case Status

Each case has a status, which you may set from a drop-down list in the upper right corner of the Case Panel. There are four status values:

- **Active:** An "active" case is part of the "living" case base. It is indexed and in use.
- **Unresolved:** An "unresolved" case is one inserted into the case base by the Unresolved Search mechanism of the *CBR Express* Search Panel or *CasePoint*. These cases are not indexed, and are just waiting for the case-base author to process them.
- **Archive:** An "archived" case is presumed to be obsolete. It is not indexed, and therefore cannot be retrieved by a case-base search.
- **Draft:** A "draft" case is a new case that is not finished yet. Sometimes the case-base author will be interrupted in the middle of creating a new case. The case may be marked "draft" and saved in an incomplete state. It will not be indexed until it is subsequently changed to "active" status and saved again.

The list of cases may be partitioned by status in two ways. The Case Base Report feature (in the File menu) lets you output a file of case definitions belonging to a particular status category or combination of categories. Also, from the Case Panel you can click the mouse on the Cases button to get the Case List dialog box. This list may be filtered to show all cases, active cases only, unresolved cases only, archived cases only, or draft cases only.

Testing the Case

Before saving a typical case, it is wise to test it against the existing cases in the case base. The new case might be nearly identical to a previous case. *CBR Express* provides a simple facility for checking this possibility.

To test a case definition, either before or after saving it, simply click the mouse on the Test Case > button at the bottom of the Case Panel. This button copies the case title, description, questions and answers from the Case Panel to the Search Panel. It automatically sets up the Search Panel to display matching cases (rather than actions) and initiates a search. This procedure quickly identifies the most similar case to the one in the Case Panel.

To return to the Case Panel, click on the End Search > button.

If you want to save the new case, be sure to do so after returning to the Case Panel.

Handling Unresolved Searches

The fastest way to identify cases that your application cannot handle is to actually put the system into use. Unsatisfactory

searches can be stored for later review by using the **Unresolved Search** button on the Search Panel.

Unresolved searches are stored in one of two ways, at the discretion of the case-base author:

- As unindexed cases in the case base.
- As entries in a local text file.

These options are set from the **Set Case Base Options...** dialog box.

Set Case Base Options Dialog Box

Storing the unresolved searches in the case base is the most convenient and streamlined approach. It does require, however, that the search operators are networked to one central set of case base files. If several operators start saving unresolved searches into their individual copies of the case base, it becomes very difficult to collate the individual entries into a central source.

The second option, storing the unresolved searches in a local text file, covers the possibility that some of your search operators are not networked with the primary case-base files. This approach is also useful when the case-definition process requires the participation and approval of multiple

layers of management, that is, where the case-base author does not have autonomous authority to create cases.

Stored in the Case Base

We recommend storing the unresolved cases in the case base itself, because the case-base author can then examine the individual unresolved searches directly on the Case Panel.

The first step in examining an unresolved search is to perform a **Test Case>** operation on it. This is to make sure that the case would still be unresolved in the current case base. This also permits the case-base author to look at the questions the operator did *not* answer... which might explain why the search was unsuccessful.

If desired, the unresolved search can form the "rough draft" or a new case. After a little editing, the case-base author can resave the unresolved search record as an indexed case. Alternately, the record of the unresolved search can be deleted if it is a duplicate or due to operator error.

Unresolved searches have a special title, which takes this form:

Unresolved by <operator> on <timestamp>.

You can retrieve them by using the **Cases . . .** button of the Case Panel. Note that you can use the **Search** feature of the Case List dialog box to isolate the list of unresolved searches contributed by a particular operator.

Stored in a File

In this situation the unresolved searches are appended to a file. The searches are in human-readable format, so they can be printed out and examined when needed. You may specify the name of the file in the **Set Case Base Options...** dialog box.

This "paper-path" option is appropriate in three different situations:

- In some applications, the search operators use laptop computers in the field, and are not in direct communication with the central set of case-base files. In

this situation, storing unresolved searches in the case base is not practical.

- Some organizations that use *CBR Express* prefer a committee approach to creating and approving new cases. Getting the unresolved searches on paper is the first step toward reviewing and formalizing them into new cases.
- Depending on the nature of the application, the volume of unresolved searches could be quite high. It is possible that the case-base author would prefer that this volume of new records not be inserted in the case base.

For whatever reason, *CBR Express* gives you the option of storing the unresolved searches as text, and handling them as you see fit after that.


Text and Graphic Browsing

CBR Express permits the user to request additional information about a case, a question or an action directly from the Search Panel. This additional information takes one of two forms:


- Text display of "additional information" from the object definition. For questions and actions, *CBR Express* simply displays the contents of the objects *Additional Information* field. For cases, *CBR Express* generates a textual summary of the case to display.
- Graphic browsing consists of running virtually any Windows application in response to the user's request for more information. Note that when a *Graphic Browse* is enabled for the object, it takes precedence over the textual browse feature.

Browsing Text To use the textual browse feature, simply place explanatory text in the *Additional Information* field of a question or action. Textual browse of a case summarizes the entire case, so there is no special field to use. Then be sure that the *Graphic Browse* checkbox on the object definition is *not* checked. Graphic browsing disables textual browsing.

Graphic Browse *CBR Express* allows the end user to "browse" a case, question or action by running a program rather than by examining stored text. This feature will handle a wide variety of programming options. These are the special browsing commands:

Run Case Base Book: Page: 


To have a graphic browse item open a case base when browsed, put CB in the *Book* field and the name of the case base file in the *Page* field. If no path is specified for the case base, the case base must reside in the same directory as the case base from which the browse is initiated.

Run Any Program Book: Page: 


To run any executable program, type RUN in the *Book* field and the name of the executable file in the *Page* field. The file must be in the current directory or in the path. You can type a directory path into the field.

Associated Files Book: Page: 

You can tell *CasePoint* to run data files that are associated with particular applications. For instance, in the example above, browsing this action would bring up Microsoft Word to edit the file `letter.doc`.

HelpBook: Page: 

This set of commands opens a Windows help file to a particular topic. The file is `sol.hlp`, and the topic is `rules`. Notice that we did *not* include the ".hlp" extension. Help files should reside in the Windows directory or in your PATH.

ToolBook FilesBook: Page: 

This facility was originally intended for browsing ToolBook files. Use the file name of the book (no extension) and the name or number of the page to browse.

Passwords

There are a total of six types of passwords that may be set in *CBR Express*. One controls access to SQL databases. Two are associated with *CBR Express* case bases; the other three are standard ToolBook features. If you are a case-base author all of them will be of some interest to you.

Database Password

If you are using SQL database support (rather than RDM support) you will be asked to supply a password whenever you open a case base or customer base. This password controls access to the database engine itself and is not optional.

This password may be stored in an encrypted form in the *CBR Express* initialization file for convenience. See page 116 for more information.

Case-Base Passwords

The two *CBR Express* passwords are associated with individual case bases. In other words, you can password-protect any case base against unauthorized searches, and against unauthorized modification.

- **Search Mode Password:** If this password is set, *CBR Express* will require the password before opening the case base in search mode.
- **Maintenance Mode Password:** If this password is set, *CBR Express* will require this password on *each* attempt to enter maintenance mode while this case base is open. It also asks for this password if the *CBR Express* interface is already in maintenance mode when you attempt to open the case base.

Setting CBR Express Passwords

The procedure for setting *CBR Express* passwords is:

1. From ToolBook reader mode, pull down the *CBR Express* Options menu.
2. Select `Set Password...` This will pop up a password dialog box.
3. Click the mouse on either the `Search Password` or the `Maintenance Password` radio buttons to indicate which password you wish to set.
4. Type the current password (the one you want to replace) into the field provided in the dialog box. If the password is currently not set, type nothing.
5. If you provide the correct password, *CBR Express* will pop up a second password dialog box. This one contains two fields. Type the *new* password carefully into both fields, then dismiss the box.

ToolBook Passwords

There are three ToolBook passwords:

- **Author Password:** If set, ToolBook requires a password on the first attempt to get into author mode. If the user supplies the correct password, ToolBook does not ask for it again during that session.

CBR Express is delivered with the author mode password set as a precaution against unauthorized tampering with the interface. The password is supplied in the cover letter that is shipped with the software and documentation.

- **Open Password:** If set, ToolBook will ask for the password when the ToolBook file is opened. This password is not set in the *CBR Express* interface.
- **Save Password:** If set, ToolBook asks for the password at the first attempt to save the *CBR Express* interface. It prevents unauthorized people from saving alterations to the interface. Note that one can save the interface file under another name even when this password is set. This password is not set in *CBR Express*.

Setting ToolBook Passwords

The full procedure for setting ToolBook passwords is covered in the ToolBook documentation. As a courtesy, we offer this short procedure:

1. In author mode, pull down the Object menu.
2. Select the `Book Properties` option. This will produce a dialog box.
3. Click the mouse on the `Passwords` button of the dialog box.
4. Type the Author password into the top field. Use tab to move the focus to the second field to reconfirm the password. Once the Author password is correctly entered, you may specify Open and Save passwords

simply by typing them into the appropriate fields. Tab to the OK button to complete the operation.

Releasing the Case Base

When in maintenance mode, *CBR Express* operates on a special case base index file that is not available to search operators. This file is for the use of the case-base author(s) only. The file has the extension .CBM, and is used for both case definition and searching while in maintenance mode.

In search mode, *CBR Express* works from a case index file with the extension .CBR. Having two versions of the case index file lets the case-base author operate on the case base without making the changes immediately available to search users. The case-base author gets complete freedom of action for maintaining the case base, while the search operators get a *stable* index to use between formal "releases" of updated files.

The `Release Search Index` command of the Options menu simply copies the current maintenance file, giving the copy the extension .CBR. This new file is then immediately available to search users.

CBR Express polls the central case base directory at the beginning of each search to be sure that the most recent .CBR index file is in use. When an update occurs, each distributed copy of *CBR Express* automatically notices the change and loads the new index file before beginning the next case-base search.

Reindexing the Case Base

Whenever *CBR Express* saves an active case, it automatically updates the search index to make the case immediately available for case-base searches. The indexing process involves a calculation based on the match weights and mismatch weights of the questions used in the case.

If you change the match or mismatch weight of an existing question and save it, *CBR Express* does not automatically seek out all the cases that use this question to reindex them. This might be quite time-consuming if the question appears in many cases. Also, if you are adjusting match weights you might want to alter several questions that always appear together in cases. It would be preferable to make all of the weight adjustments before refreshing any of the cases.

If the altered questions appear in only a few cases, the fastest way to reindex the cases is simply to pull them up on the Case Panel one at a time and save them individually. If the altered questions affect many cases, however, this is not practical.

The **Reindex Case Base** command of the Options menu iterates over the entire case base and resaves all active cases. It rebuilds the search index completely, assuring you that no case has been overlooked.

It is not necessary to reindex the case base unless you have changed the weight (or type) of a question. If you are working with a relatively stable set of questions, you may never need to reindex at all.¹²

¹² Reindexing is also required if you make any changes to the lists of separators, synonyms or ignored words used to filter text input before searching. These lists cannot be changed from the *CBR Express* user interface, however.

Case Base Report

This menu option pops up a dialog box for generating text reports about a case base. The box contains a variety of controls to help you filter the case base data into the type of report you prefer.

Case Base Report Dialog Box

Case Base Report Dialog Box

This feature writes a text file to disk. The default file is named after the currently-loaded case base, with .RPT as the extension.

- **Save Report to File Name:** This box always displays the name of the current case base. If you want to work with a different case base, use the File/Open menu command.
- **Display In Notepad?** If this checkbox is checked, *CBR Express* will read the report file back into the Windows Notepad editor so you can examine it.

- **Search For:** Include only those cases, questions or actions that contain the string in this field.
- **Include:** Use the checkboxes to indicate what type of records should be included in the report. You may mix and match among cases, questions, and actions. The *Case Base Statistics* checkbox is for a brief summary of the number of each type of object in the case base.
- **Cases:** Use these checkboxes to indicate which types of cases should appear in the report. Choose from among *Active*, *Draft*, *Unresolved*, and *Archived* cases.

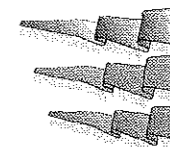
Reports from CBR Express Tester Module

The *CBR Express* Tester Module can generate a report containing all the cases that contain particular combinations of questions and answers. See the *CBR Express Tester Module User's Guide* for more information.

Conclusion

Creating a typical case in *CBR Express* is a simple procedure that requires only minutes (sometimes seconds) per case. Most of the activity takes place in the Case Panel, with temporary excursions into the Question Panel and Action Panel when it is necessary to define a new question or action.

CBR Express lets anyone build a case base quickly and easily. There is no need for special programming skills. You just type in the case descriptions as if you were making a series of database entries, and *CBR Express* does the rest.



Importing and Exporting

This chapter presents information on the *CBR Express* case base import/export utilities, which are available from the File menu when in maintenance mode. The export utility writes a case base to a text file called a *case-base definition file* (.CDF). The import utility reloads the case base from the text file, not only building the required records but simultaneously building the ART-IM case-base index. It is possible to export several individual case bases and then reload them into a single case base using these features.

These utilities are useful for various tasks:

- For porting an existing case base from one version of *CBR Express* to another.
- For porting an existing case base from one database platform to another.
- For exporting the case base to a text file in order to make global edits in it.
- For porting a case base from one *CBR Express* platform to another. (PC to mainframe, for instance.)
- For merging two or more existing case bases into one.
- For updating a case base with changed or added cases.



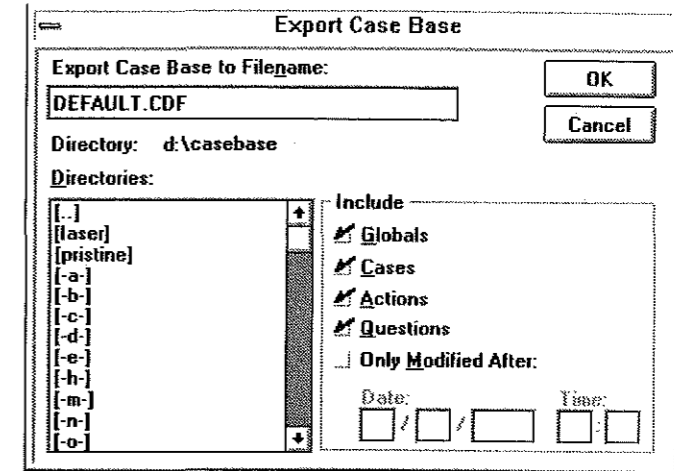
Note: The import/export utility is not offered as a migration path for bringing external information into *CBR Express*. It can be done (see the BNF listing in this chapter), but that is not the purpose of this utility.

The best method for integrating the work of multiple authors is to have them all access the same casebase file over a local-area network. It is possible to use import/export to allow multiple authors to develop independent case-base databases and then merge them, but this requires rigorous design and discipline and should not be undertaken lightly. See *Designing CBR Express Case Bases* from Inference Corporation for more information.

Exporting a Case Base

This section describes the procedure for exporting an open case base to a text file. This feature is available only in Maintenance Mode (which you set from the Options menu).

The export feature takes the current, open case base and writes case, question and action definitions to a text file. This text file may then be edited (for global string replacements) or ported to another *CBR Express* version or platform.



Export Dialog Box

To export all or part of an existing case base to text files:

1. Use the *CBR Express* interface to open the case base you want to export.
2. Be sure you are in Maintenance Mode.
3. Select Export Case Base from the File menu.
4. Use the resulting dialog box to specify the name and path of the export file you wish to create.
5. The dialog box contains checkboxes for exporting globals (including synonyms, ignored words, separators), cases, questions, and actions. One normally exports all types of objects, but one may pick and choose in special situations.
6. The dialog box also offers an option to export only those objects that have been created or modified since a specific date and time. This is very useful if your intention is to update a remote copy of the case base with new cases. Note that this feature expects 24-hour time. Midnight is 00:00 hours.

7. Click on the OK button.

CBR Express will then write out a text file containing a reloadable description of the case base. If you want to export only a few cases (questions, actions) it will be necessary to edit the export file to remove the excess objects.

Importing a Case Base

This section describes the procedure for importing an exported case base into an open case base.

The **Import Case Base** command of the File menu pops up a dialog box for restoring exported case bases into current case base data files. There are two versions, both of which involve moving exported data into current open case bases:

- **Append** means to add all of the cases, questions and actions of the exported file to the currently open case base. It can take two completely distinct case bases and combine them in one file. Objects shared between the two case bases will appear as duplicates. That is, if two cases have the same key number, they will be renumbered so they can both exist in the combined case base.
- **Update** means to destructively combine the exported cases, questions and actions with those of the current case base. Incoming objects replace the existing objects that have the same key numbers; i.e., *an imported case5 will overwrite and replace an existing case5.*

The purpose of this feature is to permit remote updating of a case base. Export only the cases, questions and actions that have changed since the last update. Distribute the (small) exported file to users, presumably

by modem. Have them update their case base file with the exported file.



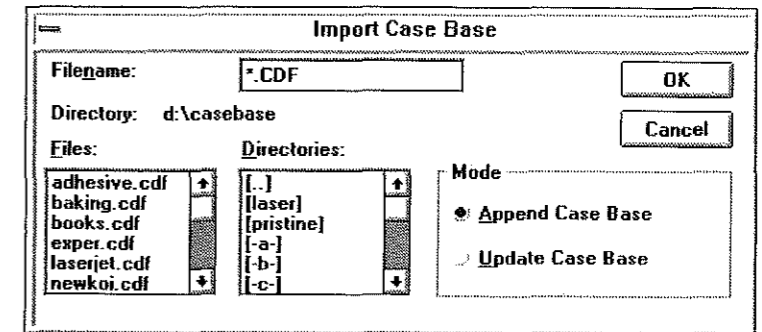
Warning: Updates make destructive changes in the case base and are permanent. Make a backup copy of the case base files before proceeding.



Note: When you import a .CDF file into a case base, the default behavior of *CBR Express* is to assign new ID numbers to the incoming objects in order to reuse numbers left vacant by deletions. This means that the imported case-base objects (cases, questions and actions) wind up with different ID's than they had in the original (exported) case base.

If you wish to preserve the object ID's as they appear in the .CDF file, edit your `cbrx.ini` file and add this line:

```
CBStoreIDAsGiven=1
```



Import Dialog Box

To import a case base:

1. Open a case base to receive the incoming data. This may be a new (empty) case base if desired.

2. Select Import Case Base from the File menu.
3. Use the resulting dialog box to indicate which exported file you want to import.
4. Select either the Append or the Update radio button, as appropriate.
5. Click on the OK button.



Note: Simply repeat this process to merge additional exported case bases into the open case base. You may repeat the process as many times as required.

Faster Imports

This section applies to people who use the Raima Data Manager (RDM) with *CBR Express*.

When *CBR Express* imports a case base, it rewrites and saves the database and index files after each case is restored. This behavior makes it possible to recover gracefully if the import process is interrupted by an error, but in the case of really large case bases you might prefer to sacrifice recovery for increased throughput.

There is a simple way to speed up the import process, particularly if the case base contains thousands of cases. The technique involves creating a RAM disk and writing the case base files directly into RAM. This dramatically increases import speed.

Your DOS documentation contains information on setting up RAM disks, but we might offer the following guidelines. First, change your CONFIG.SYS file to contain the following line:

```
DEVICE=C:\DOS\ramdrive.sys /e 2048
```

where "2048" is the number of K bytes to devote to the RAM disk. Each time you boot your machine, this command will create a phantom "disk" in memory, with a drive ID that is one letter after your last drive. That is, if your machine has drives A:, B:, and C:, the RAM disk will be drive D:.

Use Windows RAMDRIVE.SYS (in the windows directory) if you have less than DOS 5.0 or DOS's RAMDRIVE.SYS otherwise.

Be sure to change the TAFPATH variable in CBRX.INI so that *CBR Express* puts transactions on the RAM disk:

```
[CBR Express]
tafpth=D:\
```

The final step is to copy case base files to the RAM disk, or to create a new case base there, and then import normally. When the import is finished, exit from *CBR Express* and immediately copy the case-base files to your hard disk or a floppy. The data on the RAM disk will vanish the instant that you boot the machine again.

Note: Using a RAM disk does not increase search speed.



BNF Grammar

This section contains the BNF description of the *CBR Express* Import/Export file format.

```

file
  : /* null */
  | file statement
  ;

statement
  : question
  | action
  | case
  | global
  ;

question
  : BEGIN QUESTION symbol question_body_spec END QUESTION
  ;

question_body_spec
  : question_title answer_spec
  | question_title answer_spec question_body_list
  | question_title question_body_list answer_spec
  | question_title question_body_list answer_spec question_body_list
  ;

question_title
  : TITLE quoted_string
  ;

weight_spec
  : WEIGHT mismatch_weight
  | WEIGHT match_weight
  | WEIGHT mismatch_weight match_weight
  | WEIGHT match_weight mismatch_weight
  ;

mismatch_weight

```

```

  : MISMATCH ':' integer
  ;

match_weight
  : MATCH ':' integer
  ;

question_body_list
  : question_body
  | question_body_list question_body
  ;

question_body
  : TEXT quoted_string
  | weight_spec
  | browse
  | TOOLBOOK BOOK ':' quoted_string PAGE ':' quoted_string
  | AUTHOR integer
  | CREATION DATE integer '/' integer '/' integer
  | TIME integer ':' integer ':' integer
  | LAST_UPDATE DATE integer '/' integer '/' integer
  | TIME integer ':' integer ':' integer
  ;

browse
  : BROWSE TEXT
  | BROWSE GRAPHIC
  ;

min_and_max
  : answer_min answer_max
  | answer_max answer_min
  ;

answer_min
  : MIN ':' number
  ;

answer_max
  : MAX ':' number
  ;

answer_spec

```

```

: ANSWERS TYPE ':' YES_OR_NO
| ANSWERS TYPE ':' TEXT
| ANSWERS TYPE ':' NUMBER min_and_max
| ANSWERS TYPE ':' LIST LIST ':' string_list
;

string_list
: /*null*/
| quoted_string string_list
;

action
: BEGIN ACTION symbol
  TITLE quoted_string
  action_body_list
END ACTION
;

action_body_list
: action_body
| action_body_list action_body
;

action_body
: TEXT quoted_string
| browse
| TOOLBOOK
  BOOK ':' quoted_string
  PAGE ':' quoted_string
| AUTHOR integer
| CREATION
  DATE integer '/' integer '/' integer
  TIME integer ':' integer ':' integer
| LAST_UPDATE
  DATE integer '/' integer '/' integer
  TIME integer ':' integer ':' integer
;

case
: BEGIN CASE symbol
  TITLE quoted_string
  DESCRIPTION quoted_string
  case_body_list
END CASE

```

```

;

case_body_list
: case_body
| case_body_list case_body
;

case_body
: QUESTIONS qa_body_list
| ACTIONS key_list
| browse
| TOOLBOOK BOOK ':' quoted_string PAGE ':' quoted_string
| AUTHOR integer
| COMMENT quoted_string
| MISC quoted_string
| CREATION
  DATE integer '/' integer '/' integer
  TIME integer ':' integer ':' integer
| LAST_UPDATE
  DATE integer '/' integer '/' integer
  TIME integer ':' integer ':' integer
| LAST_USED
  DATE integer '/' integer '/' integer
  TIME integer ':' integer ':' integer
| NUMBER_OF_CALLS integer
| REFERENCE_COUNT integer
| CORRECT_REFERENCE_COUNT integer
| STATUS symbol
;

qa_body_list
: /* null */
| qa_body_list qa_body
;

qa_body
: qa_pair
| qa_pair scoring
| qa_pair full_text
| qa_pair full_text scoring
| qa_pair scoring full_text
;

```



```

qa_pair
  : q_key ':' quoted_string
  ;

key_list
  : /* null */
  | key_list a_key
  ;

a_key
  : symbol
  ;

q_key
  : symbol
  ;

scoring_type
  : '+'
  | '-'
  | '+' '-'
  | 'd'
  ;

scoring
  : '(' SCORING ':' scoring_type ')'
  | '(' MATCH_WEIGHT ':' scoring_type MISMATCH_WEIGHT ':'
    scoring_type ')'
  ;

full_text
  : '(' FULL ':' quoted_string ')'
  ;

global
  : THRESHOLD integer
  | MINIMUM_UTILITY integer
  | TOTAL_CALLS integer
  | SEARCH_USER
    INDEX_STAMP integer
    PASSWORD quoted_string
  | MAINTENANCE_USER

```

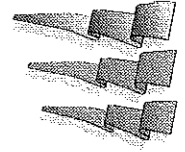
```

    INDEX_STAMP integer
    PASSWORD quoted_string
  | UNRESOLVED_CASES
    destination
    file_format
    FILE quoted_string
  | GLOBAL_WEIGHTS
    DESCRIPTION integer
    ABSENCE integer
    MATCH_DEFAULT integer
    MISMATCH_DEFAULT integer
  | COLOR_THRESHOLD integer
  | MAX_MATCHES integer
  | BEGIN SCHEMA quoted_string END SCHEMA
  ;

destination
  : DESTINATION DB
  | DESTINATION DUMP
  ;

file_format
  : FORMAT REPORT
  | FORMAT LOADABLE
  ;

```



Appendix 1: Preferences and Options

CBR Express can be customized to conform to an individual user's needs. Search preferences, case base options, and network options can be set either in a dialog box or by changing the `CBRX.INI` and `WIN.INI` files.

User Preferences

The `Set Preferences` menu item in the `Options` menu brings up the `Set Preferences` dialog box, which can be used to customize the behavior of the interface for an individual user.

Preferences Setup		
Operator Name: Clayton	Search Panel Options: <input checked="" type="checkbox"/> Automatic Search after answer Reposition answered questions in list to: <input checked="" type="radio"/> Top <input type="radio"/> Bottom	OK
Data Base User ID: User1	Default databases: Case base Filename: e:\cbrx20dk\printer Find...	Save
Entry Panel Setting: Maintenance Mode: Question	Tracking base Filename: d:\cxr13rdmd\50state Find...	Cancel
Search Mode: Search		

Set Preferences Dialog Box

The `Operator Name` is the string used to label automatic call record entries in the Tracking Panel.

The `User ID` field is a string of up to seven alphanumeric characters that uniquely identifies a user. Each user on a network must have a unique User ID. The User ID is shared between *CBR Express* and *CasePoint*.

Search frequency can be set to suit the needs of your application. The `Automatic Search` checkbox triggers a case-base search following each answer. In some case bases this narrows the field of questions and shortens the overall search. If the checkbox is not checked, you must demand the search by clicking on the `Search Case Base` button. The latter approach allows you to answer several questions before searching again in circumstances where the case-base search itself is expensive.

Answered questions can either go to top of the list of questions on the search screen, or to the bottom. This option is shared between *CBR Express* and *CasePoint*.

The `Entry Panel Setting` controls configure the initial appearance of *CBR Express* to the user:

- The `Maintenance Mode` drop-down list selects which panel the user will see first if the interface is brought up in maintenance mode.
- The `Search Mode` drop-down list selects which panel the user will see first if the interface is brought up in search mode.

The `Default Database` controls automatically open a particular case base and tracking base at startup time. You may type in the path and file name of the desired files, or use the `Find...` buttons to locate them via an `Open` dialog box.

The `OK` button saves the preferences for the current run of *CBR Express*. The `Save` button saves the preferences in `WIN.INI`, where they will be remembered the next time

CBR Express is run. The `Cancel` button closes the dialog box without making any alterations in user preferences.

Case Base Options

The `Set Case Base Options` dialog box controls aspects of case-base search behavior. The customized behavior is temporary and local; no permanent change in the case base takes place. In order to save these settings permanently, you will need to make the changes in the case base in *CBR Express* Maintenance Mode.

Case Base Options

Action/Case Display options for Search Panel

Acceptance Color Threshold:

Minimum Display Score:

Maximum Cases Displayed:

Weight Options

Case Description Percent:

Absence Weight:

Match Weight Default:

Mismatch Weight Default:

Save Unresolved Searches as:

Unindexed Cases Indexed Cases

File:

File Format: Report Import/Export

Set Case Base Options Dialog Box

The `Acceptance Color Threshold` field specifies the score a case or associated action must receive before its text color changes. This feature gives the user the "green light" to go ahead and use the cases that have surmounted the threshold. The default is 90.

The `Minimum Display Score` is the lowest score that will be displayed to the search user. In maintenance mode,

lower scores will automatically be displayed. The default is 1.

The `Maximum Cases Displayed` field specifies the maximum number of cases that will be displayed following a case-base search. Since the top few cases are generally all you need to see, the default of five works well.

The `Case Description Percent` field determines the percent of the total score contributed by the text entered in the description field. If you want to emphasize the importance of the description, make this value high. If you are more interested in the contribution of questions, make this value low.

`Absence Weight` is a penalty that is subtracted from a case score when the user answers a question that the case does not possess. The assumption is that the user is answering only pertinent questions, and that cases lacking these questions are irrelevant. To experiment with this feature, use a value of 1. The default is 0.

`Match Weight Default` and `Mismatch Weight Defaults` are the default values used on the Case Panel. Defaults are 10 for Match Weight, and 2 for Mismatch Weight.

`Unresolved Searches` may be saved as unindexed cases in the case base, or in either of two external file formats. Report format is human-readable, while Import/Export format is reloadable into *CBR Express*. The `Find...` button helps you locate the file and pathway of the file.

The OK button closes the dialog box and saves the new option settings.

The Cancel button simply closes the dialog box, without saving any changes in the option settings.

CBRX.INI Settings

A number of *CBR Express* preferences can only be set by hand-editing the `CBRX.INI` file. This file resides in the same directory as the *CBR Express* executable.

The default state of `CBRX.INI` is as follows:

```
[CBR Express]
tafpath=. \
lockcomm=INTERNAL
resolved=0
relevant=0
lockmgr=lockmgr
```

There must be no spaces between the variable, the equals sign, and the value. Additional `CBRX.INI` fields may automatically appear in the file if necessary to accommodate user preferences that normally have default values.

The meaning of the variables in `CBRX.INI` is described below.

`tafPath`: The `tafPath` is the drive and directory in which `VISTA.TAF`, `CB11.DBD`, `CT11.DBD`, and the `[username].LOG` files reside. If you are using *CBR Express* as a single user, just use the current directory:

```
tafPath=. \
```

If you are using *CBR Express* on a network with other users, everyone's `tafPath` must point to one directory on the network. This is easily accomplished by installing *CBR Express* on a network drive, so everyone shares one copy of the *CBR Express* executable and `CBRX.INI`. The default is the current directory.

Note that the `tafpath` is limited to 35 characters.

`lockcomm`: This parameter controls Lock Manager behavior for installations that depend on RDM database

support. The lockcomm options and arguments have changed in RDM 3.21a.

0 is no longer a valid value for lockcomm. We still honor the previous values of 1 and 2, but the following symbolic values should be substituted.

NETBIOS (previously 1) invokes the NetBIOS version of the Lock Manager, which is the recommended version for most situations.

INTERNAL (previously 2) implies that *CasePoint* is being used in a stand-alone environment (potentially on a network) and that the Lock Manager does not need to be running, even if NetBIOS is running. This is the default value.

GENERAL (no previous designation) invokes the General Lock Manager, a new feature of RDM 3.21a. We recommend that you contact the Inference Technical Services Center for information about the General Lock Manager.

resolved: Reserved for future use. Set to 0.

relevant: Reserved for future use. Set to 0.

lockmgr: This is the name of the Lock Manager. The default Lock Manager name is "lockmgr". The Lock Manager can be named by using the "-a" option when you start LM or LM_TSR.

With CBR Express 1.3 we added the following CBRX.INI attributes to accommodate the creation of SQL (non-Raima) case bases and tracking bases:

DefaultDBType: This is the default database type, which may be SQL Server (the default), Oracle, or Q+E.

DefaultDBLogin: This is the default database login ID, and defaults to "cbx".

DefaultDBServer: This is the hostname of the default database server. It does not have a default value.

DefaultDBNameCB: This is the default database name for the case base. It defaults to "cbxdb".

DefaultDBNameCT: This is the default database name for the tracking base. It defaults to "cbxdb".

DefaultQ+EConnection: This is the default connection string for the Q+E Database Library.

In CBR Express 1.3, we added these attributes to control SQL database error and warning messages:

showSQLWarnings: Values 0 and 1, default 0. 0 turns off display of SQL warning messages. 1 displays them.

showSQLErrors: Values 0 and 1, default 0. 0 turns off display of SQL error messages. 1 displays them.

These error and warning messages are displayed by the database itself (not by *CBR Express*) through callback. In addition to these messages, *CBR Express* will still display its own error and warning messages.

In CBR Express 1.3, we added these attributes to control RDM database error and warning messages:

showCBErrors: Values 0 and 1, default 0. 0 turns off display of RDM case base error messages. 1 displays them.

showCTErrors: Values 0 and 1, default 0. 0 turns off display of RDM tracking base error messages. 1 displays them.

Note that the RDM database error dialog boxes are displayed in mid-transaction and effectively lock the database against all users until they are dismissed.

In CBR Express 1.3, we added this attribute to control case-base object numbering during "Update" import operations. This attribute has no impact on import operations under the "Append" option:

CBStoreIDAsGiven: Values 0 and 1, default 0. 0 provides backward-compatible behavior with previous

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versions of *CBR Express*, where the product would assign a new object ID number to any imported (updated) case-base object that was not already present in the case base. 1 changes this behavior by preserving the case-base ID number of the exported object when it is imported again. This is convenient in a number of contexts where an export/import operation must be performed, but it is important to preserve object ID's.

In CBR Express 2.0 we added this attribute to permit SQL and Oracle database users to store an encrypted database password:

dbpassword: This parameter stores a database password in encrypted form as a convenience to the user. When opening an SQL or Oracle case base, the user will not be prompted for a database password unless the one supplied here fails to open the database.

The value of this parameter is set by a utility program, `passwd.exe`, supplied with *CBR Express* and *CasePoint*. To set this parameter, run `passwd.exe` from DOS. It will ask you to type in the new password twice (to verify that you typed it correctly). It will update `cbrx.ini`.

WIN.INI Settings

Several *CBR Express* preference and status settings are stored in the *CBR Express* section of the Windows `WIN.INI` file. This section of `WIN.INI` looks like this:

```
[CBR Express]
browsePage=7
Operator=Clayton
UserID=User1
UserStart=1
MaintStart=4
CaseBase=d:\cx13rdma\printer
CallTrack=d:\cx13rdma\50state
AutoSearch=1
AnsweredQ=1
```

BrowsePage: This is a temporary annotation serving as a mailbox when starting up ToolBook browse books. This identifies the page to display.

Operator: Name of the default operator to use in call tracking annotations.

UserID: This is the default database User ID as set in the Preferences dialog box.

UserStart: Panel to use when opening *CBR Express* in Search Mode. 0 is the Tracking Panel; 1 is the Search Panel.

MaintStart: Panel to use when opening *CBR Express* in Maintenance Mode. 0 Tracking; 1 Search; 2 Question; 3 Action; 4 Case.

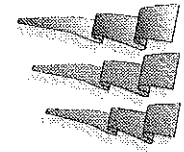
CaseBase: Path and name of the default case base.

CallTrack: Path and name of the default customer base.

AutoSearch: This is the default search behavior preference, as set in the Preferences dialog box. 0 indicates

Command; 1 indicates search each time a question is answered. This parameter is *not* affected by the `SaveSettings` feature.

`AnsweredQ`: This parameter controls whether answered questions go to the top of the bottom of the question list. 0 means bottom; 1 means top.



Appendix 2: Network Utility Programs

This appendix contains additional documentation on NetBIOS and the Lock Manager.

NetBIOS

CBR Express will operate in multi-user mode on any network that supports the IBM NetBIOS standard. NetBIOS is only required when you wish to use *CBR Express* in multi-user mode.

Note that NetBIOS is generally built into IBM and Microsoft networks.

If NetBIOS is not found when *CBR Express* starts, *CBR Express* operates in "Single Machine Mode". That is, multiple Windows tasks on that single machine can use the databases, but other users on the network cannot. This is useful if you don't need multi-user access.

NetBIOS is generally implemented as a stand-alone TSR (Terminate Stay Resident) program that comes with your network software. This program must be run on every machine before Windows is started.

The Novell network version of NetBIOS must be 3.01 or above.

On 3COM networks, on the machine where the Lock Manager is to be run (see below), NetBIOS must be invoked as follows:

```
NetBIOS /C /M /W2
```

On Novell 3.11, the maximum number of NetBIOS sessions the Lock Manager will handle is set in the NETBIOS SESSIONS=XX line of the file SHELL.CFG. The default of 32 sessions is sufficient to support fourteen *CBR Express* users simultaneously. *CBR Express* requires three NetBIOS sessions for itself, plus two for each of the multiple users.



Warning: Windows for Workgroups and NetBIOS.

If you were running Novell NetBIOS before you set up Windows for Workgroups, the setup program attempts to remove it, substituting NetBEUI instead.

To run both, add the following line to the [network] section of your system.ini file:

```
exclude=0
```

This entry will prevent Windows for Workgroups from interfering with NetBIOS.

Add the following line to the [388Enh] section of your system.ini file:

```
V86ModeLANAs=0
```

This entry defines the real-mode LANAs that are in use by NetBIOS.

Lock Manager

In addition to NetBIOS, the Lock Manager must be run. The Lock Manager (LM.EXE) is distributed with *CBR Express* and oversees the locking of database files. This program must be run on ONE machine on the network. If you try to run it again, you get a warning. The Lock Manager must be started after NetBIOS is running or you will get a warning. Since the Lock Manager is of vital importance to the integrity of your databases, we suggest that you run it on a server machine that is not likely to go down.

If LM.EXE is to be run from a DOS box (a Windows MS-DOS prompt), the following lines must be added to the SYSTEM.INI file:

```
IdleVMWakeUpTime=1
TimerCriticalSection=500
ReflectDosInt2A=true
NetHeapSize=28
```

Novell implements the equivalent of a DOS APPEND on all of its search drives. This can cause unpredictable results. We recommend modifying the shell.cfg file to include "search mode=2" specifying that Novell default to the same search mode as MS DOS. Novell's smode command can also be used to change the search mode for a single executable, using the following syntax:

```
smode prog.exe 2
```

If the line "search mode=2" is not in the shell.cfg file then use smode on all executable files compiled with RDM.

In addition to LM, we also provide a second Lock Manager called LM_TSR. LM_TSR can be used when less than ten users will be using *CBR Express* at the same time. Both programs take the same parameters. LM_TSR needs to be run from an environment that will not be running Windows or *CBR Express*.

If NetBIOS is running and the Lock Manager is not found, *CBR Express* will report an error when you try to open or create a call-tracking or case-base database. See page 113 for information on the LOCKCOMM variable, which alters this default behavior.

If a machine running *CBR Express* crashes, you may need to reboot in order to inform the Lock Manager that your task died. Rebooting will close the databases and allow you to get back on the databases without the "User ID already in use" error.

The Lock Manager recognizes two databases as being the same if both the database name and the path from the root directory of the drive are the same. Many networks allow you to assign a drive to an arbitrary path on a drive. So, for example, two users could see the same database on a network as:

```
User 1: e:\cbrx\casebase.dbd
User 2: f:\users\cbrx\casebase.dbd
```

CBR Express cannot be used in this way. All users of a given database must see the *full path* of database files in the same way. The drive specifier is not significant and need not be the same for all users.

LM.EXE and LM_TSR.EXE

To invoke LM or LM_TSR from DOS use this syntax:

```
lm | lm_tsr [-a name] [-b dd] [-t ddd] [-h] [-q ddd]
           [-r dddd] [-t ddd] [-u ddd]
```

- a name** Specifies a name for the Lock Manager. The value is the name of the Lock Manager as known by Data Manager at runtime. The name is an (optionally mixed case) alphanumeric string and can be up to 16 characters long. The default name is `lockmgr`.
- b dd** Sets default timeout value (in seconds) for lock requests. The minimum value is 2 seconds.

- f ddd** Sets the maximum number of files. The Lock Manager maintains a table of all database files that have been opened by its clients. The value following this switch is the maximum number of files that can be opened by this lock manager. The default value is 64, maximum value is 576, minimum value is 8.
- h** Help for command line parameters. Displays help information about how to start the Lock Manager.
- q ddd** Sets lock request queue size (entries). If a lock request cannot be immediately granted, it is placed in the lock request queue. The default value for this switch is 128, maximum value is 256, minimum value is 32.
- r dddd** Sets the request message queue size (in bytes). The Lock Manager maintains a message queue to hold messages waiting to be processed. The default size is 10 kilobytes, maximum is 60 kilobytes, minimum is 2 kilobytes.
- t ddd** Sets the recovery timeout value (in seconds). The Lock Manager controls the client who does recovery on a database. The time allowed for a recovery is controlled by this switch. The default value is 60 seconds, maximum is 240 seconds, minimum value is 30 seconds.
- u ddd** Sets the maximum number of users. The Lock Manager maintains a table of active users. The value following this switch is the maximum number of users that can log into this lock manager. The default value is 16, maximum value is 128, minimum value is 8.

CBR Express needs three "users". Each open case base or tracking database needs one "user". Therefore if eight actual people need to operate *CBR Express*, each with a tracking

base and a case base open simultaneously, the total number of "users" required is:

$$3 + (2 * 8) = 19 \text{ users}$$

LMREMCON

To monitor the functioning of the Lock Manager, you can use the LMREMCON program (Lock Manager Remote Control). To run it from DOS use this syntax:

lmremcon [-a *name*] [-h] [-s]

-a *name* The name given to the Lock Manager you are attempting to monitor. The default name is "lockmgr."

-h Provides help information.

-s Sends a shutdown command to the Lock Manager (for batch files).

With the remote console program and the dedicated Lock Manager are several commands you can enter to display different data, or to control the Lock Manager. The commands are listed below:

USERS Displays the currently logged-in users, and their related status. The following data is displayed when the USER command is entered:

- User Name - User's name. This is based on the User ID value entered in the Set Preferences dialog box of *CBR Express*. We append a "B" to the User ID for case base transactions, and a "T" for tracking base transactions.
- LSN - NetBIOS Local Session number.
- Q - Number of lock requests queued. One for each file lock.
- TO - Lock request time out in seconds.
- Status - Current running status of a user.
- Rec - Status of a user during a database recovery.

- Log File - Name of user's logfile. Appears during a transaction commit.

FILES Displays the file report showing files open, which user has a file locked, and pending lock requests. The following data are displayed when the FILE command is entered:

- File Name - Database file name. The path of the filename is not shown.
- Lock - Type of lock being held.
 - f File is not locked.
 - r Read lock.
 - w Write lock.
 - x Exclusive lock.
- # - Number of users holding the lock. Only 1 on write and exclusive locks. 1 or more on read locks.
- Holding Lock - User name of the user (or first user on read locks) holding the lock.
- Waiting - User name(s) of users waiting for a lock on the file.

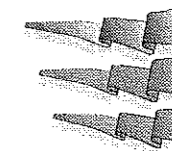
HELP Display the commands available within the program.

KILL<User> Disconnects the user from the Lock Manager and frees all locks and files held by that user.

QUIT Logs out of the Lock Manager, returns to DOS.

SHUTDOWN Shuts down the Lock Manager (LM or LM_TSR), returns to DOS.

STATUS Displays main status screen showing lock statistics, operational parameters, and logged-in users.



Appendix 3: ToolBook Browse Books

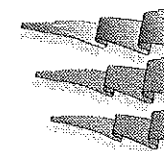
In order to support direct display of a particular browse page on demand, the Book Script of a graphic browse book must contain this script:

```
to handle enterbook
  set sysChangesDB to false
  send sizeToPage

  linkdll "kernel"
  word globalAlloc(word,dword)
  word globalFree(word)
  pointer globalLock(word)
  word globalUnlock(word)
  int getProfileString(string,string,string,pointer,int)
end

set p to getProfile("CBR Express","browsePage")
if p is null
  getRemote "CBRXBrowsePage of this book" application \
    toolbook topic " "
  set p to it
end
if p is null
  set p to 1
end
go to page p

unlinkdll "kernel"
end enterbook
```



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