

WebFOCUS

Describing Data With Graphical Tools
Version 5 Release 2

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Preface

This documentation describes how to create the metadata for the data sources that your WebFOCUS projects will access. It is intended for database administrators, application developers, or other information technology professionals who will create the metadata used by WebFOCUS to access corporate data.

How This Document Is Organized

This manual includes the following chapters:

Chapter/Appendix		Description
1	<i>Data Source Description Overview</i>	Introduces data source descriptions and explains how to use them.
2	<i>Creating Master Files</i>	Describes how to manage Master Files for reporting and data maintenance projects with the Master File Editor. This tool enables you to create a Master File and generate the data description language required to read the data in data sources.
3	<i>Creating Synonyms</i>	Describes how to create a synonym for your data source description.
4	<i>Defining Dimensions for OLAP Analysis</i>	Describes how to use the Dimension Builder to create logical views based on enterprise data for multi-dimensional analysis.
5	<i>Adding Data and Rebuilding FOCUS Data Sources</i>	Describes utilities to create new FOCUS data sources and to refresh existing data sources after the structure has changed.
6	<i>Creating Master and Access Files for Fusion Data Sources</i>	Describes how to use the Filetool to create the Master and Access Files (metadata) you need to maintain local Fusion databases, and report from Fusion databases.

Documentation Conventions

The following conventions apply throughout this manual.

Convention	Description
<code>THIS TYPEFACE</code> or <code>this typeface</code>	Denotes syntax that you must enter exactly as shown.
<i>this typeface</i>	Represents a placeholder (or variable) in syntax for a value that you or the system must supply.
<u>underscore</u>	Indicates a default setting.
<i>this typeface</i>	Represents a placeholder (or variable) in a text paragraph, a cross-reference, or an important term. It may also indicate a button, menu item, or dialog box option you can click or select.
this typeface	Highlights file names and commands (in a text paragraph) that must be lowercase.
Key + Key	Indicates keys that must be pressed simultaneously.
{ }	Indicates two choices from which you must choose one. You type one of these choices, not the braces.
[]	Indicates a group of optional parameters. None are required, but you may select one of them. Type only the information within the brackets, not the brackets.
	Separates two mutually exclusive choices in a syntax line. You type one of these choices, not the symbol.
...	Indicates that you can enter a parameter multiple times. Type only the parameters, not the ellipsis points (...).
. . .	Indicates that there are (or could be) intervening or additional commands.

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Information You Should Have

To help our consultants answer your questions most effectively, be ready to provide the following information when you call:

- Your six-digit site code number (xxxx.xx).

- Your Developer Studio configuration:
 - The front end you are using, including vendor and release.
 - The communications protocol (for example, TCP/IP or HLLAPI), including vendor and release.
 - The software release.
 - The server you are accessing, including release (for example, 4.3.5).
- The stored procedure (preferably with line numbers) or FOCUS commands being used in server access.
- The name of the Master File and Access File.
- The exact nature of the problem:
 - Are the results or the format incorrect; are the text or calculations missing or misplaced?
 - The error message and return code, if applicable.
 - Is this related to any other problem?
- Has the procedure or query ever worked in its present form? Has it been changed recently? How often does the problem occur?
- What release of the operating system are you using? Has it, Developer Studio, your security system, communications protocol, or front-end software changed?
- Is this problem reproducible? If so, how?
- Have you tried to reproduce your problem in the simplest form possible? For example, if you are having problems joining two databases, have you tried executing a query containing just the code to access the database?
- Do you have a trace file?
- How is the problem affecting your business? Is it halting development or production? Do you just have questions about functionality or documentation?

User Feedback

In an effort to produce effective documentation, the Documentation Services staff at Information Builders welcomes any opinion you can offer regarding this manual. Please use the Reader Comments form at the end of this manual to relay suggestions for improving the publication or to alert us to corrections. You can also use the Document Enhancement Request Form on our Web site, <http://www.informationbuilders.com>.

Thank you, in advance, for your comments.

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Contents

CHAPTER 1

Data Source Description Overview

Topics:

- A Note About Data Source Terminology
- What Is a Data Source Description?
- How a Project Uses a Data Source Description
- What Does a Master File Describe?
- Creating a Data Source Description
- What Is in a Master File?

Information Builders products provide a flexible data description language, which you can use with many types of data sources, including:

- Relational, such as DB2, Oracle, Sybase, and Teradata.
- Hierarchical, such as IMS and FOCUS.
- Network, such as CA-IDMS.
- Indexed, such as ISAM and VSAM.
- Sequential, both fixed-format and free-format.
- Multi-dimensional, such as Fusion.

You can also use the data description language and related facilities to:

- Join different types of data sources into a temporary structure from which your request can read or write.
- Define a subset of fields or columns to be available to users.
- Logically rearrange a data source to access the data in a different order.

A Note About Data Source Terminology

Different types of data sources make use of similar concepts, but refer to them differently. For example, the smallest meaningful element of data is called a *field* by many hierarchical database management systems and indexed data access methods, but called a *column* by relational database management systems.

There are other cases in which a common concept is identified by a number of different terms. For simplicity, we have standardized on a single set of terms. For example, we usually refer to the smallest meaningful element of data as a *field*, regardless of the type of data source. However, when required for clarity, we use the term specific to a given data source. Each time we introduce a new standard term, we define it and compare it to equivalent terms used with different types of data sources.

What Is a Data Source Description?

When your project accesses a data source, it needs to know how to interpret the data that it finds. Your project needs to know about:

- The overall structure of the data. For example, is the data relational, hierarchical, or sequential? Depending upon the structure, how is it arranged or indexed?
- The specific data elements. For example, what fields are stored in the data source, and what is the data type of each field—character, date, integer, or some other type?

To obtain the necessary information, your project reads a data source description. The primary component of a data source description is called a Master File. A Master File describes the structure of a data source and its fields. For example, it includes information such as field names and data types.

For some types of data sources, an Access File supplements a Master File. An Access File includes additional information that completes the description of the data source. For example, it includes the full data source name and location. You need one Master File—and, for some types of data sources, one Access File—to describe a data source.

How a Project Uses a Data Source Description

Master Files and Access Files are stored separately, apart from the associated data source. Your project uses a data source's Master File (and if required, the corresponding Access File) to interpret the data source in the following way:

1. Identifies, locates, and reads the Master File for the data source named in a request.

If the Master File is already in memory, your project uses the memory image and then proceeds to Step 4. If the Master File is not in memory, the project locates the Master File on a storage device and loads it into memory, replacing any existing Master File in memory. If your Master File references other data sources as cross-referenced segments, or if a JOIN command is in effect for this file, the cross-referenced Master Files are also read into memory.
2. Reads the security rules if Information Builders data source security (DBA) has been specified for the data source and ensures that user access is based on any DBA security specified.
3. Locates and reads the Access File for the data source named in the request, if that type of data source requires an Access File.
4. Locates and reads the data source(s).

The data source contents are interpreted based on the information in the Master File and, if applicable, the Access File.

What Does a Master File Describe?

A Master File enables you to:

- Identify the name and type of a data source.
- Identify and relate groups of fields.
- Describe individual fields.

Identifying a Data Source

In order to interpret data, your project needs to know the name you are using to identify the data source and what type of data source it is. For example, is it a DB2 data source, an Oracle data source, or a FOCUS data source?

For more information about identifying a data source, see Chapter 2, *Creating Master Files* and Chapter 6, *Creating Master and Access Files for Fusion Data Sources*.

Identifying and Relating a Group of Fields

A Master File identifies and relates groups of fields that have a one-to-one correspondence with each other—in Master File terms, a segment; in relational terms, a table.

You can join data sources of the same type (using a Master File or a JOIN command) and data sources of different types (using a JOIN command). For example, you can join two DB2 data sources to a FOCUS data source, and then to a VSAM data source.

For more information about defining and relating groups of fields, see Chapter 2, *Creating Master Files* and Chapter 6, *Creating Master and Access Files for Fusion Data Sources*.

Describing a Field

Every field has several characteristics that you must describe in a Master File, such as type of data and length or scale. A Master File can also indicate optional field characteristics. For example, a Master File can specify if the field can have a null value, and can provide descriptive information for the field.

A Master File usually describes all of the fields in a data source. In some cases, however, you can create a logical view of the data source in which only a subset of the fields is available, and then describe only those fields in your Master File.

For more information about describing individual fields, see Chapter 2, *Creating Master Files* and Chapter 6, *Creating Master and Access Files for Fusion Data Sources*.

Creating a Data Source Description

You can create a Master File and Access File for a data source in several ways. If the data source:

- **Has an existing description**—such as a native schema or catalog, or a COBOL File Description—you can use a tool to automatically generate the Master File and Access File from the existing description. For example, if you want to use WebFOCUS to read a DB2 data source, you can use the Synonym Wizard to generate a Master File and Access File from the DB2 catalog.

For more information about generating a Master File and Access File, see Chapter 3, *Creating Synonyms*.

- **Does not have an existing description**, you can create a Master File by coding it using Information Builders' data source description language, or by specifying its attributes using the Master File Editor.

For more information about creating a Master File with graphical tools, see Chapter 2, *Creating Master Files* and Chapter 6, *Creating Master and Access Files for Fusion Data Sources*.

For details about coding Master Files, see *Describing Data With WebFOCUS Language*.

Creating a Master File and Access File Using an Editor

You can create a Master File and an Access File by:

- **Coding** them using a text editor. You can do this in all Information Builders products. For information on Master File syntax, see Chapter 2, *Creating Master Files* and Chapter 6, *Creating Master and Access Files for Fusion Data Sources*. For information about Access File syntax, see your data adapter documentation.

After editing a Master File, issue the CHECK FILE command to validate the new Master File and to refresh your session's image of it.

- **Specifying** their attributes using the Master File Editor. The Master File Editor tool is available in WebFOCUS (Windows version) products.

What Is in a Master File?

A Master File describes a data source using a series of declarations:

- A data source declaration.
- A segment declaration for each segment within the data source.
- A field declaration for each field within a segment.

The specifications for an Access File are similar, although the details vary by type of data source. The appropriate documentation for your data adapter indicates whether you require an Access File and, if so, what the Access File attributes are.

Syntax **How to Specify a Declaration**

Each declaration specifies a series of attributes in the form

attribute = *value*, *attribute* = *value*, ... , \$

where:

attribute

Is a Master File keyword that identifies a file, segment, or field property. You can specify any Master File attribute by its full name, its alias, or its shortest unique truncation. For example, you can use the full attribute FILENAME or the shorter form FILE.

value

Is the value of the attribute.

A comma follows each attribute assignment, and each field declaration ends with a dollar sign (\$). Commas and dollar signs are optional at the end of data source and segment declarations.

Each declaration should begin on a new line. You can extend a declaration across as many lines as you wish. For a given declaration you can put each attribute assignment on a separate line, combine several attributes on each line, or include the entire declaration on a single line. Each line can be a maximum of 80 characters long.

CHAPTER 2

Creating Master Files

Topics:

- Master File Editor
- Sample Master Files
- Creating a Master File Shell
- Identifying the Type of Data Source You Are Describing
- Assigning Century Values in a Master File
- Associating a National Language Code Page With a Master File
- Describing the Segments in a Master File
- Describing the Fields in a Segment
- OLAP-enabling a Master File
- Adding Virtual Fields to a Segment
- Adding Group Fields to a Segment
- Creating a Cross-Reference
- Setting Up Security for a Master File
- Viewing the Master File Layout
- Previewing and Printing a Master File

You can manage Master Files for reporting and data maintenance projects with the Master File Editor. This tool enables you to create a Master File and generate the data description language required to read the data in data sources. For related information, see Chapter 1, *Data Source Description Overview*. Maintain users should see the WebFOCUS Maintain documentation for details about the data description language.

Note: The tools for managing a data maintenance project are available only in the Developer's Studio version of this product. If you have this version, note that some features of the Master File Editor are useful in reporting projects, but are not relevant in data maintenance projects and are clearly noted in the text.

Sample Master Files

This product includes several sample Master Files (.MAS) and corresponding data source (.FOC). You can use these samples as a learning tool when using the Master File Editor.

You can also use these samples to practice creating projects or building procedures and components.

There are several types of samples:

- **Reporting and data maintenance.** Designed for use in the reporting and Maintain environments. There are 24 sample Master Files, some of which demonstrate a specific feature.
 - **Standard Sample Master Files**

These can be used in either the reporting or Maintain environments. Several of these are primarily for reporting (finance, ledger, and region).

These sample data sources are located in the *install_drive/ibi/apps/ibisamp* directory path.
 - **Fannames Sample Master Files**

The Fannames sample Master Files are primarily for data maintenance projects and were designed for use in the Maintain environment.

These samples are located in the in the *install_drive/ibi/apps/ibisamp* directory path.

These samples are only available in the Developer's Studio version of this product.

Maintain users should see the WebFOCUS Maintain documentation for details on the Fannames sample Master Files.
- **OLAP.** Designed with Online Analytical Processing (OLAP) capabilities. You can use these sample Master Files to see how a Master File is OLAP-enabled and to create report procedures from which you can invoke the OLAP Control Panel, a control panel that enables you to manipulate OLAP-enabled data. For more information on OLAP, see *Creating Reports With Graphical Tools*. These samples are located in the in the *install_drive/ibi/apps/ibisamp* directory path.
- **Managed Reporting.** Designed for use as domains (Gotham Grinds Franchise Sales and Gotham Grinds Purchasing and Inventory Management) in the Managed Reporting environment. These include sample Standard Reports and Reporting Objects. These samples are located in the *install_drive/ibi/apps/ibisamp* directory path.

Note: These sample Master Files can be used as Gotham Grinds Franchise Sales and Gotham Grinds Purchasing and Inventory Management projects in the reporting and Maintain environments. Right-click the Managed Reporting folder in the WebFOCUS Environment in the WebFOCUS Explorer. Click each domain in the Managed Reporting folder and then return to the developer's environment.

Creating a Master File Shell

You can create a Master File shell for a FOCUS data source, for supported relational data sources, and for data sources that reside on a WebFOCUS Reporting Server.

You begin creating a Master File shell by assigning a file name. For Master Files accessing relational data sources, the file name can consist of up to 64 alphanumeric characters and must contain at least one letter. You should make the name representative of the data source contents. It can have the same name as the data source it is describing if the name complies with naming conventions. After assigning the file name, you are ready to build your data description.

Note: For Master Files accessing FOCUS data sources, the file name can consist of up to 8 alphanumeric characters and must contain at least one letter.

The Master File shell, when opened in the Master File Editor, displays the directory path, root segment, and root segment key field in the left panel. In this panel you can add segments and then fields to those segments. The right panel displays the file level properties: General, DBA, and Codepage tabs. Note that when you select a segment or field level, properties change accordingly.

After you create the shell file you need to:

- Set the file level properties by identifying the type of data source you are describing (see *Identifying the Type of Data Source You Are Describing* on page 2-6), setting cross-century values (see *Assigning Century Values in a Master File* on page 2-8), and including a description for the Master File.
- Develop the Master File segments and fields.
- Apply appropriate security restrictions to the Master File. See *Setting Up Security for a Master File* on page 2-38.
- Associate a national language code page if the Master File will be used in a project internationally. See *Associating a National Language Code Page With a Master File* on page 2-9.

Master Files often work in conjunction with an Access File. For FOCUS data sources, you do not need an Access File. However, to locate data in a relational data source you do need an Access File, which you cannot create with this editor. Instead you must code the Access File using your text editor. If a related Access File is required, you must code it manually and assign the same name as its corresponding Master File.

As a simpler alternative, you can generate synonyms for both the Master and Access Files using the Create Synonym Wizard, which is accessible only when working from a reporting application environment. For details, see Chapter 3, *Creating Synonyms*.

Procedure How to Create a Master File Shell (Reporting Environment)

1. From an open project, right-click the *Master Files* folder and select *New* or choose *New* from the File menu.

The New Master File dialog box opens. Note that the Suffix drop-down box defaults to the FOCUS (FOC) suffix.

2. Type a name for the Master File in the text entry field.
3. Click *OK*., The shell file opens in the Master File Editor. Your next step is to choose a data source type. See *Identifying the Type of Data Source You Are Describing* on page 2-6 and *How to Choose a Data Source Type* on page 2-6.

Procedure How to Create a Master File Shell (Maintain Environment)

1. Click  (*New database description*) on the Application toolbar.

or

Right-click the *Databases* folder and choose *New database description* from the shortcut menu.

2. Type a new name for your Master File and press *Enter*. The name must start with a letter and cannot contain special characters. Otherwise, simply press *Enter* to accept the default name.
3. Select *Save* from the File menu., You have created the Master File shell file that will contain the data description.
4. Open the shell file in the Master File Editor. Right-click the Master File shell in the *Databases* folder. Select *Edit description* from the shortcut menu., The shell file opens in the Master File Editor. Your next step is to choose a data source type. See *Identifying the Type of Data Source You Are Describing* on page 2-6 and *How to Choose a Data Source Type* on page 2-6.

Identifying the Type of Data Source You Are Describing

After naming your data source, you must indicate the type of data source you wish to describe by choosing an abbreviation for the data source type—for example, FOC represents a FOCUS data source and SQLORA represents an Oracle table. For details, see *Supported Data Source Types and Suffixes* on page 2-6.

Procedure How to Choose a Data Source Type

1. In the General tab, select a data source type from the drop-down list to identify the type of data source you are using.

Note: For details on creating descriptions for Fusion data sources, see Chapter 6, *Creating Master and Access Files for Fusion Data Sources*.

2. Select *Save* from the File menu.

Once you specify the data source type, you can assign century options and begin to develop the Master File segments and fields. See *Master File Tab: General (Segment Level)* on page 2-13 for additional information.

Note: When the Master File is complete, you can apply security restrictions (see *Setting Up Security for a Master File* on page 2-38) and associate a code page for international support (see *Associating a National Language Code Page With a Master File* on page 2-9).

Reference Supported Data Source Types and Suffixes

Data Source Type	Suffix
Adabas	ADBSIN
Comma Delimited (not supported for Maintain)	COM
dBase	DBASE
EDA	EDA
Fixed Format	FIX
FOCUS	FOC
FUSION	FUSION
Hyperion ESSBase (not supported for Maintain)	ESSBASE

Data Source Type	Suffix
IBM DB2	SQL Also supports DB2, SQL400, SQLDS, SQLDBM
Informix	SQLINF
Microsoft Access (not supported for Maintain)	SQLMAC
Microsoft SQL Server	SQLMSS
MS SQL Server OLAP Services (not supported for Maintain)	MSOLAP
ODBC	SQLODBC
Oracle	SQLORA
Sybase	SQLSYB
Tab Delimited	(TABT)
Teradata	(SQLDBC)

Reference Master File Tab: General (File Level)

The screenshot shows a software window with three tabs: 'General', 'DBA', and 'Codepage'. The 'General' tab is active. It contains the following elements:

- File Type:** A dropdown menu currently showing 'Focus'.
- Default century options:** A group box containing two input fields:
 - 'Two digit century value for date fields:' with the value '20'.
 - 'Two digit base year for century:' with the value '00'.
- Description:** A large empty text area at the bottom of the window.

When you select a data source in the left (Master File) frame, the General tab has the following fields/options:

File Type

Choose the type of data source you will be describing. For details, see *Identifying the Type of Data Source You Are Describing* on page 2-6.

Default century options

Together these options define a range of 100 years and control the century value for all date fields in the data source.

Choose a century value to represent 1900 or 2000.

Choose a base year that represents the lowest year to which the century option applies.

The defaults are 19 and 00, respectively.

For details, see *Assigning Century Values in a Master File* on page 2-8.

Description

Type a descriptive name for the Master File. This name appears as the REMARK field when you view the Master File as text.

Assigning Century Values in a Master File

The Master File Editor enables you to assign century options—the two-digit century value and the two-digit base years—to control the century value in a Master File.

The century value and base year together define a range of 100 years:

- Century value specifies a two-digit century number.
- Base year indicates the lowest year to which this century applies.

For example, if the century value is 19 and the base year is 80, year values from 80 through 99 are interpreted as 1980 through 1999, and year values from 00 through 79 are interpreted as 2000 through 2079.

If you are satisfied with the century value and the base year default values (19 and 00, respectively), you can omit one or both of these options from the Master File.

You can set century default options for the Master File at the file or field levels. A century value setting at the field level will override a century value setting at the file level. See *Master File Tab: General (File Level)* on page 2-7 and *Master File Tab: General (Field Level)* on page 2-21.

Note: You can also set century values for all Master Files used by a project. For details, see SET DEFCEM and SET YRTHRESH in your documentation on setting environment parameters.

Procedure How to Set Century Values for a Master File at the File Level

1. Select the file name in the Master File hierarchy (left frame).
2. In the General tab (File level), choose a century value to represent 1900 or 2000. The default is 19.
3. Choose a base year value to represent the lowest year to which the century value applies. The default is 00.

Procedure How to Set Century Values for a Master File at the Field Level

1. Select a field in the Master File hierarchy (left pane).
2. In the General tab (Field level), select *Date format*.
3. Choose a century value to represent 1900 or 2000. The default is 19.
4. Choose a base year value to represent the lowest year to which the century value applies. The default is 00.

Associating a National Language Code Page With a Master File

If your reporting or data maintenance projects are used internationally, you can set up any Master File in your project to provide comprehensive National Language Support (NLS); the display of foreign language characters in data. NLS allows you to store, process, and retrieve native language data using code pages to map characters between different character sets. It allows data to be sorted and presented in culturally appropriate time, date, calendar, monetary, and numeric formats that are essential for everyday use.

NLS ensures that data source utilities and error messages are presented to the user in the appropriate native language for French, German, Japanese, and Spanish. All other language options display in English.

NLS eliminates the requirement for locale-specific coding in your projects. Through a one-time configuration by the administrator, NLS enables you to store code pages for language locales, retrieving one code page at a time. When necessary, NLS allows you to conveniently add new language locales without having to perform a full reconfiguration. For information on NLS configuration, see *National Language Support for International Computing*.

If NLS is configured correctly on your PC, you can associate a code page to a Master File. Every time you use that Master File to create a report, the code page you selected converts character sets in the Master File to the appropriate character sets found in the selected code page. The resulting report displays with the character sets from your chosen code page.

Note: The Master File Editor does not support Master Files that contain OEM (DOS) national characters. In order to prevent corruption, use the Developer Studio text editor (TED) to edit these types of Master Files.

Procedure **How to Associate a Code Page With a Master File**

Note: In order for the code page you select to work, NLS must be configured first. For information on NLS configuration, see *National Language Support for International Computing*.

1. Select the location path in the Master File hierarchy (left pane).
2. Select the *Codepage* tab.
3. Select a code page from the list to associate with the Master File.

See *Master File Tab: General (File Level)* on page 2-7 for additional information.

Reference **Master File Tab: Code Page (File Level)**

The image shows a dialog box titled "Master File Tab: Code Page (File Level)". It has three tabs: "General", "DBA", and "Codepage", with "Codepage" selected. The "File Type:" label is above a dropdown menu showing "Focus". Below this is a "Default century options" section with two input fields: "Two digit century value for date fields:" with the value "20", and "Two digit base year for century:" with the value "00". At the bottom, there is a "Description:" label above a large empty text area.

Describing the Segments in a Master File

A segment is a group of fields that are related to one another. Each segment has a unique name and each can have its own key field(s). Master Files have three types of segments:

Master Files have three types of segments:

- **Root segment.** The first segment in a FOCUS data source. It is the only segment in a Master File referred to by a special name. All instances in descendant segments start from an instance in the root segment.

In the Master File pane, you can find the root segment directly below the path. This segment is identified by a lock symbol.

Note: In a relational data source, a table is represented as a segment.

- **Parent segment.** A segment that is a part of a higher segment (referred to as the “parent” segment) and can have descendants of its own. For each parent segment instance, there can be one or more related records in a descendant or “child” segment.
- **Unique segment.** A segment that has a one-to-one relationship with its parent segment and cannot have descendent segments. A unique segment is a logical extension of its parent segment. When data values in a unique segment are retrieved, they are treated as if they were part of the parent segment.

The segment type displays in the General tab (Segment Level).

When you add a segment to a Master File, you:

- Specify a name for the segment.
- Indicate the type of segment you are adding: parent or unique.
- Specify sorting criteria for a parent segment (sorting criteria are not required for unique segments).
- Indicate whether you wish to encrypt the segment to protect it against unauthorized examination.
- Specify a location to store that segment.

For details, see *How to Describe a Segment* on page 2-12 and *Master File Tab: General (Segment Level)* on page 2-13.

Procedure How to Describe a Segment

1. Click the parent segment. In the case of a new Master File, click the root segment, then perform one of the following actions:
 - Right-click and select *New*, then choose *Parent* from the cascading menu.
 - Click the *Segment* button on the editor toolbar.
 - Select *Parent* from the Insert menu.

In the left pane, the segment icon is added beneath the last field in the parent or root segment. The General tab opens in the right pane.

2. Type a name for the segment, using uppercase characters, in the Segment Name box.
3. Make sure a DBA password has already been assigned. For details, see *How to Set Up Security for the Database Administrator* on page 2-39 and *Master File Tab: General (Segment Level)* on page 2-13. Encryption will not occur properly if the DBA password has not been set prior to the encryption of a segment.
4. Click the *Encrypt* box if you want to encrypt the segment.
5. Select a segment type: either *Parent segment* or *Unique segment*., If you select *Unique*, you do not specify sorting criteria.
6. Select sorting criteria for the Parent segment.
 - a. Specify the number of fields you intend to use as key fields.
 - b. Select one of the following:
 - Sort records in ascending order.
 - Sort records in descending order.
 - Do not sort records.
7. Type a location where you want to store this segment.
8. Once you have defined the segment, you can define the fields that will populate it. See *Describing the Fields in a Segment* on page 2-18.

Procedure How to Delete a Segment

Right-click the segment, then select *Delete*.

Note: You cannot delete a root segment.

Reference Master File Tab: General (Segment Level)

The screenshot shows the 'General' tab of a software interface. At the top, there is a 'Segment Name' field containing 'ORIGIN' and an unchecked 'Encrypt' checkbox. Below this is a 'Segment Type' field containing 'Root segment'. Underneath is a 'Sorting' section with a 'Number of key fields' field containing '1'. There are three radio button options: 'Sort records in ascending order.' (which is selected), 'Sort records in descending order.', and 'Do not sort records.'

When a segment is selected in the left (Master File) frame, the General tab has the following fields/options:

Segment Name

Assign a name of up to 8 characters to the segment, using uppercase characters. All characters and digits are permitted, except embedded blanks and special characters.

Encrypt

Check this box to scramble field values in the current segment in order to protect it from unauthorized examination.

Note: You must assign a DBA password to the file before setting the Encrypt option on. For details, see *How to Encrypt a Segment* on page 2-42. You must then turn the Encrypt option on before adding any records. If you add a record to a segment before setting the Encrypt option on, that value will not be encrypted.

Once a segment is encrypted, you can remove encryption only if you remove the segment and recreate it without turning on the Encrypt option.

Tip: Because there is a loss of processing efficiency when data is encrypted, encryption should be used selectively.

Segment Type

Identify the segment as:

- **Root**, the top segment in the data source hierarchy. (For a relational data source this is the only segment.)
- **Parent**, a segment that can have descendant segments with one or more related records.
- **Unique**, a segment with a one-to-one relationship to its parent, and no descendant segments.

You can change the type of a parent or unique segment (if necessary).

Sorting

Records are sorted in a data source by key fields. A key uniquely identifies each segment instance. For example, no two employees can have the same employee ID number, so you can use that field as the key. A segment instance can have more than one field that makes up the key; that is, two or more field values may be used to distinguish records. Key fields appear before all other fields in a segment and are indicated by a key symbol.

Sorting criteria are required for a parent segment, but not for a unique segment. For a parent segment sorting is based on the key. If you specify more than one key field in the key, records are sorted by the first key field, then the second, and so on.

- First, enter the number of key fields that you want to use for sorting.
- Then indicate whether you want to sort records in ascending or descending order, or choose *Do not sort records*. Ascending is the default.

Storing a Segment in a Different Location

By default, all of the segments in a FOCUS data source are stored in one physical file. Optionally, you can designate one or more segments to be stored in a separate physical file called the Location file.

Note: This feature only applies to Master Files for FOCUS data sources.

You store segments in a separate file for two reasons:

- **To apply security.** You can store data in separate physical files to show only the segments needed for a report. Unreferenced segments can be stored in a separate file and archived, but must be restored before they are accessed in a FOCUS request. Alternately, they can be kept on another disk, where separate security can be arranged. In some situations, the separation of the segments into different files allows different disk drives to be used.

Note: Divided data sources require more careful file maintenance. You have to be especially careful about procedures that are performed separately on these files, such as backups. For example, if you perform backups on Tuesday and Thursday for two related files, and you restore the FOCUS structure using the Tuesday backup for one half and the Thursday backup for the other, FOCUS has no way of detecting this discrepancy.

- **To increase the size of a FOCUS data source beyond the normal maximum of 1 gigabyte.** You can split the data source into several physical files, each one subject to the 1 gigabyte page maximum.

Procedure How to Store a Segment in a Different Location

Tip: Before completing this procedure we suggest that you read *Usage Notes for Storing Segments in Different Locations* on page 2-15.

1. In the Master File hierarchy (left pane), select the segment that you want to store in a separate location.
2. In the General tab, type the name of the location file in the Location text box. This name can be up to 8 characters long.

Repeat steps 1 and 2 to store additional segments.

Reference Usage Notes for Storing Segments in Different Locations

- The name of the location file can be either the file name of a FOCUS data source, or a name assigned by the USE command.
- The location must be changed if the location file name or the name assigned by a USE command is changed.
- You can name multiple location files in a Master File. You can also store different segments in the same location file.
- Descendant segments will be stored in the same location file as a parent segment unless different location files are included in their segment declarations.
- For reporting, the location file does not need to be available to FOCUS at all times. FOCUS can still access the data in other segments. However, to include data from the location file in the report, both the host data file and the location file must be available. FOCUS can only access the data in the location file through the information stored in the host file. For data maintenance, location files must be available to FOCUS.
- The number of different location segments and text location files you can specify is limited to a maximum of 64 entries.

Describing Repeating Fields in a Segment

In a Master File, you can describe multiply occurring records for free-format (comma-delimited) and fixed-format sequential data sources. This is accomplished by creating a descending segment and defining the occurring fields in the descendent segment of the parent segment. You can have one or many descending segments depending on the structure of the data.

For instance, consider a library file that contains the information for two copies of *The Sun Also Rises*, one hardcover (\$17.95) and one paperback (\$5.25). There are two values for binding and price, both corresponding to the same book. In the Master File, the information that occurs only once—book information: the publisher's number, author, and title—is placed in one segment and the information that occurs several times in relation to this information—binding and price—is placed in a descendant segment. Similarly, information that occurs several times in relation to the descendant segment, such as an individual serial number for each copy of the book, is placed in a segment that is a descendant of the first descendant segment.

Since the root segment is the highest-level segment in a Master File, all segments below it are considered parent segments. Thus, you are able to describe multiply occurring records for any segment below the root segment.

There are two basic types of multiply occurring records: parallel sets and nested sets. Parallel sets of repeating fields are those that have nothing to do with one another (that is, they have no parent-child or logical relationship). Nested sets of repeating fields are those that, in some way, depend on one another.

Maintain users should see the WebFOCUS Maintain documentation for more information and detailed examples on describing repeating fields.

Procedure How to Describe Repeating Fields in a Segment

1. In a free-format (comma-delimited) or fixed-format Master File, select the segment that contains the repeating fields in the Master File hierarchy (left pane).

The General and Occurs tabs for that segment display. Note that if you select the root segment, the Occurs tab does not appear because this segment is the highest-level segment in a Master File.

2. Select the Occurs tab and describe the repeating fields by choosing one of the following options:
 - **Value.** Type a value from 1-4095. Optionally, you can specify the position by selecting the field in which the records reside from the drop-down list. This field list is derived from the parent segment.
 - **Fieldname.** Select the field that contains the multiply occurring fields from the drop-down list. This field list is derived from the parent segment.

- **Variable.** Indicates that the number of occurrences varies from record to record.

For information that will help you choose an option, see *Master File Tab: OCCURS (Segment Level)* on page 2-17.

Reference Master File Tab: OCCURS (Segment Level)

The screenshot shows a software interface for defining a segment. At the top, there are two tabs: 'General' and 'Occurs', with 'Occurs' being the active tab. Below the tabs, there is a 'Parent Segment' label followed by a text box containing 'MOVINFO'. Underneath, there is a section titled 'Occurs' containing three radio button options: 'Value (1-4095)', 'Fieldname', and 'VARIABLE'. The 'Value (1-4095)' option is selected, and its corresponding text box contains the number '3'. The 'Fieldname' option is unselected, and its text box is empty. The 'VARIABLE' option is also unselected. Below the 'Occurs' section, there is a 'Position' label followed by a dropdown menu that is currently empty.

When a segment is selected in the left (Master File) frame, the Occurs tab has the following fields/options:

Parent Segment

The segment that is a part of a higher segment (referred to as the “parent” segment) and can have descendants of its own.

Occurs

Describe the repeating field by selecting one of the following options:

- **Value (1-4095).** Type a value from 1-4095. Optionally, you can specify the position where a field occurs in a record, if it is not at the end, by selecting the field from the drop-down list. See *Position*.
- **Fieldname.** Names an integer field in the parent segment that is a counter containing the number of occurrences of the descendant segment. Select the field that contains the multiply occurring fields from the drop-down list. This field list is derived from the parent segment.

- **Variable.** Indicates that the number of occurrences varies from record to record. The number of occurrences is computed from the record length (that is, if the field lengths for the segment add up to 40, and 120 characters are read in, it means there are three occurrences).

Position

When the Value (1-4095) field is selected, this field is enabled. It is derived from the parent segment and is an optional function. It is used to describe a structure in which multiply occurring fields with an established number of occurrences are located in the middle of the record. You describe the data source as a hierarchical structure, made up of a parent segment and at least one descendent segment that contains the multiply occurring fields. The parent segment is made up of whatever singly occurring fields are in the record, as well as an alphanumeric field that appears where the multiply occurring fields appear in the record. The alphanumeric field is a dummy field that is the exact length of the combined multiply occurring fields. For example, if you have four occurrences of an eight-character field, the length of the dummy field in the parent segment will be 32 characters.

Note: When different types of records are combined in one data source, each record type can contain only one segment defined as *variable*. It may have descendants (if it contains a nested group), but it may not be followed by any other segment with the same parent—that is, there can be no other segments to its right in the hierarchical data structure. This restriction is necessary to ensure that data in the record is interpreted unambiguously by FOCUS.

Describing the Fields in a Segment

When you add a field to a segment, the Master File Editor places a field icon below the segment in the Master File tree (left pane) and displays four properties tabs in the right pane, in which you supply the information that defines the field. The tabs are:

- **General.** You supply the field characteristics: the field name, field alias, field format (alphanumeric, numeric, or date), if the field is indexed, if the field allows missing data, and if the field is a parent or child in a hierarchy that can be used for financial reporting.
- **Display.** You supply supplementary field information for reporting, such as title, help message, and description.
- **Accept.** You supply validation criteria (acceptable values) for a field. Validation criteria restrict the values a user can enter for the field.
- **OLAP.** You supply a dimension name to be associated with fields. This process OLAP-enables the Master File. (This feature is not used in data maintenance projects.)

You *must* supply at least a field name and a field format. See *How to Describe a Field in a Segment* on page 2-19 for details on entering required and optional information.

Procedure How to Describe a Field in a Segment

1. In the Master File hierarchy (left pane), select the segment in which you want to add a field, then perform *one* of the following actions:
 - Right-click and select *New* from the shortcut menu, then choose *Field* from the cascading menu.
 - Click the *New Field* button on the editor's toolbar.
 - Select *Field* from the Insert menu.

You see the General, Display, Accept, and OLAP tabs in the right pane.

2. In the General tab:
 - a. Type a name for the field, using uppercase characters, in the Field Name input box (required).
 - b. Type an alias for the field in the Field Alias input box (optional). (Note that aliases are not used by the Maintain language; however, they may be used in report requests.)
 - c. If you are defining a hierarchy for financial reporting, describe the parent/child relationship, and, optionally, a descriptive caption to use in place of hierarchy field values, in the Field Property and Field Reference boxes.
 - d. Click the *Index* box if you want the field to be indexed.
 - e. Select a format or data type, then specify the length, the decimal places (if applicable) and any display options for the field. The data type (numeric, alphanumeric, date), field length and, for some numeric formats, decimal places are required parameters; display options are not. Maintain users should see the WebFOCUS Maintain documentation for more information.
 - f. Click the *Allow Missing Data* box if you want to enter a missing value for a field.

For details about all of these entries, see *Master File Tab: General (Field Level)* on page 2-21.

3. Click the *Display* tab if you wish to include a column title, help message, or description for the field. To include any of these characteristics, type the text in the appropriate input box. (Note that these options apply only to reporting.) For details, see *Master File Tab: Display (Field Level)* on page 2-24.
4. Click the *Accept* tab to specify acceptable values. These serve as validation criteria to limit the values that a user can enter for the field. If you specify a list of values, you can also use them to populate radio buttons, combo boxes, and list boxes. The default value is None, which indicates no validation criteria. For details, see *Master File Tab: Accept (Field Level)* on page 2-25.

Select *List of values* to specify a list of acceptable field values:

- a. Type a value in the input box and press *Enter*. The value is added to the list box.
- b. Continue to type values and add them to the list box.

Select *Range of values* to specify a range of acceptable field values:

- a. Type the minimum range value in the From input box.
- b. Type the maximum range value in the To input box.

Select *Find* to supply file and field names to instruct FOCUS where to search for a data source and for a list of acceptable values. You supply the field name of the data field for which the validation criteria are being assigned, the file name of the target FOCUS data source where the field can be found, and the field name of the target data field that contains the validation criteria.

Note: Find is only available for FOCUS data sources and does not apply to OLAP-enabled Master Files. Note also that, in the Maintain environment, Find is not supported when developing a Master File.

Once you have supplied information for the required parameters and any optional parameters, the field definition is complete. You can now add other fields to the current segment, add fields to another segment, or create a new segment.

5. Click the OLAP tab to create a dimension and associate it to the fields you selected. After you create the dimension you can associate other fields to it. For details, see *OLAP-enabling a Master File* on page 2-26., This step does not apply in data maintenance projects.

***Procedure* How to Delete a Field From a Segment**

Right-click the field, then select *Delete*.

Reference Master File Tab: General (Field Level)

General | Display | Accept | OLAP

Field Name: Index (Standard B-tree)

Field Alias:

Field Property: ▼

Field Reference: ▼

Format

Alphanumeric Length (1-256)

Floating Point

Integer

Decimal

Packed

Date/Time

Text

CLOB

VarChar

Allow Missing Data (do not substitute blanks or zeros)

When a field is selected in the left (Master File) frame, the General tab has the following fields/options:

Field Name

Enter a unique name (1-66 characters) in uppercase characters. The first character must be a letter. Do not use embedded blanks or special characters if you wish to include the field in a calculation. This is a required entry.

Field Alias

Enter a brief alternate name that you can use in requests as a synonym for the field name to minimize typing. (Length and format rules apply to aliases.) This is an optional entry. If you create a report, the field name appears as a column heading unless you have specified an alternate title for the field. Aliases cannot be used as column titles.

Note: Aliases are not available for virtual fields and are not used in the Maintain language.

Field Property

Choose one of the following, to be used in conjunction with Field Reference:

PARENT_OF

Identifies this field as the parent of the referenced field in a hierarchy. This attribute can be specified on every field. Therefore, multiple hierarchies can be defined in one Master File. However, an individual field can have only one parent. If multiple fields have PARENT_OF attributes for the same hierarchy field, the first parent found by traversing the structure in top-down, left-to-right order is used as the parent.

CAPTION

Signifies that this field contains a descriptive caption that can be displayed in place of the hierarchy field values in a report. For example, if the employee ID is the hierarchy field, the last name may be the descriptive text to be displayed in place of the ID.

A caption can be specified for every field, but an individual field can have only one caption. If multiple fields have CAPTION attributes for the same hierarchy field, the first parent found by traversing the structure in top-down, left-to-right order will be used as the caption.

You can assign either PARENT_OF or CAPTION to a field in the data source or to a virtual field defined in the Master File.

Field Reference

If PARENT is the field property, the reference is the child field in the hierarchy to say which field this is the parent of.

If CAPTION is the field property, the reference is the child field in the hierarchy to show which field to apply the caption to.

Index (Standard B-tree)

You can index the values of a field to enhance data retrieval performance. To do so, select the Index check box when you add a field and *before* you add the data. An index is an internally stored and maintained table of data values and locations that enhance the performance of data retrieval. A Master File can have several associated indexes, but the combined total of indices and segments cannot exceed 64.

This feature is not available for virtual fields.

Tip: You can turn on the index *after* adding data to a field, however, you will have to use the Rebuild Index option to create the index. For details, see Chapter 5, *Adding Data and Rebuilding FOCUS Data Sources*.

Format

The field Format option is a required entry. It enables you to assign a format to the field based on the values the field will hold. The options are: Alphanumeric, Numeric (Floating Point, Integer, Decimal, Packed), and Date.

The input fields in the window adjust based on the format you select:

- For fields with Numeric formats, you can assign display options that determine how the field will be displayed in reports.
- For fields with a Date format, you assign display options that determine how the field will be displayed in reports. You can also assign century values to the date field. For more information, see *Assigning Century Values in a Master File* on page 2-8.

Maintain users should see the WebFOCUS Maintain documentation for detailed information about available formats (data types) and associated display options.

Tip: The term Format in the Master File Editor is equivalent to the term Type in the WebFOCUS Maintain Type wizard.

Length (1-256)

Indicate the maximum number of positions an alphanumeric or numeric field can contain.

Allow Missing Data (do not substitute blanks or zeros)

If a segment instance exists but no data has been entered into one of its fields, that field has no value. This absence of data is represented as a null value or missing data. You use the Allow Missing Data check box to request the display of a missing data value for a field when read from a data source or written to a data source.

Not supported for virtual fields. See *Master File Tab: Missing (Virtual Field Level)* on page 2-30.

Reference Master File Tab: Display (Field Level)

The image shows a software window with four tabs: 'General', 'Display', 'Accept', and 'OLAP'. The 'Display' tab is active. Below the tabs are three text input fields. The first is labeled 'Column Title:', the second 'Help Message:', and the third 'Description:'. Each label is positioned to the left of its corresponding text box.

This tab provides optional parameters that you can supply for a field. These parameters make it easier for you to describe the field to users. They affect reports, not data maintenance transactions.

When a field is selected in the left (Master File) frame, the Display tab has the following fields/options:

Column Title

Optional. Enter a title of up to 64 characters. This entry will appear as the column title on reports instead of the field name.

Help Message

Optional. Enter a line of text (up to 78 characters) to provide additional information about a field on a form.

Description

Optional. Enter descriptive text (up to 43 characters) to identify the data field. It can be displayed in Fields lists and on the status bar.

Field descriptions also appear as bubble help in OLAP-enabled reports. If you do not include a description, bubble help shows the field name (column title). For information on displaying bubble help in OLAP-enabled reports, see *Creating Reports With Graphical Tools*.

Note:The Master File Editor supports 43 character descriptions. However, the Text editor and Command Console support descriptions of up to 78 characters. For the Text Editor, this includes starting and ending quotes.

Reference **Master File Tab: Accept (Field Level)**

The screenshot shows a dialog box with four tabs: 'General', 'Display', 'Accept', and 'OLAP'. The 'Accept' tab is active. It contains two main sections: 'Type' and 'Options'. Under 'Type', there are four radio button options: 'None' (which is selected), 'LIST of values', 'RANGE of values', and 'FIND values in file'. The 'Options' section is currently empty.

You can control the acceptable values for a field by setting validation criteria. Since data fields can be addressed by several procedures, setting validation criteria in a Master File eliminates the need to provide lists in each separate procedure.

You can set validation criteria for Maintain and MODIFY procedures and for OLAP-enabled Master Files.

Within an OLAP-enabled Master File, validation criteria enable you to:

- Specify a list of acceptable data values for an OLAP-enabled field.
- Specify a range of acceptable data values for an OLAP-enabled field.
- Specify acceptable data values that match values contained in an external flat data source (ddname option).

If you set validation criteria for a field, your project will allow only certain incoming values for the field when it is displayed on a form. If a user enters an unacceptable value for the field, a list of acceptable values will be displayed from which the user can make a selection.

The Accept tab displays the following options for setting validation criteria:

Type

None

Indicates that you do not wish to set validation criteria. A user can enter any value within the limitations of the field's format. This is the default setting.

LIST of values

Enter a list of valid values. A user can only enter a value from this list. You can also use this list to populate radio buttons, combo boxes, and list boxes.

RANGE of values

Enter a range of valid values (for example, a range for an integer might be 100-200). A user can only enter a value within the defined range.

FIND values in file

Supply file and field names that instruct FOCUS where to search for a data source and for a list of acceptable values. You supply the field name of the data field for which the validation criteria are being assigned, the file name of the target FOCUS data source where the field can be found, and the field name of the target data field that contains the validation criteria.

Note: Find is only available for FOCUS data sources and does not apply to OLAP-enabled Master Files. Note also that, in the Maintain environment, Find is not supported when developing a Master File.

OLAP-enabling a Master File

Master Files can be modified to support Online Analytical Processing (OLAP). OLAP enables you to drill down or roll up on hierarchical data, pivot fields from columns to rows (or vice versa), and slice-and-dice information by filtering or querying data sources based on specified criteria thresholds.

You OLAP-enable the Master File by creating dimension(s) at the field level and associating fields with each dimension. In addition, you can specify acceptable values for each dimension member (field). For details on the syntax for dimensions (WITHIN) and controlling acceptable values (ACCEPT), see *Describing Data With WebFOCUS Language*.

Note: OLAP is a reporting facility; it is not relevant to data maintenance projects.

Reference Master File Tab: OLAP (Field Level)

General | Display | Accept | **OLAP**

Please specify either a dimension name or field within a dimension. The naming convention follows the same rules as a FOCUS field name.

A field within a dimension defines a hierarchical relationship among additional members to be included in a given dimension.

NOTE: A given field may participate in only one dimension and two fields cannot reference the same higher level field.

Within:

Make root dimension

When a field is selected in the left (Master File) frame, the OLAP tab has the following fields/options for specifying a dimension:

Within

Is the name of a field to be included in a dimension.

Make root dimension

Specifies a field as the root dimension.

Creating a Dimension in a Master File

In order for you to OLAP-enable a Master File, you must create a dimension. A dimension is a group or list of related fields, called *elements*. For example, a typical hierarchy of sales regions could be defined in a Master File as the GEOGRAPHY dimension and could include the fields (in descending order) Region, State, and City. Region, the highest level in this hierarchy, would contain a list of all available regions within GEOGRAPHY. State, the second highest level in the hierarchy, would contain a list of all available states within region, and so on. Dimensions can be defined in the Master File for any supported data source.

A combination, or matrix, of two or more dimensional hierarchies in an OLAP-enabled data source is called “multi-dimensional.” For example, although products are sold within states they need not be grouped in the same dimension as states. Rather, the elements Product, Category, and Product Name would more commonly be grouped in a dimension called PRODUCT. State would be a member of the GEOGRAPHY dimension that might also include Region and City. Then, these dimensions are combined in a matrix so that the intersections of their criteria provide specific values—for example, sales for coffee in the Northeast region.

For details on the WITHIN syntax that defines dimensions, see *Describing Data With WebFOCUS Language*.

Procedure How to Create a Root Dimension in a Master File

1. Select a field in the Master File hierarchy (left pane), then click the *OLAP* tab.
2. Type the dimension name in the Within input box, then click the *Make root dimension* check box. Note that the dimension name must start with a letter and can contain up to 66 characters, which can be any combination of letters, digits, underscores, or periods. Avoid using special characters and embedded blanks.

FOCUS creates the dimension. You can now associate fields to the dimension. For details, see *Associating Fields to a Root Dimension* on page 2-28.

Note: When you type the dimension name, the dimension is automatically created. To view the change in the Master File, right-click the root segment and choose *Show Master Text* from the shortcut menu or open the Master File in the text editor.

Associating Fields to a Root Dimension

To OLAP-enable a Master File, you must associate fields with the dimension you created. This association identifies the fields as part of the dimension. Note that a field may be associated to only one dimension.

If Master Files have been joined, you can associate a field from one Master File to a dimension in the other. The field from the joined Master File will be active in the dimension when the join is run.

You can specify acceptable values for each field you associate with a dimension using the Accept tab. For details, see *Master File Tab: Accept (Field Level)* on page 2-25.

Procedure How to Associate a Field to a Root Dimension

1. Select the field in the Master File hierarchy (left pane) to which you want to associate to a dimension, then click the *OLAP* tab.
2. In the Within input box, type the name of the dimension to which the field should be associated.

When you type the dimension name, the dimension is automatically created. To view the change in the Master File, right-click the root segment and choose *Show Master Text* from the pop-up menu or open the Master File in the text editor.

Adding Virtual Fields to a Segment

A virtual field is a field whose value is not stored in the data source but can be calculated from the data that is there. You can create a virtual field in your Master File. The field is available whenever a user accesses the corresponding data source.

This feature is convenient when you want to use a virtual field in many different procedures that use the same data source; it saves you the effort of defining the field in each procedure.

The procedure for adding a virtual field to a Master File is similar to the procedure used to add any field. For both, you must specify a field name and a field format. However, the difference between describing a virtual field and a regular field is that you must define the field by using at least one other *real* field that belongs to the same segment. You use this *real* field to build an expression that defines the values a virtual field will hold. An expression enables you to combine fields, constants, pre-defined functions, and operators into one statement that produces a single value.

Procedure How to Describe a Virtual Field in a Segment

1. In the Master File hierarchy (left pane), select the segment in which you want to add a virtual field, then perform one of the following actions:
 - Right-click and select *New*, then choose *Defined field* from the cascading menu.
 - Click the *New Defined Field* button on the toolbar.
 - Select *Defined field* from the Insert menu.

The General, Display, and Missing Data tabs open in the right pane.

2. In the General tab (Field level):
 - a. Type a name for the field, using uppercase characters, in the Field Name input box (required).
 - b. Type the syntax for the expression in the Expression input box (required).

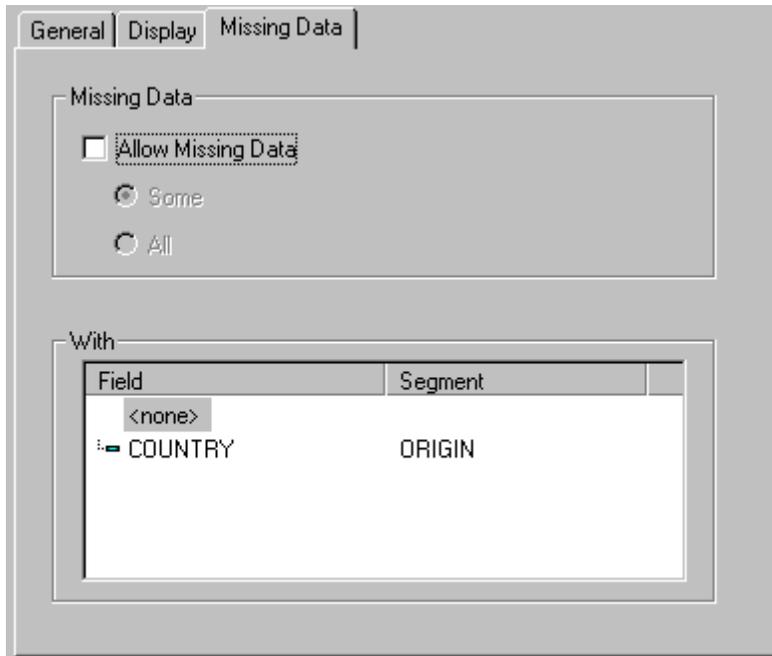
or

Click the *Assist* button to create an expression using the Define Expression Assistant. For details, see *Defining Expressions for Virtual Fields* on page 2-31.

The expression will display in the Expression input box. For additional information, see *Creating Reports With Graphical Tools*.

- c. Select a format or data type, then specify the length, the decimal places (if applicable), and any display options for the field. The data type (numeric, alphanumeric, date), field length and, for some numeric formats, decimal places are required parameters; display options are not. You can also assign century values to virtual fields in Master Files. Maintain users should see the WebFOCUS Maintain documentation.
3. Click the *Display* tab if you wish to include a column title and help message for the field. Type the text in the appropriate input box. *Master File Tab: Display (Field Level)* on page 2-24.
4. Click the *Missing Data* tab if you want to enter a missing value for the field. See *Master File Tab: Missing (Virtual Field Level)* on page 2-30.
5. Click the *OLAP* tab to create a dimension and associate it to the field you selected. After you create a dimension you can associate other fields to it. See *Master File Tab: OLAP (Field Level)* on page 2-27.

Reference Master File Tab: Missing (Virtual Field Level)



When a virtual field is selected in the left (Master File) frame, a Missing Data tab is available with the following fields/options:

Allow Missing Data

Sets the default value for missing data to null for a virtual field. When you activate this option, Developer Studio or Maintain can distinguish a null value from an intentionally entered blank or zero. When this option is selected, if a field with a missing value is read, that value is ignored when an aggregating calculation, such as averaging, is performed. When you select *Allow Missing Data* the following associated options are available:

Some

Indicates that if *at least one* field in the expression has a value, the virtual field has a value (the fields missing values are evaluated as 0 or blank). If all of the fields in the expression are missing values, the virtual field is missing its value. This is the default.

All

Indicates that if all the fields in the expression have values, the virtual field has a value. If at least one field in the expression is missing a value, the virtual field is missing its value.

With

Field

Associates the virtual field with a data source field in a specific segment.

Segment

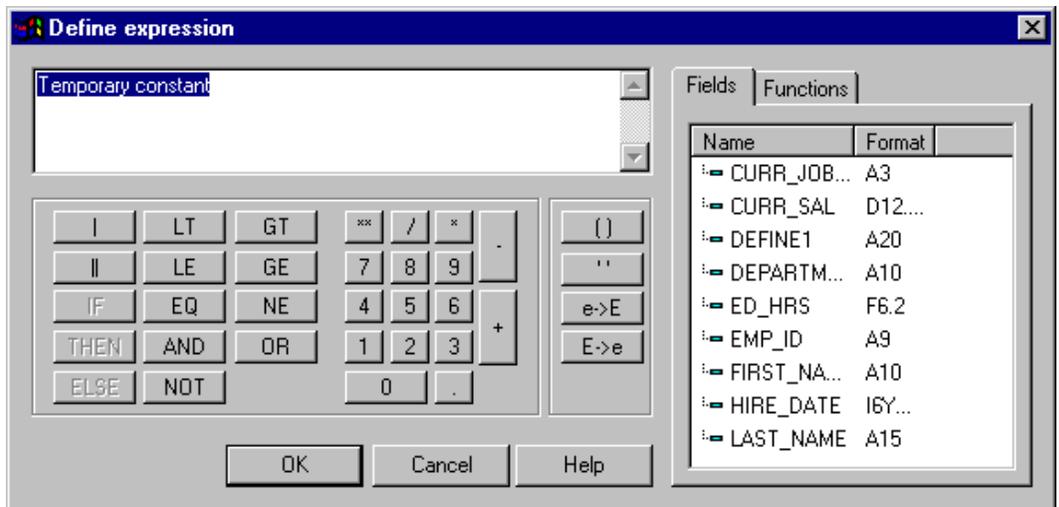
Identifies the segment that contains the field with which the virtual field is associated.

Defining Expressions for Virtual Fields

You can type the syntax for the expression directly into an input box in the General tab, or you can access the Define Expression Assistant, which will help you build the field's expression.

Reference Define Expression Dialog Box

The Define Expression dialog box is used by the Master File Editor to create expressions for virtual fields, and by the WebFOCUS Maintain Language Wizard to create WHERE expressions for NEXT commands. The dialog box displays a list of available data source fields, functions (Master File Editor only), variables (Language Wizard only) and logical and mathematical operators you can use to build an expression.



Expression box

Location for typing an expression. You can add data source fields from the Fields tab, variables from the Variables tab (Language Wizard only), functions from the Functions tab (Master File Editor only), and numbers and operators from the calculator as you type.

Calculator

Provides numbers and operators that you can use to create expressions.

Fields tab

Lists the data source fields that you can use in creating an expression.

Variables tab (Language Wizard only)

Lists the variables that you can use in creating an expression.

Functions tab (Master File Editor only)

A function is a program that returns a value. This tab lists the built-in functions that you can use to derive the value of a temporary field. For details, see the documentation on built-in functions available from your reporting or Maintain environment.

Adding Group Fields to a Segment

You can assign a unique name to multiple fields to create a group field. A group field is created by two or more alphanumeric fields, physically next to each other. A group field provides an efficient means for grouping similar or logically connected fields that will be accessed as a single unit, but do not warrant a separate segment.

Note: In the Maintain environment group fields are supported in a Master File as long as they are not group keys, that is groups that are actual fields, as supported by VSAM. If you create a group field in the Maintain environment, the group will not be visible, only the fields that make up the group will be visible.

Procedure How to Add a Group Field to a Segment

1. In the Master File hierarchy (left pane), select the segment in which you want to add a group field and then perform one of the following actions:
 - Right-click and select *New*, then choose *Group Field* from the cascading menu.
 - Click the *New Group Field* button on the toolbar.
 - Select *Group Field* from the Insert menu.

The General and Display tabs appear in the right pane.

2. In the General tab, type a name for the group field in the Group Name input box (required). Notice that the default format is A20 and the field names in the group appear in the Fields Within Group box at the bottom of the tab window.
3. Click the Display tab to include a column title, help message, or a description for the field. To include any of these characteristics, type the text in the appropriate input box.
4. Click a field in the group field hierarchy and supply the required information in the General, Display, Accept, and Maxvalue tab (Fusion only) windows. For information about these tab windows, see *How to Describe a Field in a Segment* on page 2-19.

Once you have supplied information for the required parameters and any optional parameters for each field, the group field definition is complete. You can now add other fields (or group fields) to the current segment, add fields to another segment, or create a new segment.

Procedure How to Add a New Field to a Group Field

Click the group field to which you want to add a new field and perform one of the following:

- Right-click and select *New*, then choose *Field* from the cascading menu.
- Click the *New Field* button on the toolbar.
- Select *Field* from the Insert menu.

The General, Display, Accept, and OLAP tabs display in the right pane. Supply the required information in each of the tab windows.

Procedure **How to Add an Existing Field to a Group Field**

1. Click the field you want to add to the group field.
2. While holding the left mouse button down, drag the field and drop it on the group field name.

The field is added to the group field.

Procedure **How to Delete a Group Field From a Segment**

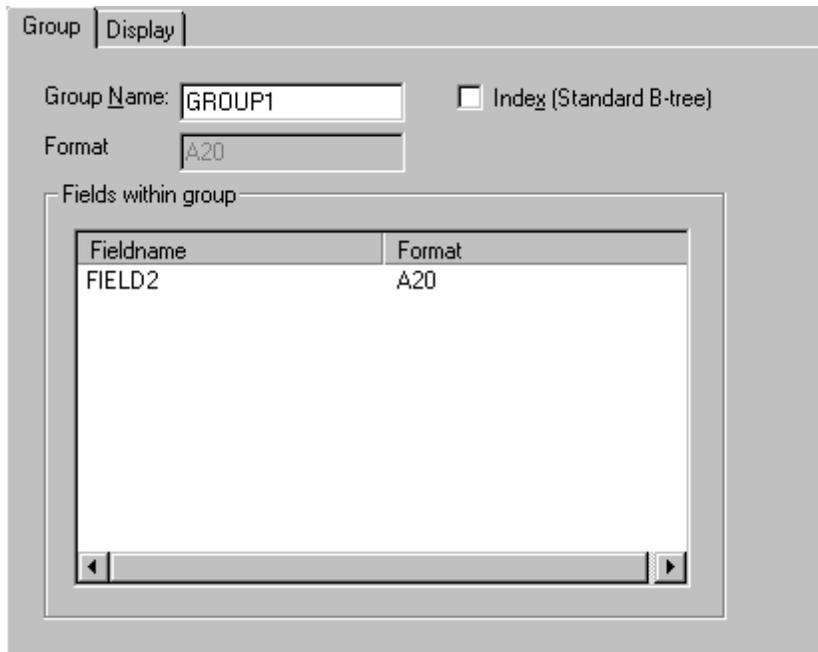
Right-click the group field, then select *Delete*.

Procedure **How to Delete a Field From a Group Field**

Right-click the field, then select *Delete*.

Reference **Master File Editor: Group Tab**

The Group tab enables you to define a group field.



This dialog box contains the following options:

Group Name

Is the name of the group field.

Index (Standard B-tree)

Specifies that you wish to index the values of this field to enhance data retrieval performance. For more information, see *Master File Tab: General (Field Level)* on page 2-21.

Format

Contains the format for the group field. Since the group field is made by concatenating together several other fields, the Master File Editor determines what this format needs to be. For example, if the group field has two alphanumeric fields in it, each 20 characters long (A20), then the group field must be alphanumeric and 40 characters long (A40). The group field is always alphanumeric, regardless of what the fields that make it up are.

Fields within group

Contains the names and formats of the fields in the group field.

Creating a Cross-Reference

A cross-reference identifies matching instances from two data sources. You can create a cross-reference between two separate data sources with corresponding data types and values in one or more fields. Once the cross-reference is created, matching data from the second (target) file will be retrieved when a segment instance from the first (source) file is retrieved.

A Cross-reference wizard accessed from the Master File Editor guides you through the process, in which you must select the host field, the target field, and the type of cross-reference you want.

There are two types of cross-references that you can create: one-to-one or one-to-many:

- A one-to-one cross-reference creates a unique relationship between the source and target segments, meaning any instance of the source segment can have at most one matching instance in the target segment. If multiple matching instances exist in the target file, only one instance is retrieved.
- With a one-to-many cross-reference, a non-unique relationship is created between the source segment and target segment resulting in the possibility of multiple matching instances in the target segment.

In addition, the Cross-reference wizard allows you to choose one of the following options:

- **Remembered** to store the locations of all matching target instances in the source data file.
- **Limit to current segment** to restrict the cross-reference to the named target segment; with this option in effect, the entire cross-referenced data source structure is not involved in the logical data source.

Procedure Using the Cross-Reference Wizard

1. Click on the host segment or field in the Master File for which you wish to create a cross-reference.
2. Click  (*New Cross-Reference*) on the Master File Editor toolbar to activate the wizard.
3. If you are creating a cross-reference from a segment, the wizard will ask you to enter your cross-reference specifications in a series of windows.
 - Type or browse for the target file to cross-reference. Select a target field from the Available Target Fields list, then click *Next*.
 - Select the type of cross-reference you would like to create, then click *Next*. Note that two additional segment types (KL and KLU) appear when creating a cross-reference within a cross-reference. For a description of each cross-reference type, see *Master File Tab: General (Cross-reference Segments)* on page 2-37.

or

If you are creating a cross-reference within a cross-reference, the wizard will ask you to choose the type of child cross-reference that you would like to create. Select a Linked segment type and a Linked Segment, then click *Next*.

Tip: If necessary, you can click *Back* to modify your selections.

4. Click *Finish*.

Note: If you are creating a new Master File in the Maintain environment, the New Cross-Reference Wizard button on the toolbar will not be active until you save the Master File on a server.

Reference Master File Tab: General (Cross-reference Segments)

When you create a cross-reference you can view information about that cross-reference when you highlight it.

General

Cross reference file: EDUCFILE

Target field: EMP_ID

Segment Type

Keyed Unique (KU)
 Keyed thru Linkage Unique (KLU)

Keyed Multiple (KM)
 Dynamic Keyed Unique (DKU)

Keyed thru Linkage (KL)
 Dynamic Keyed Multiple (DKM)

Cross reference file

A physical Master File.

Target field

A key field from the cross-reference file that matches a field in your data source.

Keyed Unique (KU)

Indicates that this is a cross-referenced segment joined to the data source using a static join defined in the Master File, and has a one-to-one relationship to the host segment (that is, it is a unique segment).

Keyed Multiple (KM)

that this is a cross-referenced segment joined to the data source using a static join defined in the Master File, and has a one-to-many relationship to the host segment.

Keyed thru Linkage (KL)

Indicates that this segment is described within a Master File defined join as descending from a KM, KU, DKM, or DKU segment in a cross-referenced data source, and has a one-to-many relationship to its parent.

This segment type is a result of creating a cross-reference within a cross-reference.

Keyed thru Linkage Unique (KLU)

Indicates that this segment is described within a Master File defined join as descending from a KM, KU, DKM, or DKU segment in a cross-referenced data source, and has a one-to-one relationship to its parent (that is, it is a unique segment).

This segment type is a result of creating a cross-reference within a cross-reference.

Dynamic Keyed Unique (DKU)

Indicates that this is a cross-referenced segment joined to the data source using a dynamic join defined in the Master File, and has a one-to-one relationship to the host segment (that is, it is a unique segment).

Dynamic Keyed Multiple (DKM)

Indicates that this is a cross-referenced segment joined to the data source using a dynamic join defined in the Master File, and has a one-to-many relationship to the host segment.

Maintain users should see the WebFOCUS Maintain documentation for additional information on creating cross-references.

Setting Up Security for a Master File

You can secure Master Files on a file-by-file basis. For each data source, security can be maintained at two different levels.

- **Database Administrator Level.** You specify the Database Administrator (DBA) password for the data source. The DBA has unlimited access to the Master File and data source and can set up or change security restrictions for individual users. Only the Database Administrator can encrypt (scramble) or decrypt (unscramble) a data source. For more information, see *Encrypting and Decrypting a Master File* on page 2-41.
- **User Level.** You specify the DBA and user passwords for the data source. The user password represents a user who has access to that data source. When you specify a user password, you must also set at least the type of file access: read, write, read/write, update. Each user's security can be further limited by restricting access to segments, fields, or field values. For more information, see *Restricting Access to Segments, Fields, and Field Values* on page 2-43. Once a user password has been established, you can apply the same restrictions to multiple users. For more information, see *Applying Security Restrictions for Multiple Users* on page 2-43.

When security is specified, the Database Administrator or user must enter a password to get access to the data source. When the DBA or user no longer has access to the data source, you can delete their security.

Before adding any type of security to a data source, the Database Administrator must be aware of certain DBA guidelines.

Procedure How to Set Up Security for the Database Administrator

1. In the Master File hierarchy (left pane), click the data source path.
The General and DBA tabs open.
2. Click the DBA tab, then type the DBA password in the DBA Password box.
Note:When the password is created and the cursor is in that field, you can right-click and use the edit options to undo, select all, cut, copy, paste, or delete the password.
3. Save the Master File with the DBA password.

Procedure How to Set Up Security for the User

1. Set up security for the Database Administrator.
2. Tab to the Users box, then type the user password., The File Access, Access Restrictions, and Same Restriction options are activated.
3. Select the type of file access from the File Access group.
Note: When the password is created and the cursor is in that field, you can right-click and use the edit options to undo, select all, cut, copy, paste, or delete the password.
4. Select the type of restriction — segment, field, and/or field value — from the Access Restrictions group, then select the type of access for each. For details, see *Restricting Access to Segments, Fields, and Field Values* on page 2-43.
5. Save the Master File with the user password and restrictions.

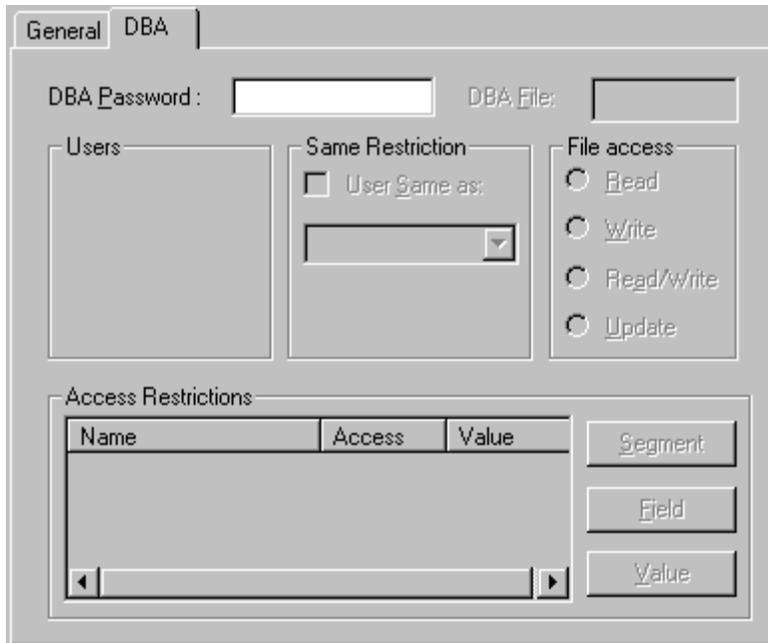
Reference DBA Guidelines

You can ensure that the security restrictions you place on Master Files are correct by adhering to these guidelines.

- Every file with access limits must have a DBA password.
- No segment, field, or field value restrictions may be specified at the Database Administrator level. The Database Administrator should have unlimited access to the data source and all cross-referenced data sources.
- Once security restrictions have been applied, the Database Administrator should conduct thorough testing of every restriction before the data source is used. It is particularly important to check field values to make sure they do not contain errors. If they are in error, user access to the fields' data will be unnecessarily restricted.
- All groups of cross-referenced data sources must have the same security restrictions.
- You must have a DBA password to encrypt and decrypt or restrict existing data sources.
- The Database Administrator can change any type of security restriction.

- Access levels effect what fields users can access. The Database Administrator must consider what commands each user will need. If a user does not have access rights, that user will receive an error message.

Reference Master File Tab: DBA (File Level)



For detailed information about Data source Administrator (DBA), see *Setting Up Security for a Master File* on page 2-38.

When you select the path in the Master File hierarchy, the DBA tab is available with the following fields/options:

DBA Password

Enter your DBA password of up to 8 characters. This is the password of the DBA who will be creating and maintaining the current data source. The DBA has full access to the data source and the corresponding Master File, controls the access rights of other users, and has encryption privileges. See *Encrypting and Decrypting a Master File* on page 2-41.

DBA File

Enter the name of the Master File that contains your DBA security restrictions. Other Master Files can use the DBA security restrictions in this Master File.

Users

Enter the passwords (up to eight characters) of users to whom access rights will be granted for the current data source.

Same Restriction: User Same as

If multiple users require the same access rights, indicate the user whose access profile you wish to apply and the new user to whom you wish to apply it. See *Applying Security Restrictions for Multiple Users* on page 2-43.

File access

Choose *Read access* for full viewing rights.

Choose *Write access* to permit additions/changes to the data source.

Choose *Read/Write* for both of the above.

Choose *Update access* to make changes to field values.

Access Restrictions

Name , User name.

Access , Type of access restriction.

Value , Value to restrict access to.

Segment, Field, Value

Choose *Segment* to grant access to all or individual segments.

Choose *Field* to grant access to all or individual fields.

Choose *Value* to limit access to values that meet a test condition. See *Restricting Access to Segments, Fields, and Field Values* on page 2-43.

Encrypting and Decrypting a Master File

You may use the Encrypt and Decrypt options to scramble and unscramble some or all of the contents of a data source. When you encrypt Master Files, they are secure from unauthorized examination.

Encryption at the data source level scrambles the entire contents of that Master File so it is unreadable. When you encrypt a Master File, you can decrypt it. Decrypting unscrambles the contents to its readable state.

Within a Master File, you can encrypt a segment. For details, see *Master File Tab: General (Segment Level)* on page 2-13.

Before you can encrypt or decrypt any Master File or segment, you must specify the DBA password. If you do not specify a DBA password, you will not be able to encrypt or decrypt.

Procedure **How to Encrypt a Master File**

1. At the file level in the Master File hierarchy (left pane), click the DBA tab and type the DBA password in the DBA Password box.
2. Save the Master File with the DBA password.
3. On the Command menu, choose *Security*, then select *Password*. A dialog box opens.
4. Type the DBA password, then click *OK*.
5. On the Command menu, choose *Security*, then select *Encrypt*.

The Master File is encrypted.

Procedure **How to Decrypt a Master File**

1. On the Command menu, choose *Security*, then select *Password*.
A dialog box opens.
2. Type the DBA password, then click *OK*.
3. On the Command menu, choose *Security*, then select *Decrypt*.

The Master File is decrypted.

Procedure **How to Encrypt a Segment**

1. Make sure a DBA password has already been assigned. For details, see *How to Set Up Security for the Database Administrator* on page 2-39.

Note: Encryption will not occur properly if the DBA password has not been set prior to the encryption of a segment.

2. Select a segment in the left pane.
3. Select the *Encrypt* check box next to the Segment Name in the General tab.
4. You can now add records to the segment.

Selecting the Type of Access

When you assign a user password, the *type of file access* and *access restrictions* become available. You must specify at least the type of access the user is permitted to have for the data source. The type of file access can be specified in the File Access group on the DBA tab. In this group, there are four file access options:

- **Read.** Allows the user only to read (to view) the data source.
- **Write.** Allows the user only to write (to add or to make changes) to the data source.
- **Read/Write.** Allows the user to read and write to the data source.
- **Update.** Allows the user to update (to make changes to) existing field values.

The type of file access determines what a user can do to the entire data source:

- If you specify only the type of file access, the user will have the specified access to the entire data source.
- If you want to impose additional limitations you can restrict access to segments, fields, and/or field values. See *Restricting Access to Segments, Fields, and Field Values* on page 2-43.

Restricting Access to Segments, Fields, and Field Values

You can restrict access to segments, fields, and field values in a Master File by specifying Access Restrictions for a user. When you specify what is to be restricted — segment, field, and/or field value — you can then specify the type of access that will be restricted. For fields, you can also specify whether or not you want the field to be displayed. For field values, you are required to enter a test condition.

- **Segments.** You specify the type of access for individual segments or all segments.
- **Fields.** You specify the type of access for individual fields or all fields. You can also specify not to display the data in that field using NoPrint. If you specify NoPrint for a field, the data will appear as blanks for alphanumeric format or zeros for numeric format whenever the user tries to retrieve it.
- **Field Values.** You specify the type of access (read or write) and the test condition. The user is restricted to using only those values that satisfy the test condition.

Applying Security Restrictions for Multiple Users

You can specify restrictions for one user and apply the same restrictions to other users. This helps when you want to set the same restrictions for a group of users.

Procedure How to Apply Previously Defined Restrictions to Another User

1. On the DBA tab, type the new user password in the Users box, then press *Enter*.
The Same Restrictions group is activated.
2. In the Same Restriction group, click the *User Same as* check box.
3. Click the arrow on the drop-down combo box, then select the user with the security restrictions that would apply to the new user., Security restrictions from the user in the User Same as box are applied to the new user. You can apply the security restrictions to other users by repeating steps 1 to 3.

Note: You must have created at least one user security restriction to apply security restrictions to multiple users.

Deleting a DBA or User's Password

You can delete a DBA or user's security when it is no longer needed.

Procedure How to Delete a User's Password

1. On the DBA tab, type the user password in the Users box.
or
Double-click on the user name so it displays in the Users box.
2. Right-click and select *Delete* or press *Delete* on the keyboard., The DBA dialog box opens.
3. Select *Yes*.

If you delete the user based upon whom you have assigned security restrictions for other users, you must reset security restrictions for all users attached to the user you deleted.

Procedure How to Delete a DBA Password

Note: Deleting a DBA's security will delete all users' security for that data source.

1. On the DBA tab, type the DBA password in the DBA Password box.
2. Right-click and select *Delete* or press *Delete* on the keyboard., A Warning dialog box opens.
3. Select *OK*.

Viewing the Master File Layout

You can view a Master File in two ways:

- The file folder hierarchical structure displays in the left pane when you open a Master File. It shows the directory path and the root segment, followed by either fields, or other segments with fields.
- The branch structure shows the directory path, root segment, and any other segments in that Master File. The branch structure does not show fields in the Master File, however it provides a clearer view of the relationships between segments.

Procedure How to View a Master File

Click the *Show Layout Window* button on the toolbar to display the Master File in a branch structure.

Procedure How to Open a Master File in the Editor (Reporting Environment)

1. From an open project, right-click the *Master Files* folder and select *New* or choose *New* from the File menu.

The New Master File dialog box opens.

2. Choose a *Master File Source*, then select a Master File from the Master File list.
3. Click *OK*.

The Master File you selected opens in the editor.

Previewing and Printing a Master File

You can preview and/or print a Master File to view its code. The editor provides the following options:

- **Show Master Text.** Allows you to display only the Master File as read only text.
- **Print Preview.** Allows you to display the Master File as read only text formatted for printing.
- **Editor (Reporting Environment only).** Allows you to display the Master File or Access File as read and write text. To view a Master File in the Text Editor you *must* exit the Master File in the Master File Editor, then reopen it in the Text Editor.

You can also print the code for a Master File using the Print option on the File menu.

Procedure How to View a Master File as Read-Only Text

1. From the open Master File, right-click the path (Reporting environment) or name (Maintain environment) above the root segment in the hierarchical pane.
2. Select *Show Master Text*.

The file opens as code in the File As Text (Read-Only) dialog box.

Procedure How to Preview a Master File

1. From the open Master File, select *Print Preview* from the File menu. The Master File opens as code in a print preview window.
2. In this window you can zoom in and out, view two pages at once, view the next or previous page, print the Master File, and/or close the print preview window and return to the Master File Editor.

Procedure **How to Print a Master File as Text**

Note: You can also print the Master File from the Print Preview option.

1. From the open Master File, select *Print* from the File menu., The Print dialog box opens.
2. Set the Printer, Print Range, and Copies options and click *OK.*, The Master File prints as code on the printer you designated. The printed document shows the Master File path and the date and time it was printed.

Note: In the reporting environment, you can also print a Master File as text by right-clicking the Master File and selecting Print.

CHAPTER 3

Creating Synonyms

Topics:

- Creating Synonyms
- Creating Synonyms for OS/390 MVS Using the Synonym Wizard

Before you can create a procedure that reports against a data source, your project must understand how the data is organized. To obtain this information, your project reads a data source description or a synonym for that description. A synonym is an alias for a data source, which tells the server where to find tables and how they are described. The data source description or synonym consists of two files:

- A **Master File**, which contains field names and formats for the columns in the data source. The synonym also contains an alias for the data source.
- An **Access File**, which contains additional information, including the real name and location of the data source.

If these synonyms do not already exist on the server, you can quickly create them using the Server Console. For details, see *Creating Synonyms* on page 3-2.

To create synonyms for an OS/390 MVS platform, you must use the Synonym Wizard. For details, see *Creating Synonyms for OS/390 MVS Using the Synonym Wizard* on page 3-11.

The appropriate tool to create synonyms will be launched for each platform.

Note: To make use of the synonyms you create, the WebFOCUS Reporting Servers must be configured to use APP PATH logic. For details about APP PATH, see *Creating Synonyms* on page 3-2 and the *Developing Reporting Applications* manual.

Creating Synonyms

Whether you are developing projects in the local server environment (the Projects on localhost area), or running procedures from the Data Servers area under WebFOCUS Environments, you will need to ensure that the WebFOCUS Reporting Server has the data source descriptions or synonyms it requires to locate and interpret your data sources. You can create synonyms using your WebFOCUS Reporting Server's Server Console.

You must configure a data adapter using the Server Console before you can create a synonym. See *How to Configure a Data Adapter Using the Server Console* on page 3-2.

Note: You must make sure that the WebFOCUS Reporting Server is configured to use APP PATH logic. Synonyms are stored within folders based on the APPROOT setting in the WebFOCUS Reporting Server. The default setting for APPROOT is *install_drive/ibi/apps*. This is the default path defined as the alias on the WebFOCUS Reporting server. For more information about APP PATH, see *Developing Reporting Applications*. Cataloged Path (EDAPATH) is not supported.

Procedure How to Configure a Data Adapter Using the Server Console

1. From Developer Studio, go to the Command menu and select *Server Console*.

The Server Console opens.

2. Click the *Data Adapters* link.
3. Open the Add folder to expand the list of available data adapters.
4. Click the (+) sign next to the data adapter you want to configure.
5. Click the data adapter you want to configure.

A list of fields is displayed in the Database Configuration screen.

6. Type the required parameters in the fields.
7. Click *Configure*.

Note: The configuration information for data adapters is stored in two configuration files—EDASPROF.PRF and EDASERVE.CFG.

The data adapter is now listed under the Configured folder on the left side of the Server Console window.

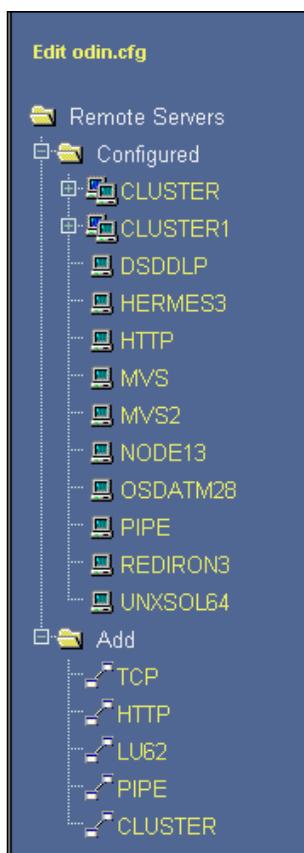
For details about the Server Console and configuring data adapters, see the *iWay Server Administration for UNIX, Windows, OpenVMS, OS/400, OS/390, and z/OS* documentation.

Adding a Remote Server

If you prefer to use a WebFOCUS Reporting Server other than the one installed locally on Developer Studio, you can add a remote server. You can then create and store synonyms on the remote server and then report on its data. Begin by determining which WebFOCUS Reporting Server accesses the data you wish to report on, then add it to your local WebFOCUS Reporting Server. If you create a synonym on a remote server, it will become available in your local environment.

Procedure How to Add a Remote Server

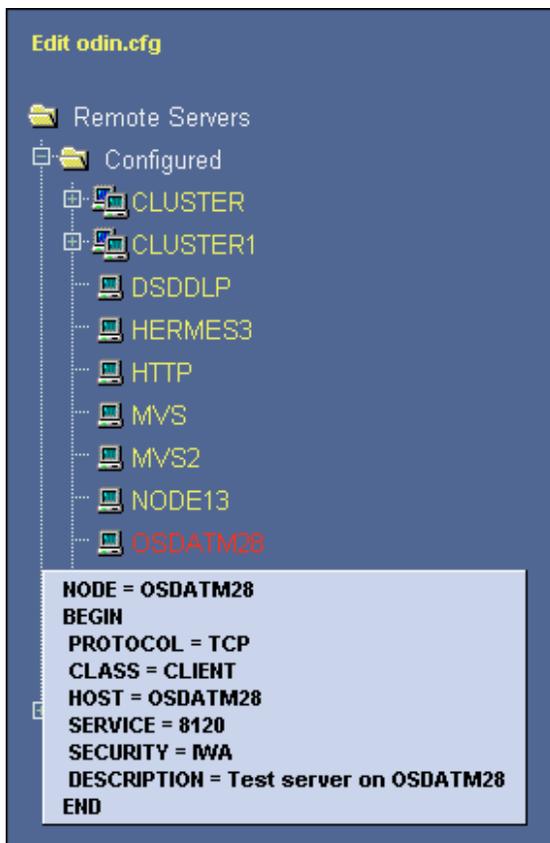
1. From Developer Studio, go to the Command menu and select *Server Console*.
The Server Console opens.
2. Click the *Remote Servers* link on the left side of the Server Console window.
3. Click the Remote Servers folder.
4. Open the Add folder to expand a list of communication protocols.



5. Choose a protocol to use for connecting to the remote WebFOCUS Reporting Server. For most Windows and UNIX machines, you can connect using TCP.

A list of fields is displayed in the right pane of the Server Console window where you must supply required information for the remote server based on the protocol that was selected.

6. Type the required parameters in the fields.
7. Click *Save*. For information about the configured remote servers, place your cursor over the server's name or click the ODIN.CFG link to view all configured remote servers.



Note: For TCP or HTTP connections, be sure to change the Service field to the appropriate port or service for the remote WebFOCUS Reporting Server. The default TCP port is 8120, not 8100. The default HTTP port is 8121, not 8101.

8. The remote server is now listed under the Configured folder on the left side of the Server Console window. You can test the connection by clicking the server and selecting *Test* from the menu.

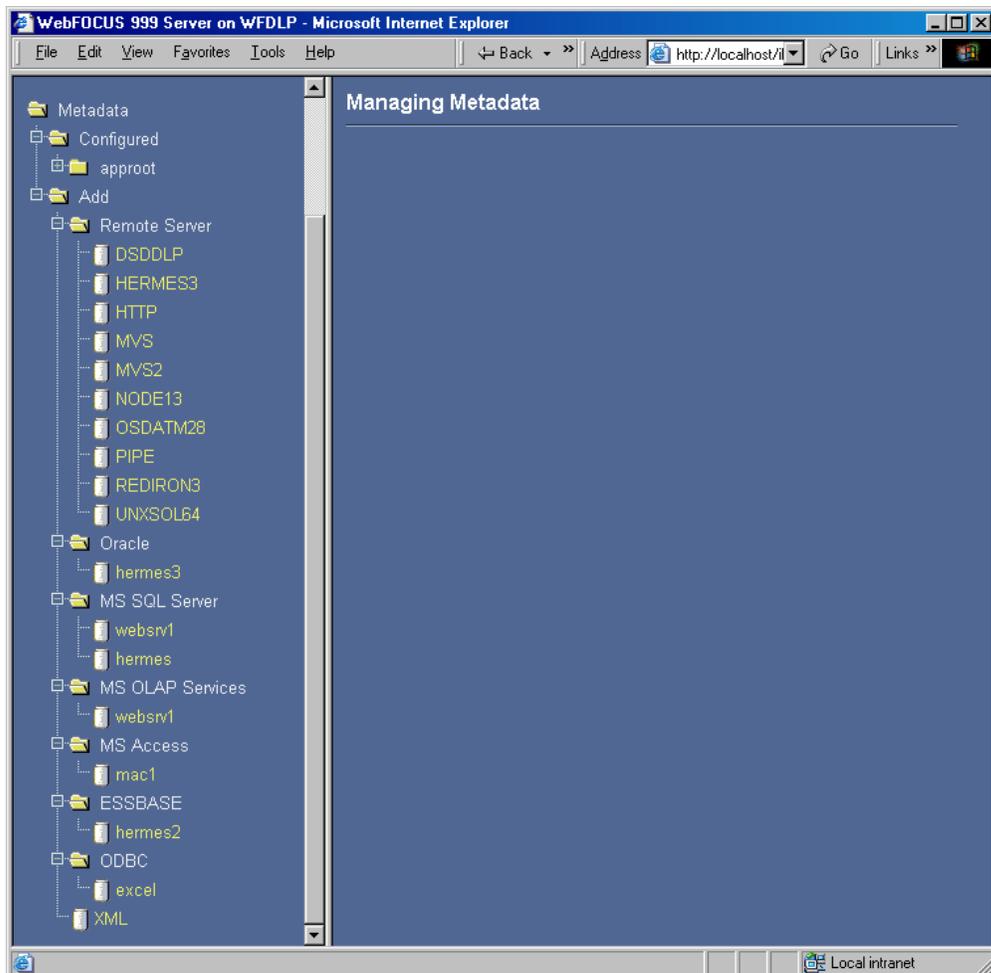
Procedure **How to Create a Synonym From the Projects on Localhost Folder**

You must create a data adapter before you can create a synonym. For details, see *How to Configure a Data Adapter Using the Server Console* on page 3-2.

Note: Synonym names can have a maximum of 64 characters, but spaces and special characters are not supported.

1. Right-click a Master File folder under Projects on localhost, select *New*, and then *Synonym*.

The Server Console window opens at the Metadata page.



2. By default, the tree under the Add folder is expanded and shows all remote servers and configured data adapters.

3. Click a connection name under a configured data adapter in order to start the Create Synonym process.

After synonyms have been created, the project where the Create Synonym tool was launched is displayed under the Configured folder. Master Files will be listed for the selected project.

4. Click a synonym to see a list of available options.

Relevant options are:

Sample data

Click this option to run a query against the data source and view records.

Edit Master File

Click this option to edit synonym code and click *Save* to save your changes.

Refresh

Click this option to recreate synonyms in order to update field information while preserving the old synonym's title, description, usage, virtual field, and DBA information. This feature also synchronizes the Master File with the table on which the synonym is based.

Drop

Click this option if you want to delete a Master File.

Procedure How to Create a Synonym From the WebFOCUS Environments Folder

You must configure a data adapter before you can create a synonym. For details, see *How to Configure a Data Adapter Using the Server Console* on page 3-2.

For all platforms with the exception of OS/390 MVS, you will create synonyms from the Server Console's Metadata page

Note: If your server is running on OS/390 MVS, you will launch the Synonym Wizard, which enables you to create synonyms for that specific platform. For more information, see *How to Create a Synonym For OS/390 MVS Using the Synonym Wizard* on page 3-12.

1. Open the Data Servers folder under WebFOCUS Environments.
2. Click the plus (+) sign next to a server name.
3. Open the Applications folder under a server.
4. Right-click an application, select *New Data File*, and then *Create Synonym*.

Note: You will only see folders based on the server's APPROOT setting.

The Server Console window opens at the Metadata page.

5. By default, the tree under the Add folder is expanded and shows all remote servers and configured data adapters.
6. Click a connection name under a configured data adapter in order to start the Create Synonym process.

Note: Synonym names can have a maximum of 64 characters, but spaces and special characters are not supported.

After synonyms have been created, the application where the Create Synonym tool was launched is displayed under the Configuration folder. Master Files will be listed for the selected application.

7. Click a synonym to see a list of available options.

Relevant options are:

Sample data

Click this option to run a query against the data source and view records.

Edit Master File

Click this option to edit synonym code and click *Save* to save your changes.

Refresh

Click this option to recreate synonyms in order to update field information while preserving the old synonym's title, description, usage, virtual field, and DBA information. This feature also synchronizes the Master File with the table on which the synonym is based.

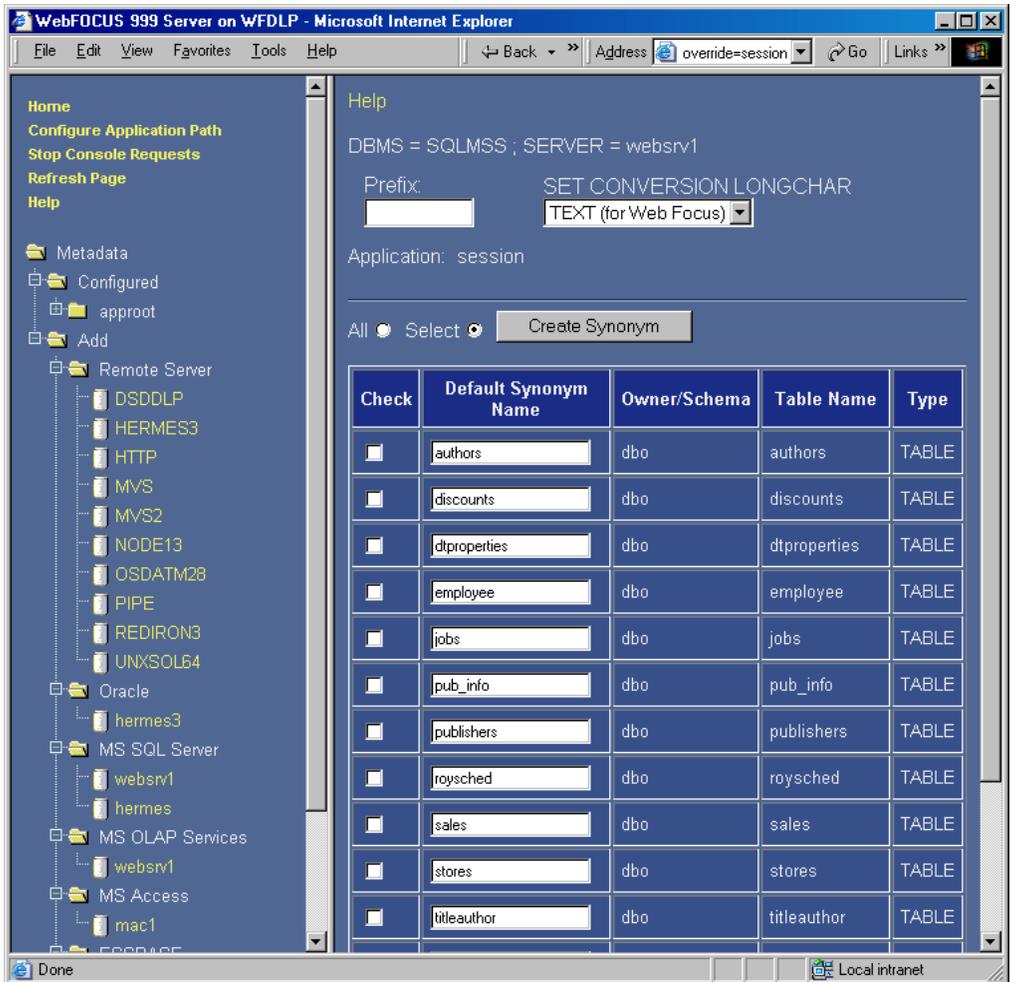
Drop

Click this option if you want to delete a Master File.

Procedure How to Select All Tables/Views

1. Click a configured remote server or data adapter.
2. Click the *Select All/Tables Views* radio button on the right side of the Server Console window.
3. Click the *Select Tables* button in order to retrieve all available tables from the remote server.

You will see a window with tables similar to the one below:



4. Select the *All* radio button to create Master and Access files for all tables.

You can change a synonym name in the Default Synonym Name field by typing a new name in the field box. Otherwise, check specific tables to use for reporting.

The Master and Access files are placed in the project or application directory (*drive:\apps\baseapp*) where the Create Synonym tool was launched.

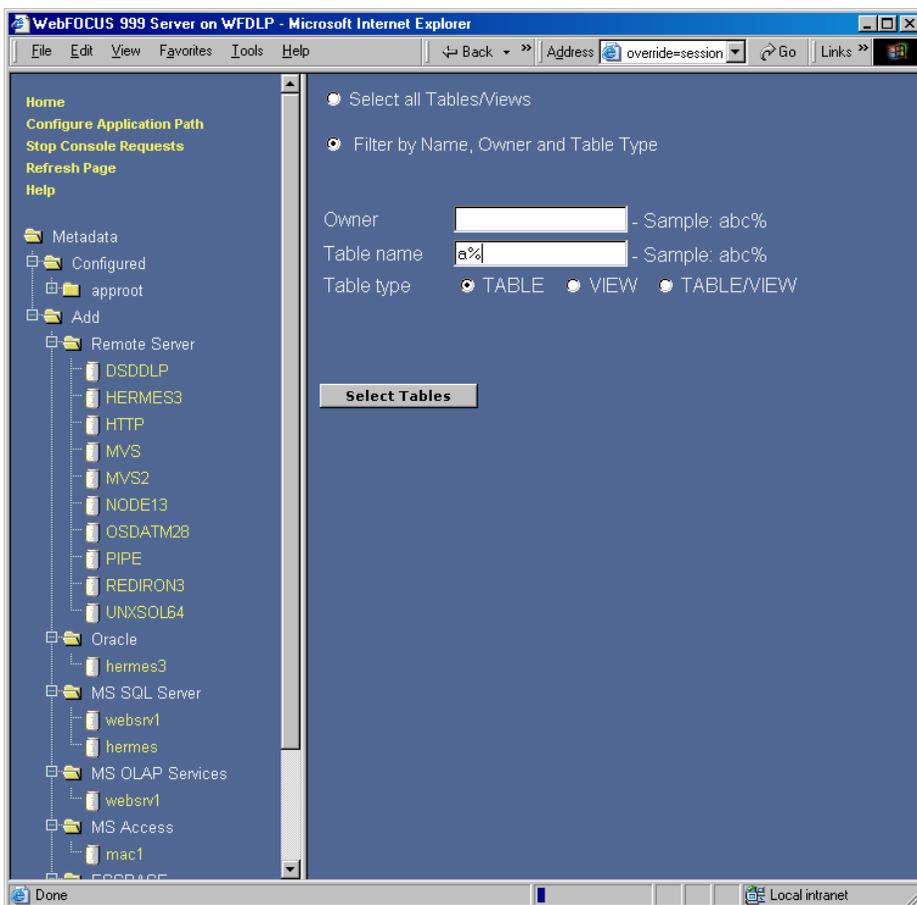
5. Click the *Create Synonym* button.

It may take some time for the process to complete, but when the files are created, they appear on your local machine. You are then ready to create projects using your local WebFOCUS Reporting Server. When you create synonyms from the Projects on localhost folder, you can use them for local development. If you create them from the WebFOCUS Environments folder, tables are created on the remote server to launch the Create Synonym tool. If you want to add a remote server, see *How to Add a Remote Server* on page 3-3 for details.

Procedure How to Apply Filters by Name, Owner, and Table Type

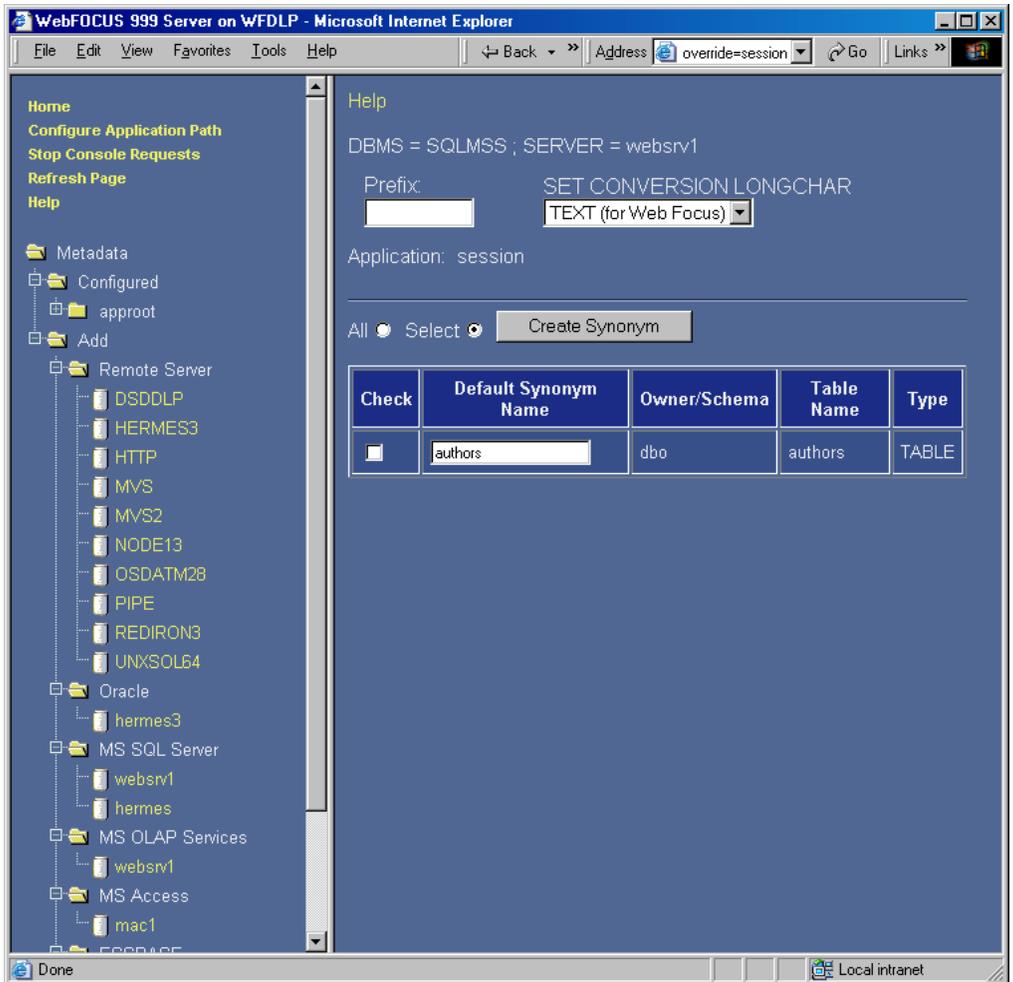
1. Click a configured remote server or data adapter.
2. Click the *Filter by Name, Owner, and Table Type* radio button on the right side of the Server Console window.

You will see a window similar to the one below:



3. Type information into the fields.
4. Click the *Select Tables* button in order to retrieve all available tables from the remote server.

The window shows the tables returned after you applied the filter:



5. Select the *All* radio button to create Master and Access files for all tables.

You can change a synonym name in the Default Synonym Name field by typing a new name in the field box. Otherwise, check specific tables to use for reporting.

The Master and Access files are placed in the project or application directory (*drive:\apps*) where the Create Synonym tool was launched.

6. Click the *Create Synonym* button.

It may take some time for the process to complete, but when the files are created, they appear on your local machine. You are then ready to create projects using your local WebFOCUS Reporting Server. When you create synonyms from the Projects on localhost folder, you can use them for local development. If you create them from the WebFOCUS Environments folder, tables are created on the remote server to launch the Create Synonym tool. If you want to add a remote server, see *How to Add a Remote Server* on page 3-3 for details.

Creating Synonyms for OS/390 MVS Using the Synonym Wizard

For OS/390 MVS platforms, you must use the Synonym Wizard to create synonyms for use in reporting against other remote servers (or subservers) that are configured on the target server. You can also create synonyms against DB2, the only relational data source supported on MVS.

Viewing Synonyms and Tables

You can use the Synonym Wizard to create a synonym for a data source on the WebFOCUS Reporting Server, based on the native schema that resides with the data. If the remote server is configured as a subserver to a hub server, the Synonym Wizard can generate a synonym on the hub server, including an Access File that identifies the location of the data on the subserver.

The Synonym Wizard guides you through the creation process for one or more synonyms. The synonyms are created on the WebFOCUS Reporting Server in the current application. The new synonym appears in the Master Files folder from which the wizard is launched.

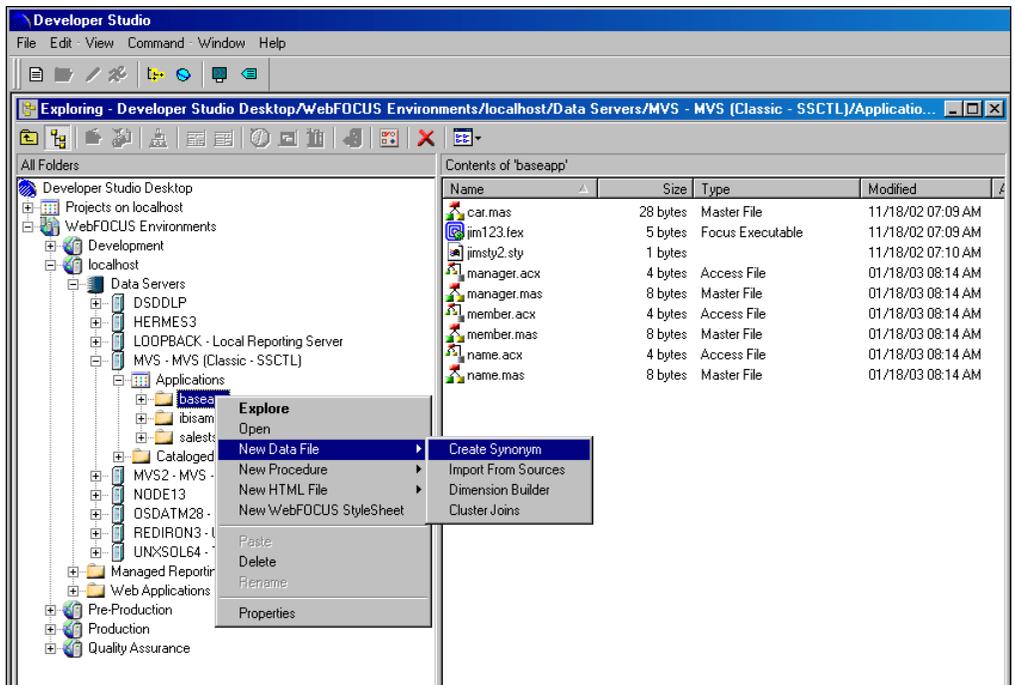
Note: For FOCUS data sources, WebFOCUS uses the original Master Files stored on the server, therefore no synonyms are required.

Procedure How to Create a Synonym For OS/390 MVS Using the Synonym Wizard

You can launch the Synonym Wizard for OS/390 MVS from the Data Servers area in the WebFOCUS Environments folder.

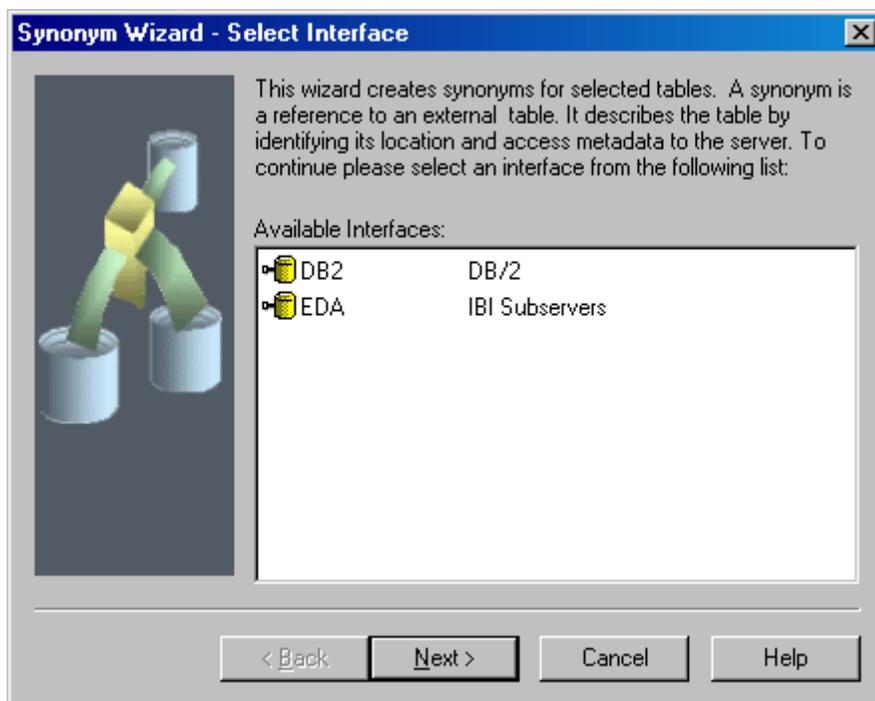
Note: Synonym names for MVS can have a maximum of 8 characters, but spaces and special characters are not supported.

1. Open the WebFOCUS Environments folder and navigate to the Data Servers area.
2. Open the Applications folder under a server.
3. Right-click an application, select *New Data File*, and then *Create Synonym*.



The Synonym Wizard - Select Interface window opens, displaying a list of relational data sources that are available on the WebFOCUS Reporting Server you are connected to, or a list of subservers configured in this environment.

The Synonym Wizard - Select Interface window displays a list of interfaces that are available on your server.

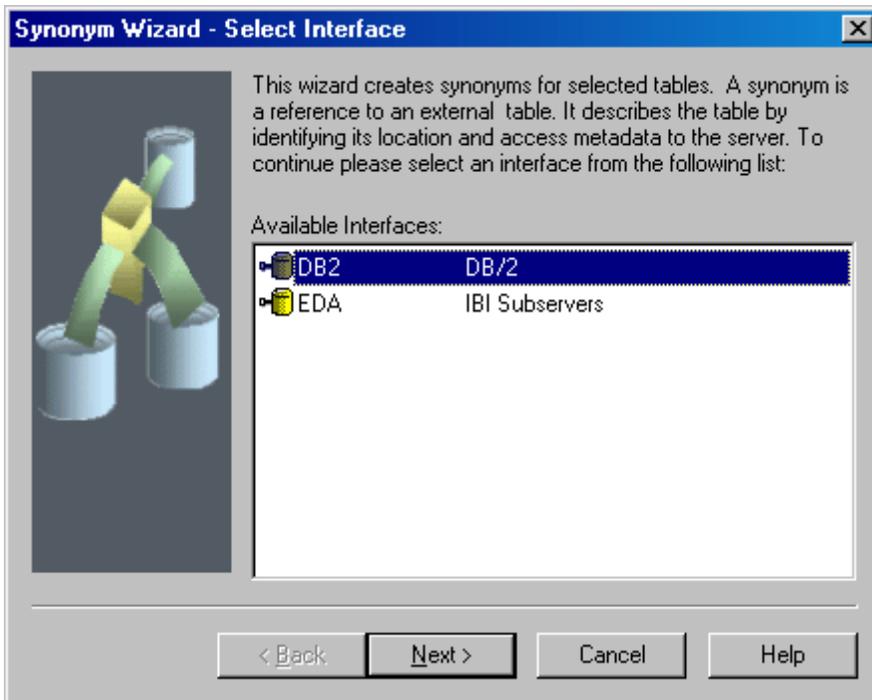


- The server configuration—as indicated by the server profile—determines which data adapters are listed as available. DB2 is shown if the adapter is configured on the remote server. EDA is shown if the remote server is configured to access other iWay Servers.
 - The server configuration—as indicated by the server profile—determines which interfaces are available.
- 4.** Click *Next* to continue.

Selecting a Synonym Source

Select an interface, and click *Next*.

The Synonym Wizard - Select Interface window displays.



Selecting a Database

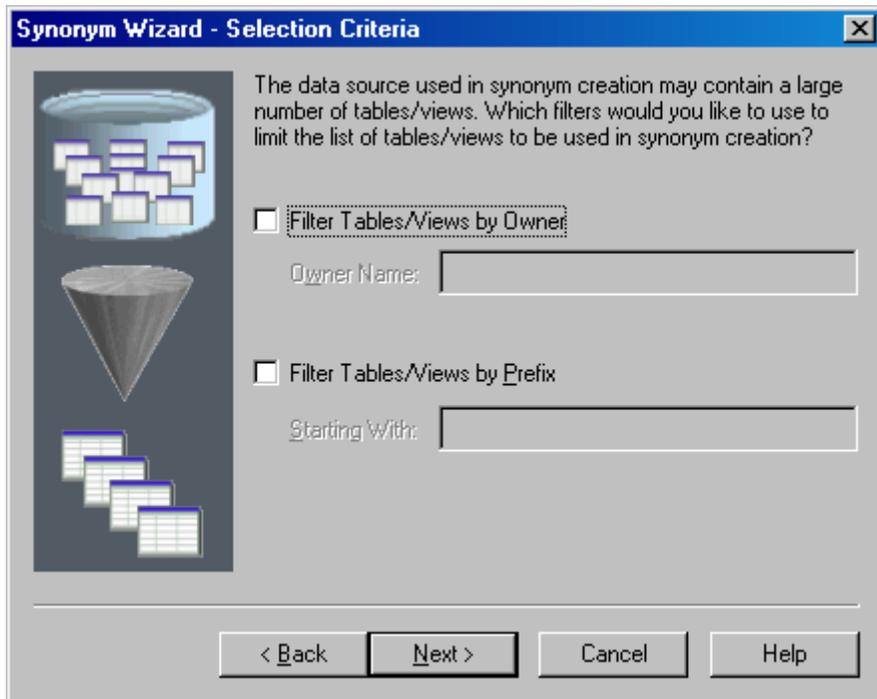
Once you have selected the interface and server, some RDBMSs allow you to choose a database from which to display a list of tables.

Procedure How to Select a Database

1. Select the appropriate database if the adapter supports databases.
2. Click *Next*.

Applying Filters

1. Apply filters based on owners or table prefixes to limit the list of tables to be returned from the remote data source. (If you do not include selection criteria, the entire list of tables is displayed.)



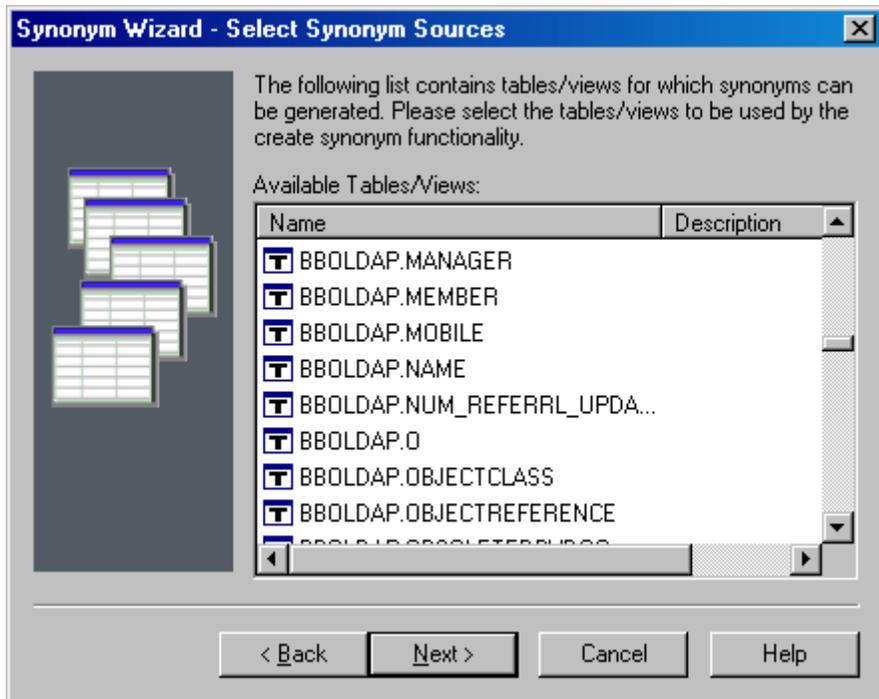
2. Click Next.

Selecting Table/Views

Once you have selected a DBMS Interface, server, and database, the Synonym Wizard - Selection Criteria window displays.

1. Click *Next*.

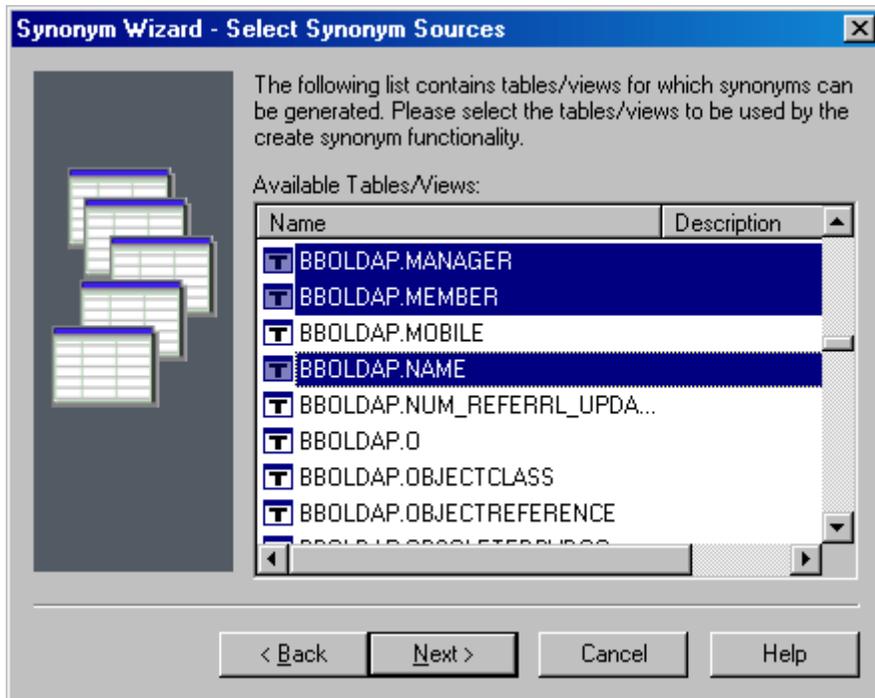
The Synonym Wizard - Select Synonym Sources window displays.



2. Click *Next* to continue.

Procedure How to Select Tables/Views for A Synonym Creation

1. Select the Table/View name.



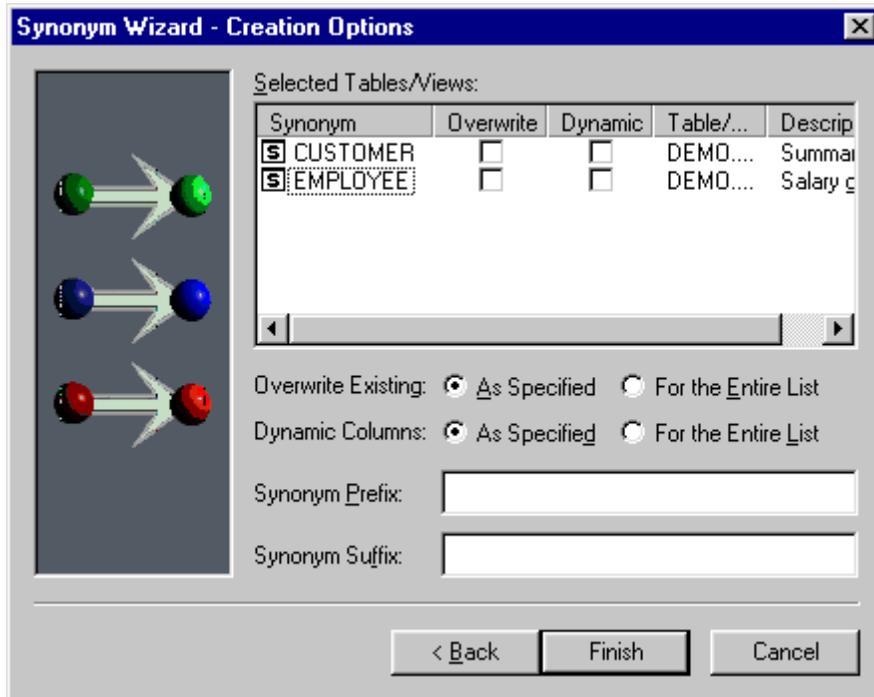
2. Click *Next* to continue.

Procedure How to Select More Than One Table for Synonym Creation

1. Click the table for which you want to create the synonym.
2. Use the Shift key to select contiguous tables or the Ctrl key to select non-contiguous tables. You can also use the Ctrl key to deselect a table.
3. Click *Next* to continue.

Assigning Synonym Names

The Synonym Wizard - Creation Options window displays the list of tables you have chosen for synonym creation.



By default, the table name is used as the synonym name. If a synonym already exists for the specified name, it will not automatically be replaced by the new synonym.

The Synonym Wizard-Creation Options dialog box has the following options:

Overwrite Existing: As Specified

Overwrites an individual existing synonym.

Overwrite Existing: For the Entire List

Overwrites all existing synonyms.

Dynamic Columns: As Specified

Creates a synonym without any columns.

Dynamic Columns: For the Entire List

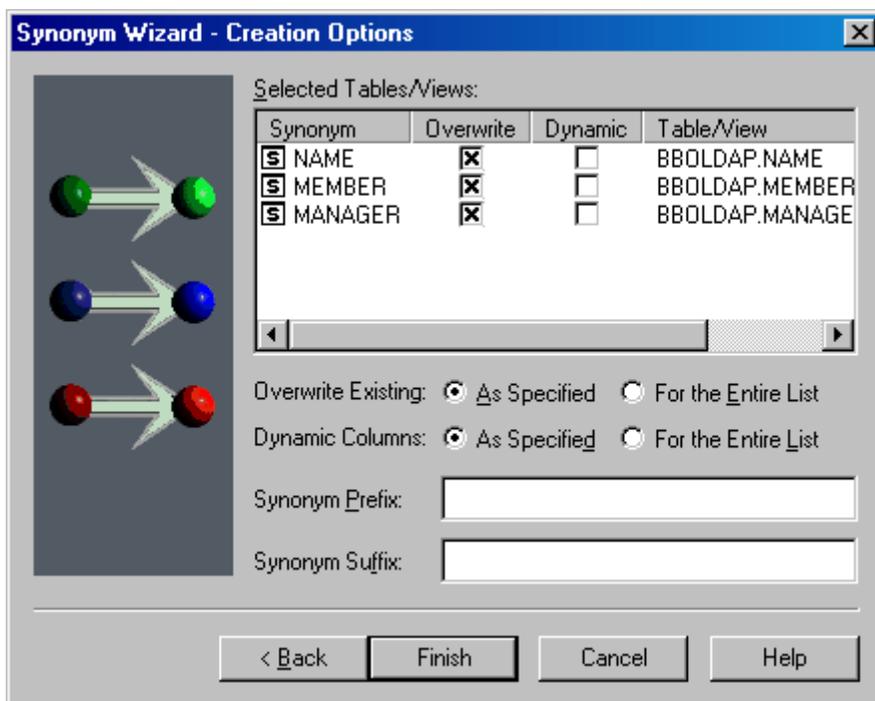
Applies dynamic columns to all synonyms. This option is especially useful in a test environment that has a constantly changing data structure.

Procedure How to Rename a Synonym

1. Click once on the synonym name to highlight it, pause, then click again. This activates the cursor and allows you to change the text.
2. Type the new name for the synonym.
Note: The synonym name can be up to 64 characters.
3. Click *OK* to continue.

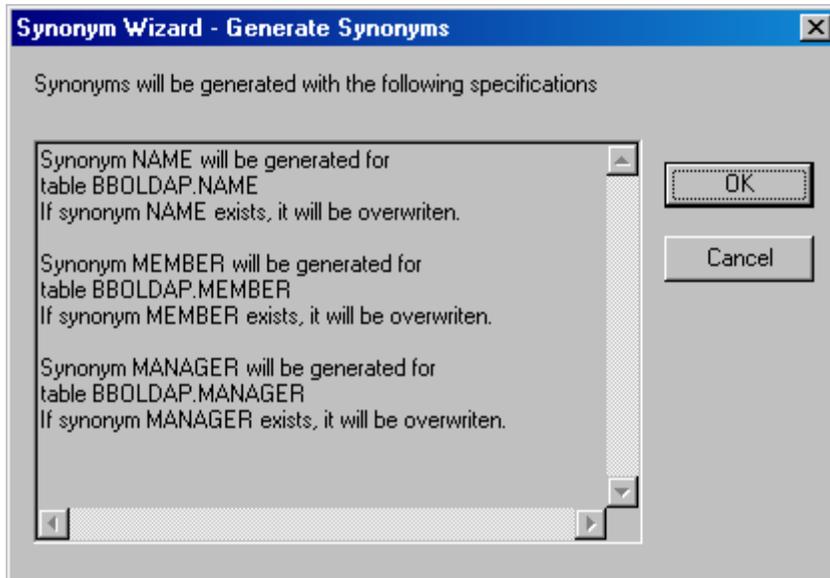
Procedure How to Assign a Unique Prefix or Suffix to All Synonyms

1. Type a prefix in the *Synonym Prefix* entry box, or a suffix in the *Synonym Suffix* entry box.
2. The synonym name changes to include the suffix or prefix you entered.



3. When all selections have been made, click *Finish*.

The Synonym Wizard - Generate Synonyms window displays.



4. Click *OK* to generate synonyms.

The new synonyms are created in the folder where the Synonym Wizard was launched.

Procedure How to Refresh Synonyms

You can recreate synonyms in order to update field information while preserving the old synonym's title, description, usage, virtual field, and DBA information with the Refresh Synonym feature. This feature also synchronizes the Master File with the table on which the synonym is based.

This feature is available in the Projects on localhost folder and in the Data Servers area under the WebFOCUS Environments folder.

1. Right-click a synonym (Master File).
 - In the Projects on localhost folder, Master Files are listed in a Master Files folder under a project's name.
 - In the WebFOCUS Environments folder, Master Files are listed in the Data Servers area under an application's name.

2. Choose one of the following:

- *Replace* to recreate the Master File.
- or
- *Create new...* to provide a name for the new synonym.

When you choose this option, a new synonym is created based on the name you provide, but the original Master File or Access File is not modified.

Synonym names for MVS can have a maximum number of 8 characters, but spaces and special characters are not supported. All other synonym names can have a maximum of 64 characters, but they also cannot include spaces or special characters.

Deleting Synonyms

Master Files and Access Files are removed from the server when you delete a synonym.

1. In the Explorer Window, right-click the synonym you want to delete.
You will be asked to confirm your deletion.
2. Click *Yes* to delete or *No* to cancel.

Procedure How to View or Edit Synonym Code

This feature is available in the Projects on localhost folder and in the Data Servers area under the WebFOCUS Environments folder.

1. Right-click a synonym (Master File).
 - In the Projects on localhost folder, Master Files are listed in a Master Files folder under a project's name.
 - In the WebFOCUS Environments folder, Master Files are listed in the Data Servers area under an application's name.
2. Choose one of the following:
 - *Edit as Text* to display code in the text editor.
 - or
 - *Open* to display in the graphical Master File Editor.

Note: By default, you can view Access (.ACX) Files in the Master Files folder in the Projects on localhost area. In the WebFOCUS Environments folder, you can view Access Files under an application's name.

To view Access File code, right-click the Access (.ACX) File and then choose *Open* or *Edit Access File as Text*.

Procedure **How to View the Properties of a Synonym**

1. Right-click a synonym in the Explorer window and select *Properties*.

The Properties dialog box displays general file information, such as location, size, and other attributes.

2. Check one of the following:

Read-only

Secures the file because you can not edit or delete it.

or

Encrypted

Encrypts the contents of the file if the file has DBA security.

CHAPTER 4

Defining Dimensions for OLAP Analysis

Topics:

- Overview
- Using Dimension Builder

The Dimension Builder enables you to create logical views based on enterprise data (relational or legacy data sources) for multi-dimensional analysis without manually editing metadata. Dimension Builder works with FOCUS data sources and relational tables.

Note: You can use Dimension Builder as an alternative to the OLAP tab in the Master File Editor.

Overview

Dimension Builder enables you to generate new Master Files with dimensions (using WITHIN statements) or add dimensions to existing Master Files that need to be used for multi-dimensional analysis. Once a Master File is created, it contains the new file structure and the Access File, which describes:

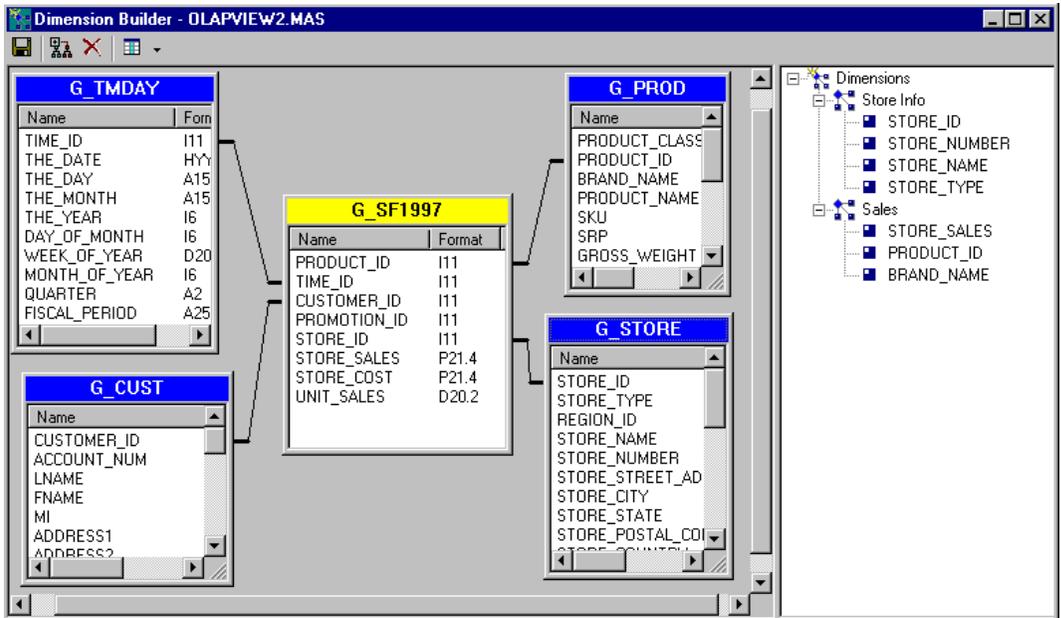
- The relationships of the joined tables using fact and dimension tables.
- The actual data source location.

Note: An Access File is created only for relational tables (for example, Oracle, DB2, or Sybase). An Access File is not created for FOCUS data sources.

The Dimension Builder allows you to create logical views of data by joining physical tables and creating virtual views of that data. The following restrictions apply:

- Joins are permitted only when using relational tables of the same type.
- When using FOCUS data sources, joins are not allowed. You are limited to using a single table and working with the multiple segments within the table as if they were different tables.

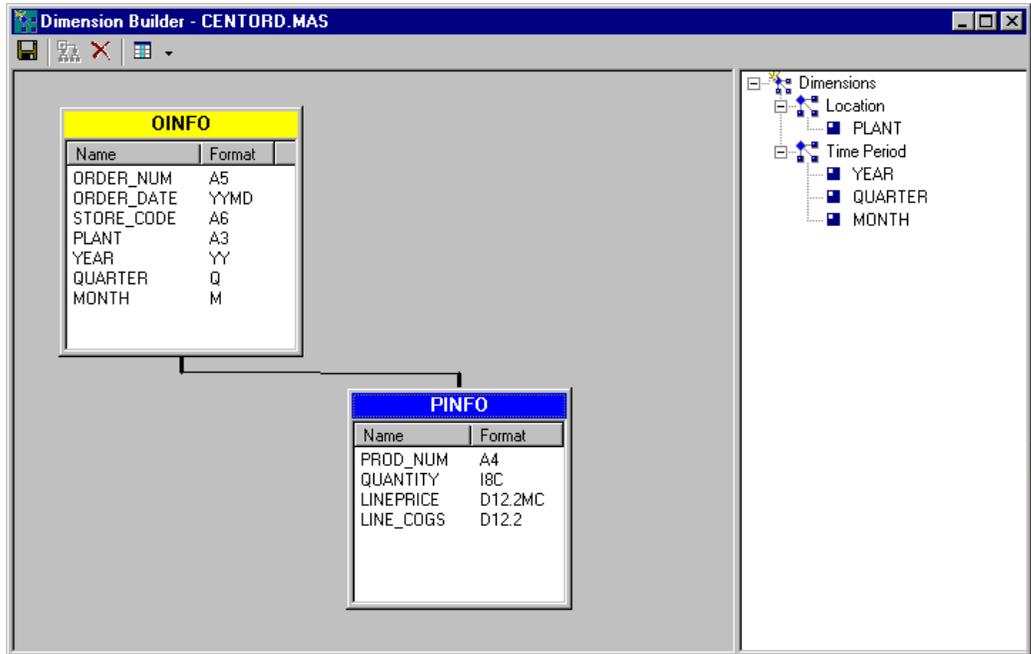
When using relational tables, a star schema (a Fact table linked to Dimension tables) is used. For example:



In the example above, G_SF1997 is the Fact table and the surrounding four tables, each linked to the Fact table, are dimension tables, which contain the attributes of the fact records.

Single files are used when working with FOCUS data sources.

When using FOCUS data sources, the Dimension Builder splits the various segments of the data source and creates a star schema view by virtually joining the segments. For example:



Note: These virtual joins cannot be modified.

Using Dimension Builder

Dimension Builder enables you to:

- Choose Fact and Dimension Tables.
- Specify Dimensions for Reporting.
- Manage Dimension Hierarchies.
- Edit Master Files.

You launch Dimension Builder from the File menu or All Folders window.

Procedure How to Launch the Dimensions Tool From the Procedure Window

To launch Dimension Builder from the Procedure window, perform the following steps:

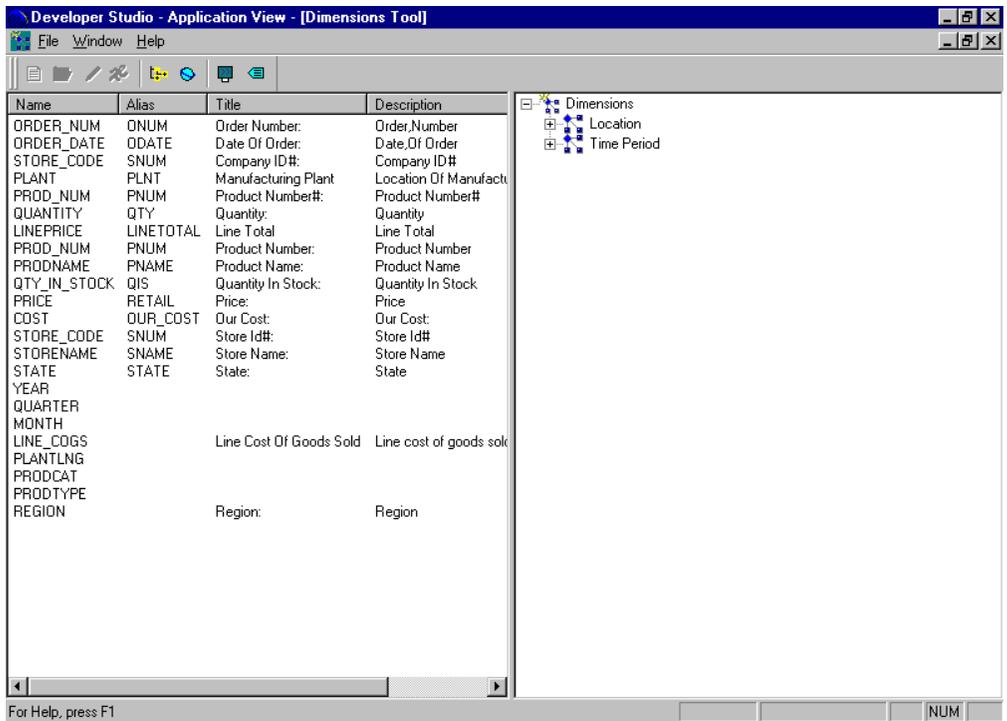
1. Right-click a component connector and select *Dimensions*.
2. In the Open dialog box, select a Master File for which you want to create dimensions and click *Open*. The Dimension Tool opens with the Master File you selected.

Procedure How to Launch the Dimensions Tool From the Report Painter

To launch the Dimension Builder from the Report Painter, perform the following steps:

1. Right-click a component connector and select *Dimensions*.
2. From the Report menu, select *OLAP Dimensions*.

Select a Master File for which you want to create dimensions. Click *OK*. The Dimension Tool opens with the Master File you selected.



Specifying Dimensions for Reporting

You can create and name a dimension by dragging a field from the Fact or dimension tables under the Dimension entry in the right pane of the Dimension Builder window, or by entering a name for the root dimension by right-clicking on Dimensions in the right pane.

Once you have created your dimension hierarchy for a Master File, close the Dimension Tool to return to the Report Painter. You can now use this hierarchy with the OLAP Control Panel. For more information about the OLAP creation tool, see the following chapters in *Creating Reports With Graphical Tools*:

- Chapter 11, *Business Intelligence Using OLAP Analysis*
- Chapter 12, *Manipulating Data in an OLAP-Enabled Report*

Managing Dimension Hierarchies

You can create a dimension by dragging and dropping a field from the Field list into the Dimension panel. Once dimensions are created, you can drag and drop these dimensions within the hierarchy to reorganize the structure.

Procedure How to Create a Dimension

1. Select a field from the Field list.
2. Drag and drop the selected field to the appropriate level in the right pane of the Dimension Builder window.

Procedure How to Delete a Dimension

To delete a dimension, right-click a dimension and select *Delete*.

Editing Master Files With Dimension Builder

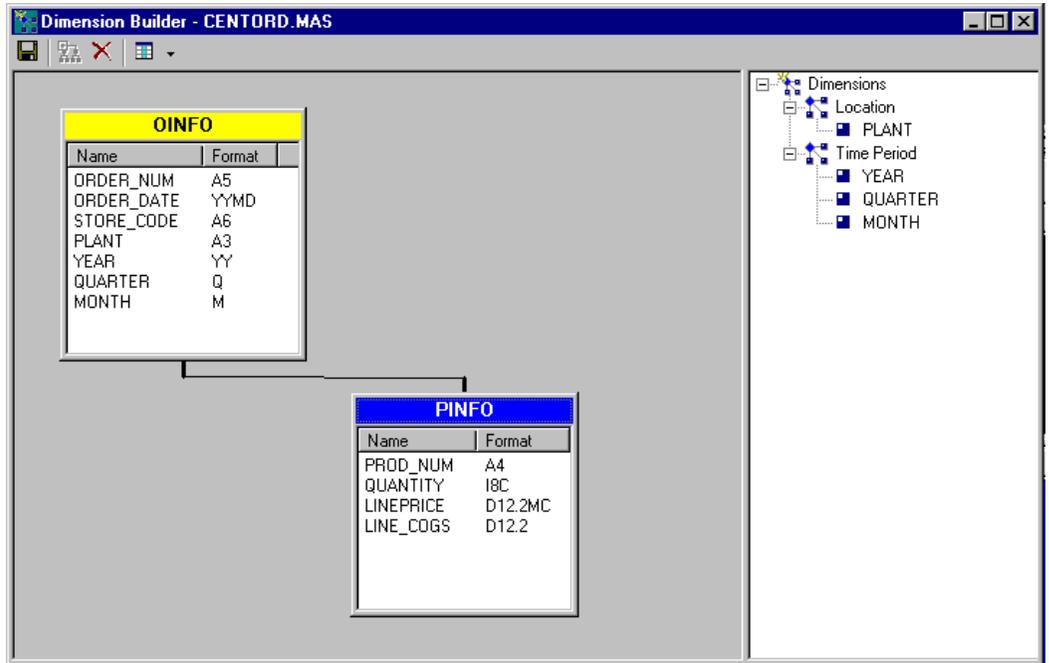
You can edit a Master File with Dimension Builder from the File menu or All Folders window.

Procedure How to Edit a Master File With Dimension Builder

To edit a Master File with the Dimension Builder, perform the following steps:

1. Select the Master File you want to edit.
2. Right-click and select *Edit With Dimension Builder*.

The Dimension Builder displays with the Master File you selected:



CHAPTER 5

Adding Data and Rebuilding FOCUS Data Sources

Topics:

- Creating a FOCUS Data Source
- Rebuilding a Data Source

If you choose to create a Master File schema before the corresponding FOCUS data source has been created, you will need to create and populate the FOCUS data source before you can use it in reports or other requests. For details about creating a Master File, see Chapter 2, *Creating Master Files*.

Furthermore, if you modify a Master File in the course of your work, you can rebuild the corresponding data source using a graphical Rebuild utility.

Creating a FOCUS Data Source

When you save a Master File, you must also create a corresponding blank data source that will hold the data for the fields defined in the Master File. This data source is saved in the application's directory.

After creating the blank data source, you can load data into it with a MODIFY request, or a Maintain request. Once you have populated the data source you can use it in conjunction with the Master File in a report request.

Procedure How to Create a Data Source

1. Open the Master File Editor and display the Master File shell you created.

Tip: Since this a required step, you may wish to complete this procedure immediately after creating the Master File, before you close the Master File Editor.

2. Close the Master File Editor. Click Yes when you are prompted to create a blank FOCUS (.foc) database file.

FOCUS creates a blank data source (.FOC) in the background.

The .foc file is stored in the application's directory.

Rebuilding a Data Source

The Rebuild tool provides a number of useful project management utilities. Rebuild enables you to restructure data sources, to reorganize data sources when a Master File is updated, to rebuild indexes, and to check the integrity of data sources.

Note: You can only use this utility with FOCUS data sources.

Procedure How to Use the Rebuild Utility

To open the Rebuild dialog box:

1. Choose *Utilities* from the Command menu, then choose *Rebuild* from the cascading menu. The Rebuild dialog box opens.
2. Select a Rebuild option. See *Rebuild Dialog Box* on page 5-3 and individual procedures for each of the Rebuild options.

If you make a change to a Master File in the Master File Editor and wish to rebuild the FOCUS data source immediately, choose *Rebuild database* from the File menu. This is an alternative to using the Rebuild dialog box.

Reference **Rebuild Dialog Box**

Choose *Utilities* from the Command menu, and *Rebuild...* from the Utilities cascading menu to display the Rebuild dialog box. The Rebuild dialog box has the following fields/options:

- Rebuild a disorganized file

This option can be used to perform the following functions:

- Re-optimize a FOCUS data source after a large amount of data has been added or deleted.
- Select specific segment instances to include in the data source, based on record selection criteria you specify.
- Reorganize a file to fit a new Master File

Reorganizes data in an existing FOCUS data source after you make changes to its Master File. Reorganizing a data source is performed in phases:

- Select *Dump the data* during the first phase of the reorganization process.
 - Select *Load the data* during the second phase of the reorganization process.
- See *How to Reorganize a Data Source to Fit a New Master File* on page 5-4.
- Index a field
- Builds or rebuilds the index for the specified field. Use this option to index an additional field that was not originally specified as an index field, or to change the index for a field. See *Rebuilding the Index* on page 5-5.
- Check the integrity of a file
- Checks the structural integrity of a data source. If FOCUS encounters an error during the check, it displays a message. See *Checking the Integrity of a Data Source* on page 5-5.
- Filename
- Contains the name of the data source to rebuild. Enter a data source name in the box, or click the *Browse...* button to open a dialog box and select the data source.
- Selection Criteria
- Specifies selection criteria for rebuilding a disorganized data source and reorganizing a data source to fit a new Master File. Only data that meets the selection criteria are included in the rebuilt data source.

Rebuilding a Disorganized File

This option in the Rebuild dialog box enables you to:

- Restructure and optimize a FOCUS data source after data has been added or deleted.
- Select specific segment instances for inclusion in the data source based on selection criteria you supply. For example, if you specify the following selection criterion

`INVOICE_DATE GT 990101`

FOCUS will omit invoices earlier than 99/01/01 from the rebuilt data source.

Reorganizing a Data Source to Fit a New Master File

Select this option from the Rebuild dialog box to reorganize data in an existing FOCUS data source after making changes to its associated Master File. A change might be the removal of a segment or field or the addition of a field at the end of a segment. For more information on the changes that you can and cannot make to Master Files, see *Describing Data With WebFOCUS Language*.

As when you rebuild a disorganized data source, you can specify selection criteria and reorganize only the data that meets those conditions.

Reorganizing a data source is performed in steps, which you must complete in the correct order. For the procedure to work, you must dump the existing data before you make any changes.

Procedure How to Reorganize a Data Source to Fit a New Master File

1. Place (dump) the data in a temporary workspace.
 - a. Select *Reorganize a file to fit new Master File* under Rebuild Options.
 - b. Enter the data source name in the File Name box, or click *Browse...* and select a data source from the list.
 - c. Enter any selection criteria in the Selection Criteria box.
 - d. Select *Dump the data* under Reorg Phase.
 - e. Click *OK*.
2. Make the changes to the Master File using the Master File Editor.
3. Create a new empty data source.
4. Load the data.
 - a. Repeat a-c in Step 1.
 - b. Select *Load the data* under Reorg Phase.
 - c. Click *OK*.

Rebuilding the Index

When you first create a Master File in the Master File Editor, you specify the fields that you want indexed. Sometimes, after data is entered, you may need to index an additional field that was not originally specified as an index field.

The first step is to alter the Master File to indicate that the field should be indexed. Altering the Master File does not actually create the index. To do this you must use the Rebuild utility after you index a field.

Procedure How to Index a Field After Data Is Entered

From the Master File Editor, select the field to be indexed, and then click the Index box on the General tab.

or

Open and edit the Master File as text in the Text Editor. For instructions on indexing a field as text, see *Describing Data With WebFOCUS Language*.

After you index a field you must rebuild the index. See *How to Rebuild the Index* on page 5-5.

Procedure How to Rebuild the Index

1. Select *Index a field* in the Rebuild dialog box.
2. Enter a data source name in the File Name box or click *Browse...* and select a data source from the list.
3. Enter the name of the field you want to index in the Field to Index box.
To index all the fields designated as index fields in that data source, enter an asterisk (*) in the Field to Index box.
4. Click *OK*.

The Rebuild utility rebuilds the data source, creating an index for all specified fields.

For more information on indexing fields, see *Describing Data With WebFOCUS Language*.

Checking the Integrity of a Data Source

It is rare for the structural integrity of a FOCUS data source to be damaged. Structural damage will occasionally occur, however, during a disk drive failure or if an incorrect Master File is used. In this situation, you can check the integrity of the Master File. Checking the integrity of a Master File performs the following essential tasks:

- It checks all pointers in the data source.
- Should it encounter an error, it displays a message and attempts to branch around the offending segment or instance. In this way, it recovers as much of the data source as possible.

Although checking the integrity reports on a good deal of data that would otherwise be lost, it is important to remember that frequently backing up your FOCUS data sources is the best method of preventing data loss.

Checking the Master File integrity will occasionally fail to uncover structural damage. If you have reason to believe that there is damage to your data source, though results from checking the integrity indicates otherwise, there is a second method of checking file integrity. This method uses the ? FILE and TABLEF commands. For more information, see *Describing Data With WebFOCUS Language*.

***Procedure* How to Check the Structural Integrity of a FOCUS Data Source**

Select *Check the integrity of a file* in the Rebuild dialog box.

If the Rebuild utility encounters an error during the check, it logs a message for you. You should then attempt to recover as much of the data source as possible or restore from backup.

CHAPTER 6

Creating Master and Access Files for Fusion Data Sources

Topics:

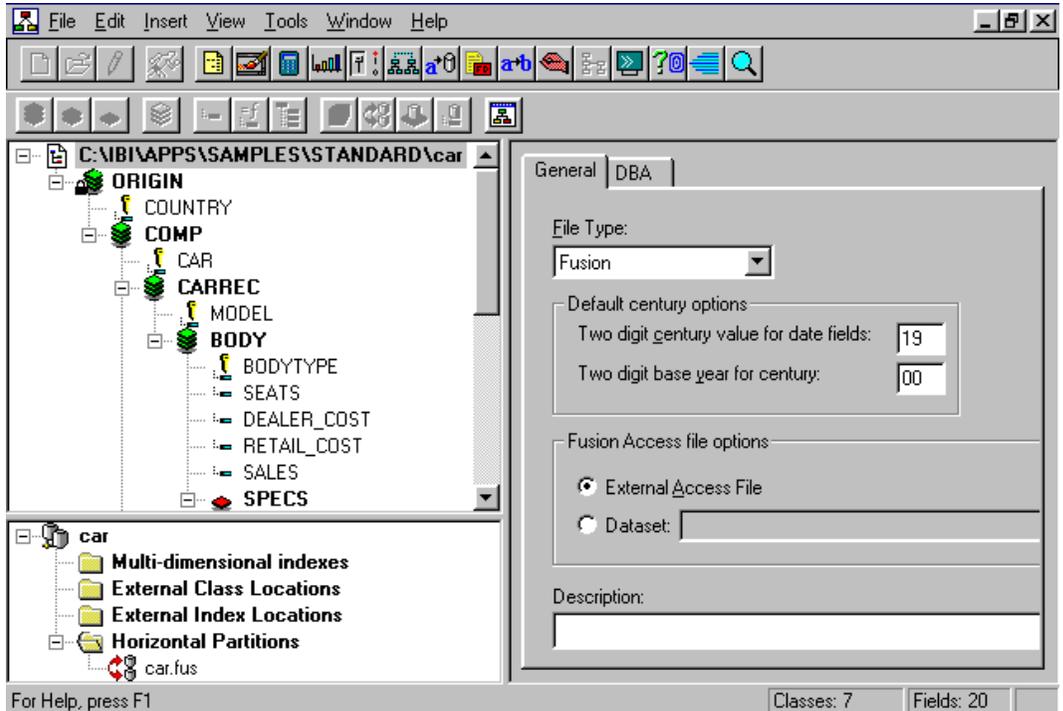
- Filetool Layout (Fusion Data Sources)
- Working With Master Files
- Adding Classes
- Adding Sections
- Adding Fields to a Class or Section
- Adding Virtual Fields to a Class or Section
- Adding Group Fields to a Class or Section
- Creating a New Cross-Reference (Fusion)
- Working With Fusion Access Files
- Setting Up Data Source Security (Fusion)

Fusion is a high performance multi-dimensional (MD) database whose unique MD index architecture extends the scope of high-speed multi-dimensional query performance. A Fusion data source offers benefits of high three-tier reporting and full integration with EDA and FOCUS architecture, and the ability to do multi-dimensional analysis on both detail and aggregate data. The Filetool enables you to create the Master and Access Files (metadata) you need to maintain local Fusion data sources, and report from Fusion data sources.

Before you attempt to use the Filetool to create and update Master and Access Files for Fusion data sources, see the *Fusion User's Manual*, which describes Fusion syntax in detail.

Filetool Layout (Fusion Data Sources)

When you select the Fusion file type, the Filetool adjusts to support the features and terminology you will need to build Fusion Master and Access Files. With Fusion selected, the Filetool looks as follows:



The Filetool window consists of the following items:

- **Master File Frame.** Provides a hierarchical view of a Master File and its contents. The tree hierarchy enables you to perform many standard Windows functions, such as expanding or collapsing levels, dragging and dropping classes, sections, and fields, and right-clicking for easy access to commonly performed tasks.
- **Access File Frame.** Provides a hierarchical view of the associated Access File, including its multi-dimensional indexes, horizontal and vertical partitions, and external class and index locations.

- **Properties Frame.** Contains tab dialog windows that provide various options depending on the item that is selected in the Master File or Access File frame. For example, when a Master File is selected in the Master File frame, the General and DBA tab dialog windows appear in the Properties frame. The General tab dialog window enables you to select Master File types and default century options and to associate the Master File with an Access File. The DBA tab dialog window enables you to set security options.
- **Master File Toolbar.** Enables you to perform many common Master File administration tasks, such as creating a new class (part-of class, subclass, or section) or field (including defined and group fields). It also enables you to create multi-dimensional indexes, horizontal partitions, external class locations, and external index locations.

Reference **The Master File Toolbar**

The following table describes the tool buttons on the Master File toolbar:

Button	Operation
	Defines a new part-of class in a Master File.
	Defines a new subclass in a Master File.
	Defines a new section in a Master File.
	Defines a new field in a Master File.
	Defines a new defined field in a Master File.
	Defines a new group field in a Master File.
	Defines a new multi-dimensional index in a Fusion Master File or Access File.
	Defines a new horizontal partition in an Access File.
	Defines a new external class location in a Fusion Master File or Access File.
	Defines a new external index location in a Fusion Master File or Access File.
	Graphically displays the layout of the selected Master File.

Working With Master Files

A Master File defines the structure and elements of a data source. Fusion stores the Master File in a separate file from the data. Whenever Fusion encounters a report requesting data from a data source, it first reads the data source's associated Master File in order to interpret the data.

Creating a Master File Shell

To create and edit a new Master File, you must first create a new Master File shell. When you create a new Master File shell, the Filetool creates a default class and field and assigns a name to each. You can change the default names for the Master File, class, and field at any time. To change a default name, double-click the default name and type a new name.

Procedure How to Create a Master File Shell (FUSION)

1. From an open project, right-click the *Master Files* folder and select *New* or choose *New* from the File menu. The New Master File dialog box opens.
2. Choose *FUSION* from the Suffix drop-down box. Type a name for the Master File in the text entry field.
3. Click *OK*.

The shell file opens in the Filetool.

Saving a Master File

You should save your Master File periodically to safeguard your work. You can save a Master File with the Save option after it is created. This option saves a Master File under the name that you specify in the Save As dialog box. It also saves an Access File, if one was created, under the name that you specify in the Browse dialog box presented for the Access File.

Note: If a Master File changes and is not saved, an asterisk appears after the top of the Master File window next to the name and directory path for the unsaved Master File. If you save a Master File after you make changes to it, the asterisk does not appear.

Procedure How to Save a Master File

In the Filetool window, do one of the following:

- On the File menu, select *Save*.
- Click the *Save* button on the Filetool toolbar.

Creating and Adding Data to a Data Source

When you save the Master File, you must create a blank data source. The data source contains the data for fields created in the Master File. Fusion creates the data source in the background and saves it in the directory specified in the Access File, or in the current directory if no Access File exists.

After creating the blank data source, you can load data into it with a MODIFY request, or a MAINTAIN request. Once you have populated the data source, you will be ready to use it in conjunction with the Master File in a report request.

Procedure How to Create a Data Source

Select *Create Database* from the File menu. The Console window opens showing that the data source was created.

Note: The Master File must be open in the Master File window to access the Create Database option.

Opening a Master File to View and Edit

You can quickly open an existing Master File to view or edit it. You can view a Master File as a file folder or branch hierarchical (top down) structure. The file folder hierarchical structure displays in the left pane when you open a Master File. It shows the directory path and the root class, followed by either fields or other classes with fields.

The branch structure shows the directory path, root class, and any other classes in that Master File. The branch structure does not show fields in that Master File; however, it provides a clearer view of the relationships between classes in the Master File.

To view and edit a Master File, it is recommended that you use the Master File window. However, you can also edit a Master File's characteristics in the Text Editor window.

If you opened the Master File in the Filetool to make changes, depending on the type of changes you made, you will need to perform a rebuild of the data source if a data source already exists.

Procedure How to Open a Fusion Master File

From an open project, right-click a Fusion Master File in the Master Files folder and select *Open* from the shortcut menu. The Fusion Master File opens in the Filetool.

Procedure How to Edit a Master File

Open a Master File. The Master File opens in the Filetool and you can begin to make your changes.

Procedure How to View the Layout of a Master File

Click *Show Layout Window* on the Master File toolbar. The Filetool shows the Master File in a branch structure.

Procedure How to Show Master File Information as Text

In an active Master File window, right-click the name of the Master File (located at the top of the Master File frame) and select *Show Master Text*. A window appears that displays the Master File as text. Click *OK* to close the window.

Closing a Master File

When you close a Master File, if you have not previously saved changes, Fusion asks if you want to save the file before you close it. If you close a Master File without saving, you lose all changes you did not save previously.

Procedure How to Close a Master File

Do one of the following:

- On the File menu, select *Close*.
- Click the *Close* button at the top right corner of the Filetool window.

You are prompted to save your changes before exiting. If no changes were made to the Master File, it closes without prompting you to save it.

Adding Classes

A class is a group of fields that are related to one another. Each class has a unique name and each can have its own key field.

Fusion recognizes three types of classes:

- **Root class.** The first class in a Fusion data source. It is the only class in a file that is referred to by a special name. All entries in descendant classes start from an entry in the root class.

You can find the root class directly below the Master File path. Fusion identifies this class with a lock symbol.

- **Part-of class.** A class that is a descendant of a higher (parent) class; the relationship between its parent class and it is one-to-many.
- **Subclass-of.** A class that has a one-to-one relationship with its parent class and cannot have descendent classes. A unique class is a logical extension of its parent class. When data values in a unique class are retrieved, Fusion treats them as if they were part of the parent class.

When you add a new class to a Master File, you first specify a name for the class. Like the Master File name, the class name can have up to eight characters. All characters and digits are permitted except for embedded blanks and special characters.

Except for the root class, you can change the type of class (if necessary). There are only two types of classes you can add to a Master File: the part-of class or the subclass-of class. When a class is added, the class type displays in the General tab.

Sorting by Key Fields

If you specify the class as a part-of class, you must set sorting criteria. Sorting criteria are based on the key fields identified in the class.

A key field is a field that uniquely identifies each class instance (collection of data values in the fields). For example, no two employees can have the same employee ID number, so you can use that field as a key field. A class instance can have more than one field that makes up the key; therefore, Fusion may use two or more field values to distinguish records. Key fields appear before all other fields in a class and are identified by a key symbol.

Fusion sorts records in a data source by key fields. If you specify more than one key field, Fusion sorts the records by the first key field, then the second, and so on.

Once you have specified one or more key fields, you can specify the order in which you want Fusion to sort the records. You can have Fusion sort records in ascending or descending order. You can also select not to impose a sort order.

Encrypting a Class

You can encrypt the data to scramble the field values of a class. This protects the class from examination by an unauthorized user. However, because there is a loss of processing efficiency when data is encrypted, encryption is used only in specific cases.

To encrypt a file at the class level, you must assign a DBA password before setting the Encrypt option on (see *Adding a DBA and User Password* on page 6-26). When the DBA password has been assigned, to ensure encryption of the class, you must turn the Encrypt option on before adding any records. If you add a record to a class before setting the Encrypt option on, that value will not be encrypted.

Once a class is encrypted, you can remove encryption only if you remove the class and recreate it without turning on the Encrypt option.

Procedure How to Add a Class

1. Select the parent class. In the case of a new Master File, select the root class, then perform one of the following actions:
 - Right-click and select *New*, then choose one of the following from the cascading menu: *Part-of Class* or *Subclass* (for Fusion Master Files) or *Parent* (for non-Fusion Master Files).
 - Click the appropriate *Class* button on the Filetool toolbar.
 - From the Insert menu, select *Part-of Class* or *Subclass* (for Fusion Master Files) or *Parent* (for non-Fusion Master Files).

In the left pane, the class icon is added beneath the last field in the Part-of class or root class. The General tab opens in the right pane.

2. Type a name for the class in the Class Name box.
3. Click the *Encrypt* box to encrypt the class, if encryption is desired.
For more information on encryption, see *Encrypting a Class* on page 6-7.
4. Select a class type: either *Part-of class* or *Subclass-of class*.
If you select *Subclass-of class*, you do not specify sorting criteria.
5. Select the sorting criteria for the Part-of parent class.
 - a. Specify the number of key fields.
 - b. Select one of the following:
 - Sort records in ascending order.
 - Sort records in descending order.
 - Do not sort records.
6. Once you have defined the class, you can define the fields that will populate the class.
See *Adding Fields to a Class or Section* on page 6-10.

Procedure How to Delete a Class

Right-click the class and then select *Delete*.

Note: You cannot delete a root class.

Procedure How to Encrypt a Class

1. Assign a DBA password (see *Adding a DBA and User Password* on page 6-26 for details).
2. Select the class in the left pane.
3. Select the *Encrypt* box next to the Class Name in the General tab.

Adding Sections

A section is similar to a class except that it holds infrequently used or accessed data fields, which are not loaded into memory unless specifically requested for in a query. You can add a section to an external class location to create a vertical partition. A vertical partition stores section data in a separate physical file, which saves space in the main data source and can be used to organize data across devices. Vertical partitions increase system optimization and Fusion's overall performance. For information on creating vertical partitions, see *Vertical Partitions* on page 6-24.

Procedure How to Add a Section

1. Select the parent class. In the case of a new Master File, select the root class and then perform one of the following actions:
 - Right-click and select *New* and then choose *Section*.
 - Click the *Section* button on the Filetool toolbar.
 - From the Insert menu, select *Section*.

In the left pane, the section icon is added beneath the last field in the Part-of class or root class. The General tab opens in the right pane. Notice that the *Unique section of parent class* radio button is selected. You can select another radio button to change a section to a class type. Also, since a section cannot contain a hierarchy, the sorting options are not available.

2. Type a name for the section in the Class Name box.
3. Click the *Encrypt* box to encrypt the section, if encryption is desired.

For more information on encryption, see *Encrypting a Class* on page 6-7.

Procedure How to Delete a Section

Right-click the section and then select *Delete*.

Procedure How to Encrypt a Section

1. Assign a DBA password. (See *Adding a DBA and User Password* on page 6-26 for details.)
2. Select the section in the left pane.
3. Select the *Encrypt* box next to the Class Name in the General tab.

Adding Fields to a Class or Section

When you add a field to a class or section, a field icon is placed below the class (or section) in the Master File tree and file properties are displayed in the right pane. You supply the information that defines the field in these file properties.

- **General.** You supply the field characteristics: the field name, field alias, field format, whether the field is indexed, and whether the field allows missing data.
- **Display.** You supply supplementary field information, such as title, help message, and description.
- **Accept.** You supply validation criteria (acceptable values) for a field. Validation criteria restricts the values a user can enter for the field.
- **Maxvalue.** You supply the maximum number of values the field may contain, if known.

You must supply at least a field name and a field format.

See the procedure *How to Add a Field to a Class or Section* on page 6-12 for restrictions on entering required and optional information.

Adding a Field Name

After adding a field to a class or section, you must assign a field name.

You should provide a unique field name of 1 to 66 characters, and the first character must be a letter. The field name appears as a column heading when you include the field in a report request against a Fusion data source, unless you have specified a title for the field. Avoid using embedded blanks and special characters if you plan to use the field in a calculation.

You can specify an alias for each field. An alias is a shorter, alternate name that identifies the field. Once assigned, you can use this alias as a synonym for the regular field name in a report request against a Fusion data source. The length and format rules are the same as those for field names, but aliases are usually brief names used to reduce typing. Fusion does not use aliases as column titles.

Selecting a Field Format

The field format describes the type and length of data as it is actually stored in the data source. You must specify a field format for every field you add. You assign a format based on the values that the field will hold. The field format specifies the following information:

- The field type, which indicates whether the field value will contain an alphanumeric, numeric, or date value.
- The field length, which determines the maximum number of positions an alphanumeric or numeric field value can contain.

- Edit options that affect how a numeric or date field value will appear in reports.
- Date format, internal format, and century options for date fields.

Identifying Missing Data

If a class instance exists but no data has been entered into one of its fields, that field has no value. Fusion indicates this absence of data as a null value or missing data. You use the Allow Missing Data option to instruct Fusion to enter a missing value for a field when read from a data source. If Fusion reads a field with a missing value when the option has been selected, it ignores that value when it performs an aggregating calculation, such as averaging. If the report specifies displaying a field, Fusion displays a special character that indicates a missing value.

Missing data is significant in reports, especially those that perform aggregating functions. You can allow missing data to be entered into or read from a field by activating the Allow Missing Data option in the General tab. When you activate this option, Fusion can distinguish a null value from an intentionally entered blank or zero.

Adding Supplementary Information to a Field

The title, help message, and description parameters are optional parameters you can supply for a field. These parameters make it easier for you to describe the field to users.

- **Title.** A field's title that appears on a report in place of the field name. Fusion uses the field name as the column title by default. The title can contain up to 64 characters.
- **Help message.** A one line text message that provides additional information about a field. This message can be up to 78 characters.
- **Description.** Provides information that will help you identify the data field. The description can be up to 44 characters long.

Controlling Acceptable Values for a Field

You can control the acceptable values by setting validation criteria for a field. If you set validation criteria for a field, your project will allow only certain incoming values for the field. If a user enters an unacceptable value for the field, a list of acceptable values will be displayed from which the user can make a selection.

The validation criteria that you can specify are:

- **None.** You do not want to supply validation criteria for the field. A user can enter any value (within the limitations of the field's format) for the field. This is the default setting.
- **List.** Supply a list of valid values. A user can enter only a value from this list.

- **Range.** Supply a range of valid values. For example, the range of valid values for an integer field might be from 100 to 200. A user can enter only a value that is within the range.
- **Find.** Supply file and field names that instruct Fusion where to search for a file and for a list of acceptable values within that file. You supply the field name of the data field that the validation criteria is being assigned, the file name of the target Fusion or FOCUS file where the field might be found, and the field name of the target data field that contains the validation criteria.

Note: Find is not an option for non-Fusion and non-FOCUS data sources.

Indexing a Field

You can have Fusion index the values of a field by activating the Index option when you add a field and before you add the data. An index is an internally stored and maintained table of data values and locations that enhance the performance of data retrieval. A Master File can have several associated indexes, but the combined total of indexes and classes cannot exceed 192.

You can turn on the index after adding data to a field. In this case, you must use the Rebuild Index option to create the index.

Procedure How to Add a Field to a Class or Section

1. In the hierarchical structure, select the class or section in which you want to add a field and then perform one of the following actions:
 - Right-click and select *New*, then choose *Field* from the cascading menu.
 - Click the *New Field* button on the Filetool toolbar.
 - Select *Field* from the Insert menu.

The Filetool displays the General, Display, and Accept tabs in the right pane.
2. In the General tab:
 - a. Type a name for the field in the Field Name input box (required).
 - b. Click the *Index* box if you want the field to be indexed.
 - c. Click *Allow Missing Data* if you want to instruct Fusion to enter a missing value for a field if no value exists.
 - d. Type an alias for the field in the Field Alias input box (optional).
 - e. Select a format type and then specify the length, the decimal place (if applicable), and any edit options for the field. The format type, length, and/or decimal place are required parameters; edit options are not. For more information about field formats, see *Creating Reports With Graphical Tools*.

3. Click the *Display* tab to include a column title, help message, or a description for the field. To include any of these characteristics, type the text in the appropriate input box.
4. Click the *Accept* tab to specify validation criteria. The validation criteria limit the values that a user can enter for the field. The default value is *None*, which indicates no validation criteria.

Select *List of Values* to specify a list of acceptable field values.

1. Type a value in the input box and click *Enter*.

Fusion Administrator adds the value to the list box.

2. Continue to type values and add them to the list box.

Select *Range of values* to specify a range of acceptable field values.

1. Type the minimum range value in the *From* input box.
2. Type the maximum range value in the *To* input box.

To specify a file that contains the values, select *Find in file*.

1. In the *Field Name* list box, select the field whose valid values you are looking for.
2. In the *Filename* input box, type the name of the target file that contains the valid values. You can also click the *Browse* button to find the target file.
3. In the target *Field Name* input box, type the name of the field that contains the acceptable values within the file.
4. Once you have supplied information for the required parameters and any optional parameters, the field definition is complete. You can now add other fields to the current class, add fields to another class, or create a new class.

Procedure How to Delete a Field From a Class or Section

Right-click the field and then select *Delete*.

Adding Virtual Fields to a Class or Section

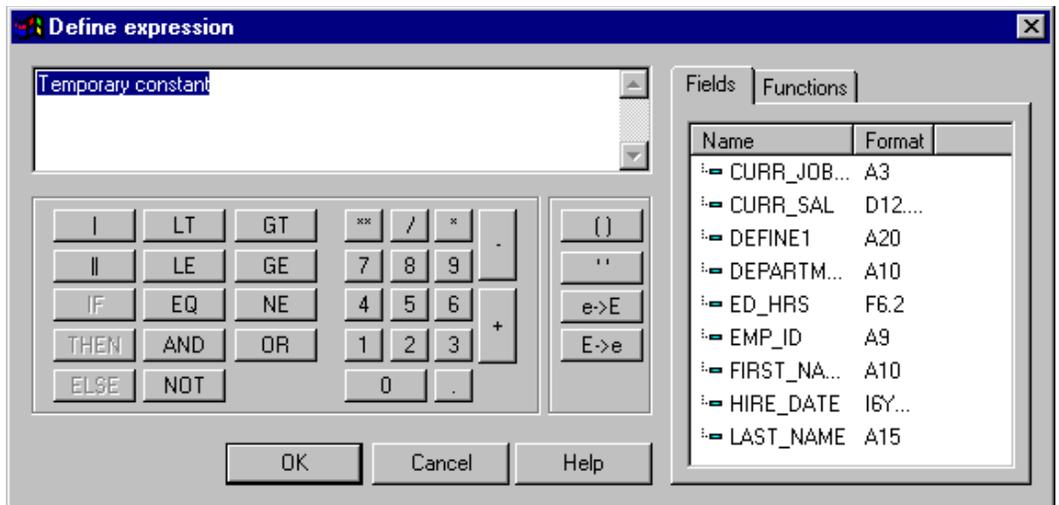
A virtual field is a field whose value is not stored in the data source but can be calculated from the data that is there. You create a virtual field in your Master File for reporting purposes. The field is available whenever a user accesses the corresponding data source. This feature is convenient when you want to use a virtual field in many different report requests that use the same data source; it saves you the effort of defining the field in each request.

The procedure for adding a virtual field to a Master File is similar to the procedure used to add any field to a Master File. You must specify a field name, an expression, and a field format for the virtual field.

The difference between adding a virtual field and a regular field is that you must define the field by using at least one other *real* field that belongs to the same class or section. You use this *real* field to build an expression that defines the values a virtual field will hold. An expression enables you to combine fields, constants, predefined functions, and operators into one statement that produces a single value. For more information about defining fields, see *Creating Reports With Graphical Tools*.

Defining Expressions for Virtual Fields

You can type the syntax for the expression directly into an input box, or you can access the Define Expression Assistant, which will help you build the field's expression.



The Define Expression dialog box displays a list of available fields, functions, and logical and mathematical operators you can use to build the syntax for the expression.

As with any other field, you can also specify the optional parameters: title, help message, description, and validation criteria. See *Adding Fields to a Class or Section* on page 6-10 for information.

Procedure How to Add a Virtual Field to a Class or Section

1. In the hierarchical structure, select the class or section in which you want to add a temporary field, then perform one of the following actions:
 - Right-click and select *New*, then choose *Defined field* from the cascading menu.
 - Click the *New Defined Field* button on the Filetool toolbar.
 - Select *Defined Field* from the Insert menu.

The Filetool displays the General, Display, and Accept tabs in the right pane.

2. In the General tab:

Type a name for the field in the Field Name input box (required).

- a. Click *Allow Missing Data* if you want to instruct Fusion to enter a missing value for a field.
- b. Type the syntax for the expression in the Expression input box (required). To create an expression using the Define Expression Assistant, click the *Assist* button to open the dialog box.

When you have completed the expression, click *OK* to exit the Define Expression dialog box and save it.

The expression will display in the Expression input box.

- c. Select a format type and then specify the length, the decimal places (if applicable), and any edit options for the field. The format type, length, and/or decimal places are required parameters; edit options are not. For more information about field formats, see *Creating Reports With Graphical Tools*.
3. Click the *Display* tab to include a column title, help message, or a description for the field. To include any of these characteristics, type the text in the appropriate input box.

Once you have supplied information for the required parameters and any optional parameters, the field definition is complete. You can now add other fields to the current class, add a field to another class, or create a new class.

Adding Group Fields to a Class or Section

You can assign a unique name to a group of multiple fields to create a group field. A group field should be created if multiple fields exist that can be logically grouped together but that do not warrant a separate class or section. A group field provides an efficient means for grouping similar fields that will be accessed as a single unit.

Procedure How to Add a Group Field to a Class or Section

1. In the hierarchical structure, select the class or section in which you want to add a group field and then perform one of the following actions:
 - Right-click and select *New*, then choose *Group Field* from the cascading menu.
 - Click the New Group Field button on the Filetool toolbar.
 - Select *Group Field* from the Insert menu.

The Filetool displays the General and Display tabs in the right pane.

2. In the General tab, type a name for the group field in the Group Name input box (required).

Notice that the default format is A40 and the field names in the group appear in the Fields Within Group box at the bottom of the tab window.

3. Click the *Display* tab to include a column title, help message, or a description for the field. To include any of these characteristics, type the text in the appropriate input box.
4. Click a field in the group field hierarchy and supply the required information in the General, Display, Accept, and Maxvalue tab windows. For information about these tab windows, see the procedure *How to Add a Field to a Class or Section* on page 6-12.

Once you have supplied information for the required parameters and any optional parameters for each field, the group field definition is complete. You can now add other fields (or group fields) to the current class or section, add fields to another class or section, or create a new class or section.

Procedure How to Add a New Field to a Group Field (Fusion)

Click the group field to which you want to add a new field and do one of the following:

- Right-click and select *New*, then choose *Field* from the cascading menu.
- Click the *New Field* button on the Filetool toolbar.
- Select *Field* from the Insert menu.

The Filetool displays the General, Display, and Accept tabs in the right pane. Supply the required information in each of the tab windows. For information about these tab windows, see the procedure *How to Add a Field to a Class or Section* on page 6-12.

Procedure How to Add an Existing Field to a Group Field (Fusion)

1. Click the field you want to add to the group field.
2. While holding the left mouse button down, drag the field, and drop it on the group field name.

The field is added to the group field.

Procedure How to Delete a Group Field From a Class or Section

Right-click the group field, then select *Delete*.

Procedure How to Delete a Field From a Group Field (Fusion)

Right-click the field, then select *Delete*.

Creating a New Cross-Reference (Fusion)

To report from two separate data sources with corresponding data types and values in one or more fields use the New Cross-Reference wizard to create a cross-reference. A cross-reference identifies matching instances from the two files based on their common fields. Once the cross-reference has been created, Fusion will retrieve matching data from the second (target) file when it retrieves a class instance from the first (source) file. In the Filetool, a cross-reference wizard will guide you through the process of creating a cross-reference. You must select the host field, target field, and the type of cross-reference you want.

There are two types of cross-references that you can choose to create: a one-to-one cross-reference or a one-to-many cross-reference. A one-to-one cross-reference creates a unique relationship between the source and target classes, meaning any instance of the source class can have at most one matching instance in the target class. If multiple matching instances exist in the target file, Fusion retrieves only one. With a one-to-many cross-reference, a non-unique relationship is created between the source class and target class resulting in the possibility of multiple matching instances in the target class.

The cross-reference wizard allows you to indicate whether to activate the Remembered option or Limit to current class option for the cross-reference. The Remembered option stores the locations of all matching target instances in the source data source. The Limit to current class option limits the cross-reference to the named target class, therefore not involving the entire cross-referenced structure in the logical data source.

Procedure Using the New Cross-Reference Wizard (Fusion)

1. Click on the host class or field in the Master File for which you wish to create a cross-reference.
2. Click on the *New Cross-Reference* button on the Master File toolbar to activate the wizard.
3. The wizard will ask you to enter the information discussed above through a series of windows. Click *Next* or *Back* to move forward or backward, respectively, through these windows.

Note: If you are creating a new Master File, the *New Cross-Reference Wizard* button on the Master File toolbar will not be active until you save the Master File on a server.

Working With Fusion Access Files

An Access File provides comprehensive metadata management for all data sources. An Access File describes how to locate, concatenate, join, and select the appropriate physical data sources for retrieval requests against one or more Fusion data sources.

The Filetool enables you to create Access Files for Fusion data sources. If you create a Fusion Master File, the Access File is located in the same directory as the Master File and its structure displays in the Access File frame.

An Access File is required to create a horizontal partition. To create a multi-dimensional index, an external class location, or an external index location an Access File is recommended but not required. If you create a multi-dimensional index, an external class location, or an external index location without an Access File, the default name for the index or location is used and its physical files are stored in the same location as the Master File.

For more information on Fusion Access Files, see the *Fusion User's Manual*.

Procedure How to Create a Fusion Access File

1. In an active Master File window, click the Master File's name and directory path, located at the top of the Master File frame.
2. In the Properties frame, click the *General* tab.
3. In the Fusion Access File Options section, click the *External Access File* radio button.
4. A message appears stating that an external Access File requires a horizontal partition and one will be created for you. Click *Yes* to continue.

The Filetool automatically creates, names, and associates an Access File and horizontal partition for the selected Master File. To change the name of the horizontal partition, click the horizontal partition's name and then click it again. A cursor appears, allowing you to type either a new name, the fully qualified path and name, if the data source will reside in a location other than where the Master and Access Files reside, or data set name for the data source.

Procedure How to Remove All Fusion Access File Information

In an active Master File window, right-click the name of the Access File (located at the top of the Access File frame) and select *Remove All Access Info*. The Access File and its contents (multi-dimensional indexes, partitions, and external locations) are deleted.

Procedure How to Show Fusion Access File Information as Text

In an active Master File window, right-click the name of the Access File (located at the top of the Access File frame) and select *Show Access File Text*. A window appears that displays the Access File as text. Click *OK* to close the window.

Changing a Fusion Access File

You can change a Master File's association with an Access File and replace it with another available Access File. When you change an Access File, its association with the Master File is removed and replaced by that of another Access File; however, the original Access File is not deleted. The physical file still exists on the server and can be used, or associated, with other Master Files.

Procedure How to Change a Fusion Access File

1. In an active Master File window, select *Change Access File* from the File menu.

A list of available Access Files on the current server appears.

2. Select the Access File you want to replace the current one with and click *Open*.

The Access File you selected replaces the current one.

Multi-Dimensional Indexes

A multi-dimensional index uses dimensions and all of their hierarchical relationships to point to specific facts in a Fusion data source. The multi-dimensional index is one of the features that gives Fusion its superb retrieval performance.

To create a multi-dimensional index that has one partition, an Access File is not required and the multi-dimensional index file is saved in the same directory as the Master File. If the multi-dimensional index contains more than one partition or if you want to store it in a directory other than where the Master File resides, you must first create an Access File. For more information about Fusion multi-dimensional indexes, refer to the *Fusion User's Manual*.

Procedure How to Create a Multi-Dimensional Index

1. In an active Master File window, select the *Multi-dimensional Indexes* folder and do one of the following:

- Right-click the *Multi-dimensional Indexes* folder and select *New Multi-dimensional Index* from the menu that appears.
- Click the *New Multi-dimensional Index* button on the Master File toolbar.
- Select *Multi-dimensional Index* from the Insert menu.

2. Type the name of the multi-dimensional index in the Index Name entry box, located in the General tab dialog window of the Properties frame.

Note: You can accept the default index name by clicking another item in the Access File frame.

3. Select the class with which the index is primarily associated from the Class Association drop-down selection list. The list contains all available classes in the Master File frame.

Note: The class that is associated with a multi-dimensional index should contain the majority of relevant facts as compared to other classes in the data source.

4. You can add or remove partitions by clicking the *Partitions* tab, selecting a partition, and clicking the *Add* or *Remove* buttons.

Note: To add data to an existing multi-dimensional index, the index must have at least two partitions. Also, a partition name can include a fully qualified path (including the file name) to store the multi-dimensional index's files in a location other than where the Master and Access Files reside.

Procedure How to Add a Dimension to a Multi-Dimensional Index

1. In the Master File frame's tree hierarchy, click the field you want to add to the multi-dimensional index.
2. While holding the left mouse button down, drag the selected field down to the Access File frame and do one of the following:
 - To add a dimension that is not hierarchical within the multi-dimensional index, drop the field on the multi-dimensional index's name.
 - To add a dimension that is a part of another dimension (hierarchical), drop the field on the name of the dimension that is above it in the hierarchy.

Procedure How to Delete a Multi-Dimensional Index or Dimension

In an active Master File window, select the multi-dimensional index or dimension you want to delete and do one of the following:

- Right-click the multi-dimensional index (or dimension) and select *Delete* from the menu that appears.
- Click the *Delete* button on the Filetool toolbar.
- Select *Clear* from the Edit menu.

Note: Since a multi-dimensional index resides outside the data source, you do not need to rebuild the data source if you delete the multi-dimensional index's references in the Master and Access Files.

External Class Locations

An external class location stores the data for a specific class in a separate physical file. An external class location can be used, for example, when disk space is unavailable for the entire data source and you want to store data for a data source on separate physical drives. Although it is not required, you can associate an external class location with an Access File.

Procedure How to Create an External Class Location

1. In an active Master File window, select the *External Class Locations* folder (located in the Access File frame) and do one of the following:
 - Right-click the *External Class Locations* folder and select *New External Class Location* from the menu that appears.
 - Click the *New External Class Location* button from the Master File toolbar.
 - Select *External Class Location* from the insert menu.
2. Type the name of the external class location in the *Location Name* entry box, located in the General tab dialog window of the Properties frame.

Note: You can accept the default name by clicking another item in the Access File frame or you can specify a fully qualified path and file name to store the data in a location other than where the Master and Access Files reside, or data set name.

Procedure How to Add a Class to an External Class Location

1. In the Master File frame's tree hierarchy, click the class you want to add to the external class location.
2. While holding the left mouse button down, drag the selected class down to the Access File frame and drop it on the desired external class location name.

Procedure How to Delete an External Class Location

In an active Master File window, select the external class location you want to delete and do one of the following:

- Right-click the external class location and select *Delete* from the menu that appears.
- Click the *Delete* button on the Filetool toolbar.
- Select *Clear* from the Edit menu.

Procedure How to Delete a Class From an External Class Location

In an active Master File window, select the class you want to delete and do one of the following:

- Right-click the class and select *Delete* from the menu that appears.
- Click the *Delete* button on the Filetool toolbar.
- Select *Clear* from the Edit menu.

External Index Locations

An external index location stores the data for a specific index in a separate physical file. An external index location can be used, for example, when disk space is unavailable for the entire data source and you want to store data for a data source on separate physical drives. Although it is not required, you can associate an external index location with an Access File.

Procedure How to Create an External Index Location

1. In an active Master File window, select the *External Index Locations* folder (located in the Access File frame) and do one of the following:
 - Right-click the *External Index Locations* folder and select *New External Index Location* from the menu that appears.
 - Click the *New External Index Location* button from the Master File toolbar.
 - Select *External Index Location* from the Insert menu.
2. Type the name of the external index location in the Location Name entry box, located in the General tab dialog window of the Properties frame.

Note: You can accept the default name by clicking another item in the Access File frame or you can specify a fully qualified path and file name to store the data in a location other than where the Master and Access Files reside, or data set.

Procedure How to Add an Indexed Field to an External Index Location

1. In the Master File frame's tree hierarchy, click the indexed field you want to add to the external index location.
2. While holding the left mouse button down, drag the selected indexed field down to the Access File frame and drop it on the desired external index location name.

Procedure How to Delete an External Index Location or Indexed Field

In an active Master File window, select the external index location or indexed field you want to delete and do one of the following:

- Right-click the external index location (or indexed field) and select *Delete* from the menu that appears.
- Click the *Delete* button on the Filetool toolbar.
- Select *Clear* from the Edit menu.

Horizontal Partitions

Unlike a multi-dimensional index and an external class or index location, a horizontal partition requires an Access File. In fact, whenever you create an Access File, a default horizontal partition is automatically created for you.

A horizontal partition separates the data source into separate files. This separation provides a simple way to maintain historical data and can be based on user-selected categories, such as year or region. Separate partitions remain one logical data source and Fusion, using the information provided in the predicates, selectively accesses only those partitions that satisfy each query. For more information on horizontal partitions, see the *Fusion User's Manual*.

Procedure How to Create a Horizontal Partition

1. In an active Master File window, select the *Horizontal Partition* folder and do one of the following:
 - Right-click the *Horizontal Partitions* folder and select *New Horizontal Partition* from the menu that appears.
 - Click the *New Horizontal Partition* button on the Master File toolbar.
 - Select *Horizontal Partition* from the Insert menu.
2. Type the name of the partition in the File Name entry box, located in the General tab dialog window of the Properties frame. You can type a fully qualified path and file name so that Fusion puts the data source in a place separate from the Master and Access Files, or data set.

Note: You can accept the default partition name by clicking another item in the Access File frame.
3. You can partition data based on an expression. To do so, click the check box next to *Data is partitioned based on expression...* and do one of the following:
 - Click the *Assist* button to create an expression with the Assist Wizard.
 - Type the expression in the text box below the expression check box.

Procedure How to Delete a Horizontal Partition

In an active Master File window, select the horizontal partition you want to delete and do one of the following:

- Right-click the horizontal partition and select *Delete* from the menu that appears.
- Click the *Delete* button on the Filetool toolbar.
- Select *Clear* on the Edit menu.

Caution: If data exists in a partition that you delete, the data and its references in the associated Master and Access Files will be permanently lost. The same is true if this partition's data was built into a multi-dimensional index.

Procedure How to Remove All Horizontal Partitions

In an active Master File window, right-click the *Horizontal Partitions* folder and select *Remove All Partitions* from the menu that appears.

Vertical Partitions

A vertical partition is a section whose data is stored in a separate physical file (an external class location). A vertical partition separates infrequently accessed pieces of data source records from the rest of the data, which minimizes retrieval overhead and memory usage. It can also organize data across devices for system optimization. For more information about vertical partitions, refer to the *Fusion User's Manual*.

Procedure How to Create a Vertical Partition

To create a vertical partition, you must first create an external class location and a section. For information on creating an external class location, see *External Class Locations* on page 6-21. For information on creating a section, see *Adding Sections* on page 6-9.

1. In the Master File frame's tree hierarchy, click the section you want to add to the external class location.
2. While holding the left mouse button down, drag the selected section down to the Access File frame and drop it on the desired external class location name.

Procedure How to Delete a Vertical Partition

In an active Master File window, select the vertical partition you want to delete and do one of the following:

- Right-click the vertical partition and select *Delete* from the menu that appears.
- Click the *Delete* button on the Filetool toolbar.
- Select *Clear* from the Edit menu.

Setting Up Data Source Security (Fusion)

Fusion data source security provides control over data source access. Although you set security in the Master File, it applies to the data source. To prevent unauthorized viewing and editing of a Master File, you must encrypt the Master File. For more information on encrypting a Master File, see *Encrypting and Decrypting a Master File* on page 6-26.

For each data source, security can be maintained at two different levels:

- **Database Administrator Level.** You specify the database administrator (DBA) password for the data source. The DBA has unlimited access to the data source.
- **User Level.** You specify the DBA and user passwords for the data source. The user password represents a user who has access to that data source. Each user's security can be limited even further by specifying a type of file access and/or by restricting access to classes, fields, or field values.

Once a user password has been established, you can apply the same restrictions to multiple users.

When the DBA or user no longer needs access to the data source, you can delete their security.

Before adding any type of security to a data source, the database administrator must be aware of certain DBA guidelines, outlined in the following section.

DBA Guidelines

You can ensure that the security restrictions you place on data sources are correct by adhering to the following guidelines:

- Every file with access limits must have a DBA password.
- No class, field, or field value restrictions may be specified at the database administrator level. The database administrator should have unlimited access to the data source and all cross-referenced data sources.
- Once security restrictions have been applied, the database administrator should conduct thorough testing of every restriction before the data source is used. It is particularly important to check field values to make sure they do not contain errors. If they are in error, user access to the fields' data will be unnecessarily restricted.
- All groups of cross-references data sources must have the same security restrictions.
- You must have a DBA password to encrypt and decrypt or restrict existing data sources.
- The database administrator can change any type of security restriction.
- Access levels affect which Fusion functions users can issue. The database administrator must consider what commands that user will need. If a user does not have access rights to use a given function, that user will receive an error message.

Adding a DBA and User Password

The DBA password identifies the database administrator. Only the database administrator has complete access to the data source and can set up or change security restrictions for individual users. Also, only the database administrator can encrypt (scramble) or decrypt (unscramble) a Master File (see *Encrypting and Decrypting a Master File* on page 6-26).

The user password identifies the users who have access to the data source. When you specify a user password, you must also set at least the type of file access. If the user password is not defined in a Master File, the user is denied access to that data source.

The DBA file name and user passwords can each contain up to eight characters. You assign the DBA and user passwords on the DBA tab, which appears when you click the Master File path of the hierarchical structure in the left pane. Once you have logged a password the DBA file and Users fields will become active. At this point either a DBA file name can be entered in the DBA file field or User specified from the Users list. When a DBA file name is entered the Users field becomes inactive and conversely when a User is specified the DBA file field becomes inactive.

When security is specified, the database administrator or user must enter a password to get access to the data source.

Encrypting and Decrypting a Master File

You may use the Encrypt and Decrypt options to scramble and unscramble some or all of the contents of a Master File from viewers. When you encrypt Master Files, they are secure from unauthorized examination.

Encryption of the Master File scrambles the entire contents of that Master File so it is unreadable. When you encrypt a Master File, you can also decrypt it. Decrypting unscrambles the contents of the Master File to its readable state.

Before you can encrypt or decrypt any Master File or class, you must first specify the DBA password. If you do not specify a DBA password, you will not be able to encrypt or decrypt a Master File.

Within a Master File, you can encrypt a class. For details, see *Encrypting a Class* on page 6-7.

When you assign a user password, Fusion activates the option for specifying the type of file access and access restrictions. You must specify at least the type of access the user is permitted to have for the data source. The type of file access can be specified in the File Access group on the DBA tab. In this group, there are four file access options:

- **Read.** Allows the user only to read (to view) the data source.
- **Write.** Allows the user only to write (to add or to make changes) to the data source.
- **Read/Write.** Allows the user to read and write to the data source.
- **Update.** Allows the user to update (to make changes to) existing field values in the data source.

The type of file access determines what a user can do to the entire data source. If you specify only the type of file access without restricting access to classes, fields, or field values, the user will have unlimited access to the data source.

If you want the user to have less access to the data source, you can restrict access even further to classes, fields, and/or field values.

Restricting Access to Classes, Fields, and Field Values

You can restrict access to classes, fields, and field values in a data source by specifying access restrictions for a user. When you specify what is to be restricted—class, field, and/or field value—you can then specify the type of access that will be restricted. For fields, you can also specify whether you want the field to be displayed. For field values, you are required to enter a test condition.

- **Classes.** You specify the type of access for individual classes or all classes.
- **Fields.** You specify the type of access for individual fields or all fields. You can also specify not to display the data in that field using NoPrint. If you specify NoPrint for a field, the data will appear as blanks for alphanumeric format or zeros for numeric format whenever the user tries to retrieve it.
- **Field Values.** You specify the type of access (read or write) and the test condition. The user is restricted to using only those values that satisfy the test condition.

Procedure How to Set Up Security for the Database Administrator

1. Click the *Master File* path on the hierarchical structure.
The General and DBA tabs open.
2. Click the *DBA* tab and then type the DBA password in the DBA Password box.
Note: When the password is created and the cursor is in that field, you can right-click and use the edit options to undo, select all, cut, copy, paste, or delete the password.
3. Save the Master File with the DBA password.

Procedure How to Set Up Security for the User

1. Set up security for the database administrator.
2. Tab to the Users box and then type the User password and hit the Enter key to add the user.
The File Access, Access Restrictions, and Same Restriction options are activated.
Note: When the password is created and the cursor is in that field, you can right-click and use the edit options to undo, select all, cut, copy, paste, or delete the password.
3. Select the type of file access from the File Access group.

4. Select the type of restriction—class, field, and/or field value—from the Access Restrictions group, then select the type of access for each. See *Restricting Access to Classes, Fields, and Field Values* on page 6-27 for details.
5. Save the Master File with the user password and restrictions.

Procedure **How to Encrypt a Master File**

1. On the DBA tab, type the DBA password in the DBA Password box.
2. Save the Master File with the DBA password.
3. Open the Console window.
4. Submit the following SET command:

```
SET PASS=dbapass
```

5. Submit the following ENCRYPT command

```
ENCRYPT FILE fname
```

where:

```
fname
```

Is the name of the Master File you want to encrypt.

The Master File is encrypted.

Procedure **How to Decrypt a Master File**

1. Open the Console window.
2. Submit the following SET command:
3. Submit the following DECRYPT command

```
SET PASS=dbapass
```

```
DECRYPT FILE fname
```

where:

```
fname
```

Is the name of the Master File you want to decrypt.

The Master File is decrypted.

Applying Security Restrictions for Multiple Users

You can specify restrictions for one user and then apply the same restrictions to other users. This technique is useful when you want to set the same restrictions for a group of users.

Procedure How to Apply Previously Defined Restrictions to Another User

1. On the DBA tab, tab to the Users group and type the new user password; press the Enter key.
The Same Restrictions group is activated.
2. In the Same Restrictions group, click the *User Same as...* box to show a check mark.
3. Click the arrow on the drop-down combo box and then select the user with the security restrictions that would apply to the new user.

Security restrictions from the user in the *User Same as...* box are applied to the new user. You can apply the security restrictions to other users by repeating steps 1 to 3.

Note: You must have created at least one user security restriction to apply security restrictions to multiple users.

Deleting a DBA or User's Password

You can delete a DBA or user's security when it is no longer needed.

Procedure How to Delete a User's Password

1. Do one of the following:
 - On the DBA tab, type the user password in the Users box.
 - Double-click on the user name so that it displays in the Users box.
2. Press the Delete key on the keyboard.
The DBA dialog box opens.
3. Select Yes.

If you delete the user whose security restrictions you have applied to other users, you must reset security restrictions for all users attached to the user you deleted.

Procedure How to Delete a DBA Password

Deleting a DBA's security will delete all users' security for that Master File.

1. On the DBA tab, highlight the DBA password in the DBA password box.
2. Press the Delete key on the keyboard.
The Warning dialog box opens.
3. Select OK.

Setting Up Data Source Security (Fusion)

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